A Thesis
entitled
What Qualities of Mind, Personality, and Environment affect Creation and Innovation?

by

Kristina Vasilakis

Submitted to the Graduate Faculty as partial fulfillment for the Master of Liberal Studies

Degree

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The University of Toledo
December 2010
An Abstract of

What Qualities of Mind, Personality, and Environment affect Creation and Innovation?

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December 2010

The topic of research in this thesis is evaluating and exploring the possible explanations for creativity and innovation in individuals. Since there is not a scientifically proven genetic reason for creativity, this paper is based upon evaluating several theories and ideas that psychologists, scientist, behaviorists and doctors have divulged regarding this topic. The main areas of focus in this thesis are to discover what areas of the mind, of personality and of environment influence the progress or repression of creative thought and innovative discovery. The findings of this research however are vague, as there is no conclusive result to date on this topic. To do this research, I sought to find a definition of creativity and innovation, evaluated scientific theories of creativity, examined environmental factors regarding some of the most influential creators in history and explained what aspects of the mind assisted in creative and innovative thought process. Through this research, I have found that the most prominent factor contributing to one’s creativity are environmental factors. The one consistent agreeable contributing factor to creativity and innovation was environment. Regardless of scientific findings or psychological findings- environmental factors are always a large influence.
The results of this research do not produce a conclusive answer to a question, but instead offer several variations of explanations for the topic of this research. In order to understand creativity and innovation, all the areas of possibility must be explored and is done so in this study.
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Preface

Neither creativity nor innovation has a firm definition or scientific explanation for why they exist. “Creative” is a subjective term used to describe individuals or products that are exceptionally excellent in an area that often requires something to be made from nothing. Creativity and innovation can usually be considered a quality of an individual or a trait. This trait though, is subjective to the one who is viewing and is loosely based upon opinion. What one group of people may consider being creative could vastly vary from that of an alternative group? Thus, creativity and innovation are often based on opinions of an audience.

However, it is largely agreed upon that being a creator or inventor is something to be respected. History and society have both been shaped primarily by creators and innovators who consistently sought to improve the quality of life for men and women. Whether it be producing a piece of artwork or inventing the wheel, creators in the human race have been steadily delivering products and designs that change the scope of the way humans view the world and operate in it. The unique thing about humans that separates us from other species is our ability to see a product or design and then take it and improve on it and keep revolutionizing that model. Creation and innovation both contribute largely to this process of implementation and improving of a product.
Creation and innovation are usually seen as two of the same. In most of the theories that this thesis explores, it is a common belief that creation cannot happen without innovation and vice-versa. The creation vs. innovation is much like a chicken and the egg type situation. If one creates, can he or she innovate? If one innovates does he or she automatically create? Those questions have yet to be answered when it comes to this topic, but what research has attempted to do is to offer reasons and explanations for where an idea is hatched in the brain and how it comes into fruition and develops into a product, and how that product is turned into a useful invention for society in the time period it is presented.

There is validity and progress in this area of study, because researchers can view the environmental, psychological and intellectual pasts of some notorious creators and compare and contrast those congruencies with modern creators. The research in this area however, contradicts itself many times. When one research study says that genetics influences creation and innovation, another will disagree supported by scientific evidence. This topic does not have a sure answer and that is why there are varying theories and explanations. The comparative theories though do provide some insight into where a creator might be coming from and where his or her innovations are going. To understand the present, we must understand the past and that logic can dutifully be applied in this subject area as well.

A large number of creations are based on the works of others and inspirations from peers and mentors. It is probable that creators breed creators and inspire other innovators. Influence from other humans is something that this research does discover and expand upon. Again, although there is no concrete evidence to why one might
specifically create or innovate, there are several profound theories as to how the product started in an innovation process and where it came from.

In chapter 1, I will be addressing the different types of definitions for creativity and innovation and the characteristics that an individual must possess in order to be considered a creator or innovator. However, since there is no definite set of characteristics or personality traits that define creativity, I am instead going to utilize signifiers that might aid in explaining what creativity is and where it comes from. In chapter 2, I will be evaluating possible scientific explanations for creativity and innovation in the human brain. I am going to identify through research and varying theories about why creativity may exist in the human brain through psychological and evolitional factors as well as explain how those two factors may have worked together in forming creative and innovative thought. In chapter 3, I will be discussing innovation and inventing. Chapter 3 explains the difference between creating and inventing and why some are more exceptional inventors than others as well as how inventing and creativity are directly correlated. I discuss in this chapter, about how the process of innovation is correlated with creativity, which is similar to how how art and science are correlated and those similarities are analyzed. After the process of inventing is explained, it is important to identify causes that aid in promoting a creator or innovator in his or her environment. In chapter 4, I discuss how important environmental factors are crucial to understand for one who is attempting to define creativity and innovation. In order to use environment as a determinant of influence on creators, all areas of environment must be evaluated. In chapter 4, I discuss some of the most well-known creators’ childhoods, traumatic experiences, their mentors, and travel experiences and
how they affected them. In discussing the environmental factors of creativity, I also
discuss how there are similarities between some of the greatest creators and innovators
in history and their environmental factors. Although the differences are discussed as
well, it is the similarities in chapter 4 that provides evidence that environments are a
large signifier when determining what affects creation and innovation.

In chapter 5, I discuss how the mind itself is also responsible for creativity and
innovation whether it is through thought processes rooted in religion, education or
behavior, the mind and its thought processes is secondary to environment as a
determinant of creativity and innovation. I also discuss the difference between right-
brained and left-brained activity and how it relates to creativity and innovation. In
chapter 6, I write how modern creators are used in today’s society. It is fairly easy to
examine artists and creators of past generations because society was developing at such
a rapid pace, so the challenge in identifying modern creativity is to see where creators
are most utilized and how society values them. In chapter 6 I use graphic designers as
an example of modern day artists who are valued by society and who make a productive
living using their creative and innovative skills. When concluding, I end with some
findings from the research in a summary. Because this topic is rather broad and
inconclusive, there is only speculation and theories as to creativity and innovation. With
all the earlier chapters considered, a conclusion is made based on the findings that
several factors influence creativity and that the definition of creation and innovation is
constantly changing.
Chapter 1

Defining and Exploring Definitions of Creativity and Innovation

All usefully creative people need to not just originate novel ideas; they must also retain the capacity to more objectively appraise these, and furthermore grasp how they will be perceived by others (Persaud 2007).

Creativity in human beings is not defined by one scientific theory, communicative behavior, interaction or behavior pattern. Creativity is not limited to a certain ‘type’ of individual or group of individuals that share the same interests and/or skills and abilities. Creativity is not something that can be defined by one expert or research study. Instead, creativity is an abstract concept which has been researched primarily based upon its roots in art and science. Regardless of the research, one thing remains the same; there are several ways to define creativity and innovation alike.

Being a ‘creator’ is subject to various meanings depending on who is producing and creating what in which domain. Creation arises when one has the ability to make something out of nothing or to change the ‘something’ into a completely different matter than it was in its original state. What is difficult to define however, is exactly what creativity is and how its presence in a human mind separates some individuals into a category of creators and others into the non-creators. Creativity has various definitions
because it is a topic that is very much subject to change based on the interpretation of the definer.

In popular culture and in research studies, there sometimes is a sense or a presumption that creativity occurs primarily in the arts and humanities—literature, music, dance, or visual arts—with little recognition that creativity is crucial to other fields as well, such as biology, mathematics, physics, chemistry, earth science, and engineering. The presumption of where creativity exists is usually one of the largest pitfalls when solidifying a definition of creation. Yet, who decides that a creative product is genuinely creative, as opposed to not really very original; or simply odd or idiosyncratic? (Andreasen 2005)

The most obvious definition can come from one’s personality. For scientists, behaviorists and sociologists, creativity can be defined in a systems model made of three parts: domain, field, and person.

Before one can fully identify how important each part of the systems’ model is, the nature of the creative personality must be understood first. Creative individuals are remarkable for their ability to adapt to almost any situation and to make do with whatever is at hand to reach their goals. There does not seem to be a particular set of traits a person must have in order to come up with a valuable novelty (Csikszentmihalyi 1997).

This means that the essence of creativity is held in the ability to adapt and to find methods in which a goal or end result will be obtained. Working with the above definition, it would then be inferred that although there are not a certain set of traits an individual may have in his or her personality that would or would not make him or her
creative, there is a set of attributes and abilities. The abilities can be brought forth into a creative forum if the domain is suitable to that creator.

Systems Model for Creativity:

1) Domain: the domain consists of symbolic rules and procedures. Domains are nested in what we call culture or the symbolic knowledge shared by a particular society or by humanity as a whole.

2) Field: All individuals act as gatekeepers to the domain. It is their job to decide whether a new idea or product should be included in the domain.

3) Person: Creativity occurs when a person, using the symbols of a given domain such as music, engineering, business or mathematics has a new idea or sees a new pattern, and when this novelty is selected by the appropriate field for inclusion into the relevant domain (Csikszentmihalyi 1997)

Using this model as a guide, the creative process would work with the domain setting the stage for what is to be discovered and researched. The field is the presence where the experts in that domain deal with cultural aspects and determine what is creative. The creator is the person who will create novelty for the domain and occasionally establish a new domain.

The definition of creativity that is formed from this perspective is: creativity is any act, idea or product that changes an existing domain or that transforms an existing domain into a new one. Similarly, the definition of a creative person is: someone whose thoughts or actions changes a domain, or establishes a new domain. It is important to
remember that a domain cannot be changed without the explicit or implicit consent of a field responsible for it (Csikszentmihalyi 1997).

All three aspects in the above are required for true creativity to become manifest; that creativity must create something new and that the final arbiters as to what is creative must come from the field responsible for the domain (Andreasen 2005).

Without the creation of something, the assumption is that the creator lacks creativity because there is no tangible item. Yet, we know that not all creators have produced great works and that this assumption not always true. Does this mean then that if Csikszentmihalyi's system’s model is true, that all ideas from inventors are not innovative or creative because they may not have ever been developed? If the person in this model took a domain and changed it to make it functioning, are they the creator or is the individual who developed the concept for the created the one who holds the creativity? Questions prompted like these are where the disconnection in setting parameters for defining creativity happens.

A difficulty in finding a solid definition for creativity comes from the amount of various elements that are taken into consideration when evaluating the creative process. Although research has found that there have not been scientifically proven personality traits linking back to creativity, there are ideas, talents and efforts to be considered during the progression of creating that does link back to creativity.

Creativity is the combination of talent and effort that produces an outcome or a product that is both novel and useful, according to Jonathan Plucker, a professor of
cognitive science at Indiana University. In other words, the original idea alone is not 

enough—the key is bringing that idea to life (Eley 2007).

In essence, an idea alone is not sufficient enough of to be considered creative. One with many ideas may have the ability to have a creative thought, but without the idea being brought to tangibility, the person does not have the potential to be viewed as a great creator, artist or scientist. Part of ‘creation' is the object produced and the action of the idea being brought into fulfillment. In addition, one essential component of creativity is originality. Creativity involves perceiving new relationships, ways of observing and ways of portraying, and creativity is not limited to particular domains. A second component is utility. Its utility resides primarily in its ability to evoke resonant emotions in others, to inspire, or to create a sense of awe at what the human mind and brain can achieve. The last component is a product – the creation of something (Andreasen 2005).

Answering where and when does the product evolve from just an idea to a new domain or a functioning new invention or product is one of the first steps in defining creativity and innovation. At some point, serving the definitions of creativity above, the creative thought and/or idea must be talked about amongst peers or colleagues to bring it into an operating result. However, the reason most creators seek the approval of his or her peers is due to the fact that most creative ideas, even after made into a product, need social approval in order to be considered ‘creative’. What is the purpose of creating something if it has no validity in society? Even artists who are considered ‘brilliant’ need the approval from society before being deemed a true creator. It is safe to draw the conclusion that without the input of society, creation loses its value. Simply put, creativity can alternatively be defined by what society deems as creative and useful. It is
possible through Csikszentmihalyi’s evaluations that creativity is not a scientific process, but instead a sociological one.

Creativity does not happen inside people’s heads, but in the interaction between a person’s thoughts and sociocultural context. It is systemic rather than an individual phenomenon (Csikszentmihalyi 1997).

When using the socio-cultural ideals for defining creativity it is important to note the time in which the creator is producing. The era in which something was produced is vital to the success and the public opinion of that product. For example, whomever ‘created’ the wheel was a revolutionary inventor in that time because he/she was creating a novelty in that domain that had not been produced prior to that point in time. The wheel, for example, is a device that enriches the well-being of society and was improved by the next creator which essentially made the original creator a staple for creative productivity in that time period. Creation around that time period would be reflected on new inventions, many trying to rival the wheel and/or improving it. This is true for inventing of practical devices in engineering and sciences as well as the arts.

Similarly, if religious artwork was revered as brilliant and innovative in a specific time period, as in the Middle Ages, it is assumed the work invented during that time would most likely pertain to that theme. When defining creativity and creative works, the time in history and current cultural trends often set the theme for the formation of a concept. The goal of the creator is to gain social acceptability in his or her age to validate the product. Interaction over time helps one understand the ebb and flow of creative activity over the course of a productive human life (Gardner 1993).
The definition of creativity is loosely defined from this research by one having a unique concept, bringing that concept into a produced reality, having that product be accepted by society and lastly allowing future generations to improve and create more in that domain. Creativity and innovation are subject to change, as time is the judging factor on the creation. It is important to remember that only a small portion of ideas are turned into useful novelties. Thus, creation is not defined by who, but rather what and where. What is the outcome? And where is the relevance?
Chapter 2

Scientific Theories for Creation and Innovation

Even during their early history, human beings have had the spark of creativity. They could see things that did not yet exist. They could imagine. They could yearn for beauty and make it immanent through art and literature and architecture. They could search the skies by day and night to look at the sun, the moon, the planets, the stars, attempting to understand their moments and their mysteries (Andreasen 2006).

Successfully finding several ways to define creativity and to develop a hypothesis on the requirements needed for one to be a creator, provides room to ask more questions rooted with a scientific answer. Is there a scientific or evolutionary explanation as to why some have an innate ability to conceptualize and produce things and others do not? Many sociologists have proven that the advantageous creator is the one who has an innate desire to explore and innovate- most likely dating back to early human cultures and societies thousands of years ago.

However, survival takes precedent over the act to create. If one’s mind is preoccupied and distracted with how he or she is going to stay warm, or get food, or have basic needs met, the desire to pursue creative endeavors is usually less. An acquisition of creativity is needed in order for one to be considered an actual creator. This means that in order for one to truly succeed in creative ventures they must have had the time and
need and desire to create. All humans are born with the ability to be creative; it’s a matter of if they have the tools and opportunity to embark on that creativity. Through curiosity, humans without distraction have had the opportunity to seize the curiosity and explore the creative desires that are innate in all humans.

Human beings have evolved into complex organisms that have invented art, music, science, technology and a written/spoken language. Evolution into organized, productive societies had to start somewhere and is most likely that the inventors started the process. There are several theories as to why some human beings are more creative than others and where it all began. Some scientists believe that creators come from a long line of ancestry of curious beings who had the innate desire to improve and learn. Human ancestor groups who nurtured those curious children had stronger societies because those children had the opportunity to make progressions on the domains set by previous generations. The need and intrinsic desire for discovery is the catalyst for inventors and creators to produce. The humanoid groups who had the discoverers in their societies were the ones who progressed more rapidly through evolution. Some early humans however, discovered that the risk-taking curious children were the children who were more probable to die earlier. Thus, the fear of death established a fear within the groups to protect those with a wandering disposition preventing some creativity.

The best societies, however, were those who came up with some kind of reward system for those who took the risk and created new ideas and concepts on how to improve the society based on their findings and exploration, regardless if the idea was useful. Pertaining to the definition of creativity, the product most likely has an opportunity to be improved on by a future creator and thus enhance society and be titled
useful. The most intelligent early humans may have caught on to the benefits of embracing the curious group members in order to improve the benefit of the group as whole and future generations.

Just as some individuals derive a keener pleasure from sex and others from food, so must have been born those people who derived a keener pleasure from learning something new. It is possible that children who were more curious ran more risks and so were more likely to die early than their more stolid companions. But it is also probable that those human groups that learned to appreciate the curious children among them, and helped to protect and reward them so that they could grow to maturity and have children of their own, were more successful than groups who ignored the potentially creative in their midst (Csikszentmihalyi 1997). Because individuals protected the ones who enjoyed exploring and inventing, they were better prepared to face the unpredictable conditions that may have threatened their survival (Csikszentmihalyi 1997).

If the above theory is true, then all modern humans must have descended from humanoid groups that embraced creativity and innovation. Those who longed for discovery in innovation were those who set the stage for a modern society full of painters, thinkers and creators. At some point in human evolution, an early human was banging a rock against a sharp object and that human realized that he or she could create an object that would benefit society. This desire to create is innate and has moved humans through the ranks of sophisticated beings.
The above image demonstrates an example of what an early human creating a tool may have looked like. This individual clearly has the innate desire to increase the growth of his society by developing a mechanism that assists his society in thriving.

From the moment some guy in a loin cloth scraped a rock against a piece of flint to create an arrowhead, human beings have been designers. Even when our ancestors were roaming the Savannah, our species has always harbored an innate desire for novelty and beauty (Pink 2005). One of the many differences that separate human beings from other animals is the desire for novelty. As described above, curiosity was the vigor behind the desire for novelty and the novelty is what developed an idea and an idea is what created a product. The innate human desire for novelty is the catalyst for the creative process described in Chapter 1, and what was clearly nurtured throughout evolution.

Even before novel ideas however, humans have been creators by simply existing. Creation in humans starts at birth and in sexuality. Creation begins in the womb when
the sperm meets the egg to produce a new life form. This is not done through invention of a great mind, but through science and sexuality. The basis of all creation is life.

Creativity at base is reestablishing of primal bi-unity with the primal object, the mother, out of which a new object comes into being. Like object relatedness, creativity seeks a vision of the primal object out of which evolves the creation of a new object that is a vision of the primal object (Oremland 1997). In other words, the act of creation is proof that human beings innately and primal desire to produce and production in itself equals creativity. The female gender is the epitome of creation because they are the individuals who spring new life and a new creation into the universe. Psychologists agree that the female gender may be predestined to create due to the internal need to procreate and produce a child and biological nutrients for that child (breast milk). However, it may be unfair for females to be considered the more creative of the sexes due to biological advantages, as several male creators have excelled in inventive fields. It seems psychology and its institutionalized external representations society, that for both sexes conspire against creativity for procreation but this is particularly so for female creativity (Oremland 1997).

After a human born, he or she begins to develop a sense of noises and movements. Encompassing movements/sounds and developing those movements and sounds into a comprehensive communicative language is a defining separation between humans and other mammals. Our advanced communication structure is one of the most vital parts of being a creator. Yet, prior to early societies utilizing fluent languages and communication structures, there is evidence that they communicated their messages via artwork on cave walls and through pottery and imagery (Csikszentmihalyi 1997).
This may explain why creators are scientifically programmed to be interested in literature. The oldest symbolic systems in the world are those organized by language. The first narrative stories were telling of real or imaginary events, the myths, and tales of ancestors that extended dramatically in the range of human experience through imagination (Csikszentmihalyi 1997).

Could something like an organ of creativity exist? And, if so, would it be related with cognitive capacities beyond the communicative function of language? We may remain skeptical regarding the answers to such questions, but it is undisputable that humans have, besides language, the capacity to create and appreciate aesthetic objects---and sounds and movements (Cela-Conde 2006).

The creation of aesthetic objects for art and visual purposes is something that makes human beings unique. Animals do not make conscious decisions to create art and/or design for the better being of their species. Whether it is for entertainment purposes, story-telling purposes or as an expression for art—appreciation of aesthetic objects is a signifier of the human species being creators.

Anthropologists have found several examples of cave paintings and ancient artifacts that communicated messages of prehistoric cultures, in the early stages of human growth and modern intelligence. One of the best examples of early artistic outbreak in communication on sites is known as the ‘Baristic Revolution’. The so-called “baristic explosion” refers to the appearance in Upper Paleolithic European sites of a real profusion of art as we understand it today; polychromous paintings adornments, statuettes, and so on.
The Baristic Revolution is inferred from European sites is no older than 40,000 years, while modern humans appeared from 150,000 to 200,000 years ago. From the moment researchers have looked for earlier evidences of symbolic thought outside of Europe, these findings have not stopped appearing. Sally McBrearty and Alison Brooks provided a wealth of examples of artifacts with evidences of symbolism extending across Africa during the Middle Stone Age, more than 200,000 years ago. Personal ornament pieces found in Blombos cave (South Africa) dated 75,000 years, confirming the presences of an artistic/symbolic mind similar to or own much earlier than the colonization of southern Europe by modern humans. (Cela- Conde 2006).

What the above evidence refers to is that modern humans and prehistoric humans alike had the ability and mind to project communication via written artwork and symbolism. Our ancient ancestors were looking for ways to design innovations and ideas in order to improve life for future generations. Yes their creations were primitive but the creative basis in humans is still the same. Our cave-person ancestors weren’t taking SAT’s, or plugging numbers into spreadsheets. But they were telling stories, demonstrating empathy, and designing innovations. These abilities have always comprised part of what it means to be human (Pink 2005).

The creators of each era with the differences of thousands of years had the same natural communicative desire which is why we know about their artwork and communicative practices today. The artwork discovered an analysis pertaining to the baristic revolution, proves to modern humans that the idea that a piece of art or communication may be produced, but (again) it’s how that piece improves and develops through the years is what is important to the success of modern society and modern
humans. The artwork found on the cave walls in Southern Europe and in South Africa are examples of early written communication documents. Symbolism eventually translated into words and those words are what evolved into modern and advanced communication.

There is no doubt in communication that past knowledge is essential to future advances. Clearly the awe-inspiring progress we have made from stone knives to food processors, from contemplating the heavens to launching probes to investigate them is a tribute to our remarkable capacity to remember and apply our past experiences (Ward, Finke, Smith 1990).

Now that we’ve attempted to discover where creativity exists in our human roots and composition, it is important to understand that even through evolution, there has been some attempt of a scientific explanation to help understand why creators are the way they are. Psychological scientists have begun studies on this aspect starting only around 200 years ago. The science of creativity began as a psychological study and has since been researched by behavioral scientists, genetic scientists, sociologists and psychologists alike.

Efforts to conduct scientific studies of creativity in a systemic manner began in the mid-nineteenth century with the work of individuals such as the Italian psychiatrist Cesare Lombrso and the British scientist and naturalist Francis Galton (Andreasen 2005). Extensive studies in creativity and genius are a relatively new concept in comparison to other realms of psychological and scientific evaluation. So, many questions like those below are still unanswered about the scientific origins of creativity.
Are creators’ brain chemistry’s awakened by a reward system? Is it a genetic programming or genetic predispositions? Could creativity be a result of mental illnesses or disorders? These are the types of questions that scientists have asked when trying to develop a fully developed theory of creativity. Being that there are many theories but no direct confirmation regarding the science of creativity, we can only suspect to a few causes as to why and where creativity exists. To answer this, there needs to be an understanding of brain chemistry. Regardless of the level of complexity of what one is creating, there is likely to be a catalyst in the brain to initiate the creating process. Perhaps human beings are scientifically hard wired for creativity and the desire to create is lodged into the pleasure centers of the brain. This explanation could provide a reason connected to brain chemistry that would easily determine why some people have the drive to produce and improve on domains in certain fields. So, are humans in fact programmed to create? The best program is one that makes an organism feel good whenever something new is discovered, regardless of its present usefulness, and this is what seems to have happened with our race through evolution (Csikszentmihalyi 1997). As discovered earlier in the chapter, through evolution, those with the innate desire to explore were those who improved in society. However, if one is go along with that theory, then the question arises: What is the driving force behind one wanting to continue to explore and make new discoveries? Yes, there is reward, but what does that reward do to the brain science to increase motivation?

By random mutations, some individuals must have developed a nervous system in when the discovering of novelty stimulates the pleasure centers in the brain. Just like
some have keener pleasures from sex or food; some must have been born who derived a keener pleasure from learning something new (Csikszentmihalyi 1997).

The mutations in the nervous system may have actually started as *genetic* mutations. If the theory is that the nervous system has been mutated genetically to stimulate pleasure, then it is implied that there is in fact a genetic responsibility for creativity. Perhaps the first trait that facilitates creativity is a genetic predisposition for a given domain. It makes sense that a person whose nervous system is more sensitive to color and light will have an advantage in becoming a painter, while someone born with a perfect pitch will do well in music. Being better at their respective domains, they will become more deeply interested in sounds and colors, will learn more about them, and thus are in a position to innovate in music or art with greater ease (Csikszentmihalyi 1997).

Thus, one who was born with a genetic mutation to see brighter colors or hear more astute pitches, has already been pre-genetically ‘gifted’ to excel in creative ventures. If one were to be born with the genetic predisposition to excel in a domain and the desire to innovate, that said person would have the triggers that would stimulate the pleasure centers in the brain from reward. However if one is to accept that there is genetic advantages to some individuals that help drive their creativity, then the new question is where did they want to embark on creative ventures come from? Do genetic predispositions need to be accompanied by personality traits in order to thrive fully in a creative being?
An alternative point of view provides evidence to those questions and says that creativity is not a dimensional trait. Rather it is a characteristic of rare, unique and unusual individuals (Andreasen 2005). Quite literally, creativity could be viewed as something of biological occurrence or of a personality trait that is to be desired, similar to positive disposition or sense of humor. With that said, some sort of spectrum needs to be put in place if the personality trait theory is to be accepted. Similar to having a personality trait tailored to a sense of humor, some individuals make a few people laugh, and others have an extraordinary ability to appeal to mass groups of people’s same senses of humor to be a successful comedian. Creators are the ones who often find themselves in the extreme ends of the spectrum, surpassing the average.

Continuous or dimensional traits are phenomena that people have in common, but for which there are individual differences; things such as height, weight, intelligence, or visual activity. Many of these traits have a ‘normal distribution’, with most of the population scattered around the middle- or representing “the average”—while few people are at either end of the curve and represent extreme examples (Andreasen 2005). So, using genetic theories and personality theories to draw conclusions about the science of creativity, causes room to speculate how exactly creativity is fully conceptualized in sciences.

One common method has been to emphasize the study of ordinary creativity. If one believes that creativity is a continuous trait, then the best strategy is to develop experimental tests of creativity and apply them to large numbers of people, selecting out of those who score high as representing “the creative person”. One can also measure their IQs to examine the relationship between creativity and intelligence, or study them
with other types of cognitive tests or physiologic measures. If the belief is that creativity is a rare and exceptional [personality] trait however, then the focus should primarily be on the study of people selected because of their history of creative success (Andreasen 2005). Domains and fields are the determinant of that creative success and must be identified when viewing someone as creator. In order for creativity to be properly identified, it has to be recognized as altering a domain. One can be a creator in any domain; it is just a matter of finding that domain and using it as a direct indicator for creative success.

Conversely, it is a not so common belief that creativity is neither a genetic trait nor a personality trait, but rather has origins in mental illness. Some scientists and behaviorists believe that creators had distant relatives who were schizophrenic. Because common symptoms of schizophrenia include outlandish stories and hallucinations, some believe that ancient cave drawings and mythology were just acts of mentally ill individuals who began divulging their images into art. Because talent is so hard to measure due to the fact that it is based on opinion, it provides space to question where talent originates. It is not an opinion that is supported by many, but some believe creative talent has a direct correlation with mental illness.

For various reasons, it is very difficult to scientifically determine whether the possession of a great talent implies a higher than average risk of developing mental disorders. For a start, defining talent is not easy-leaving aside how complicated it is to unequivocally define mental illnesses. But, even if we take a common sense approach to talent, and we indentify it with that which painters, writers, musicians and other
successful artists have, studies regarding their tendency to suffer mental disorders yield contradictory results (Cela-Conde 2006).

This is not a conclusive theory however, but over the course of these studies,’creators’ have been proven to have suffered mental illness. This is difficult however to affirm because mental illness is far from being conclusive, and even the direction of the link [between creativity and mental illness] needs to be determined (Cela-Conde 2006).

Another theory however, is that creators succeed when placed in environments or situations where they are under pressure and/or experience symptoms of anxiety, which is another form of mental angst. Anxiety has now been suggested to be one symptom of mental illness, but anxiety, pressure, and isolation are all signs that some creators have in common when making some of their best works. Often times with anxiety comes aggression. If the theory above has truth that those with schizophrenia or mental illnesses in their psychological composition have a higher probability towards being creative, it is also then possible that other mental disorders such as anxiety would produce the same result.

A creative person is more tolerant of aggressive impulses when forced to identify with an aggressive role. Aggression is commonly associated with anxiety and a level of anxiety is shown to be of importance in creative endeavors. Studies comparing anxiety and aggression revealed a slight tendency for creativity to be positively associated with anxiety (Smith, Carlsson 1990).
Anxiety and mental illness are times when gender differences play a part when creation is in process. There is a difference between male and female brain psychology and so the theory that anxiety leads to aggression and aggression produces positive creativity may not always be true, unless the gender of the aggressor is determined. Males have a tendency to be the more aggressive sex and thus may not have the same results in scenarios pertaining to anxiety. It is probable that males do not focus their aggression caused by anxiety into creative endeavors but instead, they isolate themselves.

Isolation is a method to particularly handle aggressive feelings (boys). Isolation in girls is less gender specific and less common. It is often blended with other defenses, but of course it still retains some of its creativity to keep anxiety out of awareness (Smith, Carlsson 1990). It is supposed, that artists as creators isolate themselves in order to have a clear vision of their end product. The theory above regarding the science in mental illness as an originator of the creative process will be as follows:

Anxiety yields aggression yields isolation which then equals varying results in the science of brain chemistry and mechanisms for the creative process.

The anxiety in children often produces aggression and isolation, but in adults it has been shown to be correlated with sensitivity. In a study done by Smith and Carlsson, repression alone was positively associated with creativity. The subject (boys and girls) deemed having all 3 defense categories with repression alone or together is isolation or sensitivity projection. Yet creativity in adults is more correlated with sensitivity. Sensitivity in adults correlated more often with a combination with repression.
With this research we know what creativity might be and some scientific reasons as to why some may have a tendency to be creative, but now we must attempt to identify the innovative process. Innovation and creation are often paired together but different. One can create a design, but an innovator executes the design to make a working product. Often, this is a situation where art and science work together, much like creation and innovation.
Chapter 3

Evaluating Innovation and Inventing   Process and the Correlation between Art and Science

“If people knew how hard I worked to get my mastery it wouldn’t seem so wonderful at all” –Michelangelo

Innovation is a large contributing component to being a creator. No matter what domain one is creating in, he or she has a goal to improve that domain by innovation and production. The task is to attempt to explain the process in which one goes through when innovating. Innovation usually comes from one having an astute sense of metaphor. Using metaphor in the creative process is the beginning stage of great creative productions in the future. The skill of invention starts with understanding one thing in terms of something else which encompasses metaphors. The ability to use metaphors in the creative process can be found in the right-brain.

The ability to forge inspired inventive relationships is a function of the right side of our brain. In the right side of the brain is where the ‘A-ha!’ moments of metaphor are born. For one to be able to see a finished product from the point of the idea stage is a rare gift that innovators hold. A simple way to explain metaphor usage is by explaining a theory modeled after popular candy (Pink 2005).

Reese’s Peanut Butter Cup Theory of Innovation:
Sometimes the most powerful ideas come from simply combining two existing ideas nobody else ever thought to unite (Pink 2005).

The Reese’s Peanut Butter Cup theory is referencing when one creator thought to put salty peanut butter with sweet chocolate into much desired piece of candy that has sold millions. The metaphor ideal is applied in this theory because one understood the chocolate and peanut butter as separate entities, but then put them together in an innovative way to design a completely new product that is useful to society.

Metaphor usage is most valuable in times of abundance, when the largest rewards go to those who can devise a novel and compelling creations, when metaphor making is vital. For instance, Georges de Mestral noticed how burrs stuck to his dog’s fur, and reasoning metaphorically, came up with the idea for Velcro (Pink 2005). When using the metaphors, an innovator is utilizing his or her ‘MQ’ or ‘metaphor quotient. Everything you create is a representation of something else’s in this sense, everything you create is enriched by metaphor--- in the creative process ‘MQ’ is as valuable as IQ (Pink 2005).

Similarly, the Wright Brothers had the same usage of metaphoric thinking when coming up with the great invention, the airplane. Building mental models and testing them by envisioning how they might work over time are tools of the trade for the creative expert. The Wright brothers’ flying machine, Einstein’s theory of relativity and the contemporary scientific view of the place of the earth in the universe all sprang from these mental operations (Ward, Finke, Smith 1990).
The usage of mental images before the product comes into fruition is what distinguishes the innovators from non-innovators. The innovators attempt to find a usage for their product before it’s in existence and metaphoric thinking aids in this process. Generation and exploration of pre-inventive mental images: What makes this procedure unique is that you essentially start with an answer and then see what question it can help you with.

1) Innovators playfully manipulate mental images with no particular goal in mind.

2) Solutions to problems that may appear as images are probed.

3) Future creative experts may begin to realize the value of this technique in a variety of practical solutions (Ward, Finke, Smith 1995).

When the right-brained thinker uses metaphoric thinking, something happens in the brain to serve as a means to assist in this innovating process. Cognitive neurosciences at Drexel and Northwestern Universities have found that the flashes of insight that precede “Aha” moments are accompanied by a large bust of neural activity in the brain’s right hemisphere. However, when we work out problems in a more methodical L (left) - directed way this eureka center [in the brain] remains quiet (Pink 2005).

The pleasure centers are stimulated in the brain during the formulation of ideas into products much like the pleasure centers in the brain are stimulated during a reward system. Again the rewards that those who were discoverers and innovators received early on in evolution from a society that embraced innovation, may intrinsically seek for the same eureka centers to go off in a different capacity. The idea that discoverers in
evolution turned into highly skilled innovators later on in history is likely because of the brain connections in the right brain.

Taken from: http://slowmuse.files.wordpress.com/2010/02/left_right_brain_xp.jpg

Once the creator has the ‘eureka’ centers in the brain set off and the image ready and the answers to questions about the product, he or she can get to work on producing. Some would argue that the creative process is not due to science or personality or communication, but in fact hard work and perseverance to see their finished product in usage. To date, there is no creative ‘gene’ per se, but rather an abundance of complex theories that provide answers on why people create and innovate.

There is no gene for creativity, and creating something useful doesn’t require genius. One of the most important aspects of being creative is persistence—the ability to take on a task and stick with it until the end (Eley 2007). The argument with this notion in the creative process is that the creator is setting out to work and finish the creative endeavor. It is up to society to put value on that endeavor and that with practice, any work can be admired. The awe-inspiring product is what innovators seek as the end result. However, artists and scientists alike are known as the two largest innovator
groups. In art and science alike, usefulness is determined by peers and society. Yet, with both of these groups and their products, it is up to the creator to give society something and for society to consider that said object to be a creative amazement.

Our admiration of the result, the great painting, the inspiring performance, the perfect approach shot, ignores the process - the struggles, the uncertainties and false starts that even the 'talented' confront (Langer 1990). Often times, society gets confronted with attraction of a finished product that the work behind the product goes unnoticed. The process of creativity is one that is full of trial and error and because of this it provides room for validity in talented individuals. For one to be an artist or a scientist they must also be an inventor and the innovating takes a process as described above and motivation to exert. Most can be an innovator if there is a concept and a drive. What prevents those who may not be right-brained or discoverers by nature are the sociological fears that the work will not be accepted and revered by society.

With almost any creative endeavor, we mistakenly think that we know what translates into success and it’s usually what we know that keeps us from trying ourselves (Langer 1990). When defining creativity one of the components is to have a timely product that is useful to society. Because society has such a huge impact in creativity, one of the biggest antitheses of creative works is criticisms. Critics from society and so-called experts in the art and sciences fields often times allow opinion to determine what products and ideas are creative and which of those are not. With that said, without fear of criticism, the effort to produce may be more likely to be seen in more people.
The abstractions that critics attach to artists and their work more often than not lead many of us to feel intimidated. Ironically, they increase the gap that lies between us and the artist, when their role is usually presumed to be that of bringing us closer to the artist and the art (Langer 1990). The gap between the individual and the art or science is not that large, and this argument is stating that the talent aspect is moot and that fear or lack of fear is the motivation for some to embark on a creative process to produce. Talent has little to do with motivation according to Langer.

The creation and innovation process is made up of three components for success in the art and sciences fields. The three components are: person, process, and product.

Creativity begins with a person. That person then addresses a problem or seeks out a good question or conceives a new way of perceiving or conceptualizing process using a cognitive neuroscience. How that process occurs is a topic in cognitive neuroscience. When the process is complete the problem is solved, the question is answered, and there is a product (Andreasen 2005). The process of innovation can be summarized with the answering of a question and a product with that question. The product can come from talent or from hard work, but there is scientific evidence that in art and science alike, the depending variable for success is criticisms and human desire for success.

Artists and scientists alike rely heavily on experience in order to have a platform for creation. If it is true that creativity is caused by pleasure stimulators, evolution, mental illness and hard work combined, and then it would be safe to assume that there are connecting factors between artists and innovators, linguists and engineers and musicians like there are connecting factors contributing to creativity. Art, dance and music are
staples of modern societies and cultures. Someone at some point had to excel in these areas to make sure that the domain would be improved on. Art, dance and music are more ancient and most likely the beginning of technology (Csikszentmihalyi 1997). Because these ancient civilizations have left their artwork behind, we can conclude that the same stipulations to creativity applied to them as well.

Work provides the potential for personal continuity. One’s work can continue after one is gone. It is through a psychoanalytically oriented providence- with a great wisdom that personal continuity not be dependent solely on interpersonal relatedness provides 2 pathways towards immortality- love and work (Oremland 1997). The need for humans to leave their imprint on society and work diligently for production are likely to be the defining factors in explaining why creativity relies so incessantly on productivity.

Human beings have an innate desire to leave their presence on the earth long after their time on earth has been finished. Much like the attraction to the ‘invention’ of a new life in pregnancy and creating a new life to transcend the parents’, humans also leave imprints through their art and language. Having a developed communication process is a very vital element in human creative development. The written words allow us to understand what is happening within ourselves. In recording real or imaginary events, the writer arrests the effervescent stream of experience by naming its aspects making them enduring in language (Csikszentmihalyi 1997). Artists of all genres demonstrate their experiences through the image and the creation of a story. Regardless of the form of art, creative artists are driven by their need to share experience. Artists seek experience and scientists seek the truth. A creative artist is not necessarily an important artist. He might for instance, work within a relatively narrow and thematic and formal sphere,
relying on limited personal experience but without compensating for this in insanity and frenzy (Smith and Carlsson 1990).

Scientists however are more alike the discoverers of early human civilizations. Scientists are truth seekers who are at the core innovators. It is a common assumption that creators are only artists or musicians, but in fact, scientists and engineers encompass every day creative success. What makes science intrinsically rewarding is the everyday practice, not the rare success. Scientists do their work from the exhilaration that comes from the pursuit of truth (Csikszentmihalyi 1997).

Art and science are not strictly separated or dominated by one part of the brain. Art and science can in many cases be mutually exclusive despite the motivation behind the producer’s actions. Many science writers for example, have called attention to way certain structures in science exhibit a kind of artistic beauty. The double helix of DNA is a fascinating, intruding structure even apart from its biological and genetic significance. There is grace and elegance in the theory of relativity. Art in turn has been influenced by scientific principles and discoveries. Leonardo DaVinci used anatomy and mechanical physics to create beautiful artwork. The impressionist movement was inspired by scientific work on the way primary colors are combined in the human visual system; many current artistic techniques are based on scientific principles of color mixing and contrast (Ward, Finke, Smith 1995).

Artists and scientists alike are products of their environment just like creators have a product that came from a concept. In the next chapter, the goal is to try to examine different environmental factors that may contribute to one’s sense of creativity.
or innovation. Some great creators will be analyzed and critiqued to see their similarities in their environments to provide reason as to why some of them were inspired to create. The determining environmental factors are: childhood experiences, overcoming adversity and trauma and the inspiration and motivation from a mentor or a creative influence.
Chapter 4

Analysis of Environmental Affects on Creation and Innovation in an Individual

The childhoods of great creators like Gandhi and Freud provide some insight on how one might be raised and how some childhood experiences may assist in the development of creation. However what is known about the childhoods of eminent creative persons, it is difficult to find a consistent pattern (Csikszentmihalyi 1997). A consistency of patterns may be in fact missing from all creators’ childhoods, but there are some significant similarities when evaluating great creators’ childhood experiences.

Mahatma Gandhi and Pablo Picasso and Sigmund Freud were not individuals who experienced their childhoods in the same country, religious practice or creative practice but have several similarities in their childhoods. Some common thematic threads in creators’ childhoods are education, parental relationships and the environment to which they were living in.

Many creative individuals do point with some distress to the restrictions of their early childhood. Those who had a strict regimen somehow managed to retain spark of curiosity, because they were strong and rebellious personalities with one role model who encouraged a stance toward life (Gardner 1993). Young creators indeed were those who harbored the desire for discovery to seek the truth as described in earlier chapters. The fact that they may have had the strength to overcome adversity and an advisor to enhance
their ideals, are some theories as to why creators had the ability to expand on their innate desire for discovery and innovation.

Gandhi and Picasso alike did not perform particularly well in school but did however; revolutionize society and their time periods alike with their ideas and products. Gandhi had religious texts to analyze as a child in education and began to question, which for his culture was not allowed in that time period. Gandhi was barley successful in passing his entrance examinations for school and he went to a small, college in Bhavnagar in 1888. He eventually went on to become a Barrister at law in England (Gardner 1993). Gandhi sought out to quench his thirst for knowledge that his culture would not allow because religion forbade voyages abroad at that time. The creation aspect came into his life because in England, Gandhi studied Christianity and Hinduism which improved his ideological movements. He wanted to learn other cultures to stand on equal terms with individuals all over the world (Gardner 1993). Although Gandhi did not succeed in his entrance exams as a child, he had an innate sense for discover and curiosity that took him across the world on a forbidden adventure. Often, this adventurousness is interpreted as insubordination, though the more fortunate thinkers receive from teachers or peers some encouragement from their experimentation (Gardner 1993).

Similarly, Pablo Picasso who was not from India but was from Spain and in an entirely different upbringing than Gandhi had a parallel experience. If it were scientifically possible for one to be considered an artist from birth, Picasso would have been it. Picasso’s first verbal word in fact was ‘piz for la pix’ which is “drawing pencil”. In addition, Picasso may have been a child who not only knew these kinds of words
because he was an artist at heart, but he may have either inherited a “talent” or been a product of his environment. Picasso’s father was an academic painter, but had been proven to have less talent than his son (Gardner 1993).

Academically, Picasso hated school and performed terribly. He could not learn to successfully read or write or master numbers. He seems to have wanted to treat numbers as if they were visual patterns rather than symbols for quantities (Gardner 1993). Picasso’s desire to create ‘art’ surpassed his ability to be a focused pupil. He began sketching and creating pictures at a young age and that desire never subsided. The reason for evaluating creators’ education experience is to determine if creativity is in fact a ‘learned’ trait or an innate trait. This is a subject of debate regarding this topic, but in the two cases of Gandhi and Picasso, the formal schooling did not ignite their desires to produce.

Due to that fact, adult creators draw repeatedly on the capital of childhood. Individuals who ultimately make creative breakthroughs tend from their earliest days to be explorers, innovators and thinkers. Never satisfied simply to follow the pack, they can usually be found experimenting in their chosen métier, and elsewhere (Gardner 1993). So, the capacity to create a product and to make that product work through trial and error and to have a finished product relies heavily on the creator’s influences from childhood and how his or her experiences attributed to enhancing their exploration and thinking. Often times the driving force to act on the instinct to discover is done so by overcoming adversity in childhood and early adulthood.
Why it is important to analyze childhood environments of creators is an attempt to identify a trigger for creators and non-creators. If environment develops conditions for creativity in children, then there must be environmental factors that encourage the potential to create. Childhood environments that are apt to laziness, a lack of discipline and distractions are often the least creator-rich environments. All children possess traits of curiosity and an allocation of attention to things that are pertaining to their own sake. Commonly, creators in adulthood hold on to this curiosity and do not let distractions interfere with their desire to use creative energy.

Einstein is supposed to have written his classic papers on the kitchen table of his apartment in Berne while rocking the pram of his baby (Csikszentmihalyi 1997). Einstein’s level of distraction did not require all of his attention to create. Much like a child, he had the ability to keep his creative energy focused even in adulthood with adult responsibilities.

Equally important in a study of creativity is the sensitivity to the innovator’s ways of drawing on the worldview of the young child (Gardner 1993). Monumental creators like Gandhi, Freud, Picasso and Einstein were raised in a time with horrible wars that resulted in famine, disease and death. Some argue that adversity is motivates creation because trauma and adversity creates a habitat for experience. What would creation be if it wasn’t drawn heavily from experience? Several of the men mentioned above who have reshaped society were impacted heavily by Western European wars in the late 1800’s and early 1900’s.
Bestowing an understanding to war adversity provides insight on not only the childhood and the psyche of the creator but some trials and tribulations of what they may have negatively experienced. The areas of war were unstable and frightening. Zurich during the war had refugees, spies, exiles, painters and poets and writers and radicals of all kind (Gardner 1993). For each creator below, there will be listed a traumatic event pertaining to war to each creator. Granted, not all of the experiences are exactly alike, but the information provides insight on how very different creators had experienced adversity in war times.

Einstein- A pacifist, he declared his opposition to the war being waged by his countrymen, and during that time he separated from his wife. (Gardner 1993).

Freud: Zurich-based, was worrying about the fate of his one on the battlefront but more generally the survival of an inherently destructive human society. (Gardner 1993).

Picasso: The war years had leaded him to see the death of his mistress (love) Eva.

Gandhi: Opposition to British rule from England in South Africa = peaceful resistance.

Trauma:

Picasso: Experienced earthquakes when he was three and was taken away from home in the middle of the night to avoid fire.

He also experienced death of a younger sister at age 17 (he held himself accountable)

Non-French speaking foreigner with little education was lost in cosmopolitan Paris and was disgusted by Parisian poverty and diseases (sexual diseases) (Gardner 1993).
Picasso went to Paris at age 19 where a foreigner was and did not speak the language or fully understand the French culture of that time. The 19 year old Picasso was ineluctably drawn there just as Stravinsky, Freud, Eliot and Gandhi felt called to Paris as well for their respective reasons (Gardner 1993).

Just as important as trauma was to shaping these creators’ minds were the influences of others. Whether it was a rival in the same field like Freud and Jung, or a mentor or a parent, all of the creators listed, had influence of an outside source or individual that was another environmental factor to their greatness.

Gandhi: Gandhi may look like the creator who invented himself from another perspective he benefited from a family-like support system during his most decisive breakthrough. Gandhi’s goals were to unite Muslim and Hindu forces in the Khilafat agitation of 1919 and 1920 and to confront British hegemony. (Gardner 1993). When Gandhi went to England to study western culture, he drew a lot of his creation from literary influences to develop his ideals on peaceful revolutions.

Some of Gandhi’s literary influences that modeled his views on the world and prompted him to question the world around him were:

1. Thoreau: Insights into philosophy and civil disobedences

2. Ruskin: Centrality of labor

3. Tolstoy: focus on one’s duties instead of one’s rights and the importance of relationships to one’s god and centrality of love on all human affairs. Tolstoy and Gandhi had correspondence and Tolstoy was impressed by Gandhi.
Literature was very much a strong influence for the creators to draw inspiration and influence from in the creative process. Literature influences, and the ability to draw experience from those influences are all environmental factors in contributing to creativity. Environmental influences also contributed to creative works.

Picasso: His love for color is what inspired the ‘blue period’ which was the reflection of his dire circumstances of living in Paris (Gardner 1993)

Literature influences and Picasso: Guillaume Apollinaire who had parallel artistic tracks as Picasso in history and art and literature. Picasso was also heavily influenced in literature with the likes of Andre Sulman and poet, Max Jacob.

Einstein and Freud:

Einstein could not have gone beyond other physicists if he had not understood their continuations, including their strengths and limitations (Gardner 1993).

Cues:

The quest for cues for creators is almost as important as mentors or predominant influence for our creators. Cues are known to be what the ‘inspiration’ for the creator, similar to experience. Creators in childhood often rely on cues to start projects or as a way to formulate ideas. Cue-rich environments might simply provide a level of cognitive stimulation necessary for subjects to engage their domain-relevant and creativity-relevant skills. The effect of cues in the physical environment may, however, depend importantly on subjects’ ability to use them (Amabile 1983). The reference to Picasso seeing numbers as symbols is an example of a cue that the creator saw and wanted to
transform into a piece of art or symbolism. His ‘creative mind’ did not see arithmetic problems in the classroom as numbers, but as shapes and objects to which he could mold and create. A young creator will often do this with his or her cues in the classroom.

Children in one study took a creativity test in either a barren room or a room that was rich in objects and pictures providing clues to possible responses. The cue-rich environment led to higher idea fluency only for those subjects who had scored high on a creativity pretest. Thus, proving that creative individuals use cues (Amabile 1983). Cue-rich environments are an environmental factor when looking for evidence to support inspiration. Like metaphor, a cue must be used in order to spark a product or idea. Cues and experience as well as the use of metaphor usually coincide together to form the initial creative or innovative concept.

Experiences:

Each creator that we have been focusing on as well as all creators has been subject to environmental factors such as childhood, adversity, and influence, but what these factors can be placed under one umbrella considered environmental experiences. The experiences that one has are what shape the mind and the personality. Nature and science have offered one explanation of creativity but what about nurture, and experience regarding environmental factors? Through research, some specific experiences are identified in these creators’ lives that may have catapulted their creative processes.

Gandhi’s travels to England are similar to Picasso’s travels to Paris. The travel changed the limitations to which they were used to. These men both were put in alien settings in different countries which helped them to gain experience in dissimilar cultures.
and be around individuals who had varied upbringings and experiences than they. This most likely was an environmental factor that could have triggered pleasure centers in the brain for discovery and creativity. When Gandhi was in England, he gained life experience as it was the center of European civilization ran by British educated leaders (Gardner 1993).

Many creators strive to seek a new experience because of a direct result of oppression. The need to flourish and excel has been caused for these creators by a domineering parent or strictness in a religious home or sociological regime. The creators of the late 1800’s to mid 1900’s often were in religion-rich environments with strict rules and limitations. For example, Gandhi was at the midding stratum of Indian society which was not highly educated or wealthy, but had high ethical standards. His religious parents were open-minded and regarded a range of religious beliefs, mostly Hindu (Gardner 1993). Because of religious tradition however, he was forced into marriage at age 13, thus setting the stage for oppression by his parents and religion at a time where it was a sociological normality. What Gandhi did once he reached England was not only seeking new experiences, but also researched western religions and cultures to help shape his thoughts on peace and harmonies within societies. It was Gandhi’s environmental experiences that helped coax his mind into revolutionizing the world.

Gandhi was Hindu, but Christian creators also faced the same kind of religious angst which may be an environmental factor of their creativity. Several of the Christian creators made something called a ‘Faustian Bargain’. Creators ended up becoming so embedded in some kind of bargain or Faustian agreement; it was executed as a means of ensuring the preservation of his or her unusual gifts (Gardner 1993). A Faustian
agreement is some kind of exchange between a person and a devil or demon in return for some kind of preservation or guarantee. Picasso was one who made a bargain with the divine and promised god he’d stop painting when his sister’s life was saved. (Gardner 1993).

This kind of agreement is common in almost all of the creators when facing adversity or looking for cues in their creativity. If God or the devil could provide something, the creator often bargained their products or talent in exchange for something they deemed as a greater good. No matter what the religious belief was, several creators relied heavily on religion as a motivation to seek higher truths (science) and/or to motivate their creation ideas. In every religion, God or gods create and are responsible for life or the sun or wind or water, thus believing in some sort of religion demonstrates an example of the general reverence for creativity and life. Religion, travel, personal beliefs, and traumatic experiences are commonalities that the creators I examined share. There are two things to consider when taking into account creators’ childhoods and environments. All of the creators must have had the following:

1) Sufficient skill and talent to allow one the option of a life different from one’s forbears.

2) Positive models in childhood of a creative life.

(Gardner 1993)

The evaluation of the creators’ lives and experiences above do not exclusively conclude that there are a set of specific environmental stimuli that increase productivity in a domain. However, the environmental factors within childhood, adversity, trauma, mentoring/influences, and travel are congruent influences in shaping the world of a
creator and enhancing their production and innovation. In conclusion, social relevancy is what ultimately determines the value of the product. Picasso may have produced 1,000 paintings in a year but only two may have had social relevance making those pieces extraordinary. The creators above are not featured because they are the only individuals who have the extreme ability to create or innovate; it is rather that they produced a high quantity of products within short periods of time. To evaluate their working environment is to understand what led to that productivity.

Regardless of the type of environmental factors that one would be exposed to contributing to creativity, whether it is childhood factors, travels abroad or religion, one question still remains. Is it possible for creativity to rely on certain aptitude factors of the mind?

Creativity is a social phenomenon and factors of the mind cannot be indefinitely proved as a determinate of creativity or innovation. But some theories however, are described below that might describe what happens in psychology and sociology to make some desire to create and innovate.
Chapter 5
Analysis of Mind Affects on Creation and Innovation in an Individual

“Personal creativity requires the capacity to construct original interpretations of experience, which we all have, an interest in those interpretations and the discretion or judgment to know when to be original and perhaps unconventional or even constrain and went to go with the status quo” – Author, Mark Runco in an interview with Suzanna Henshon 2010

Identifying intelligence is a very subjective and relative term. Many times people assume that intelligence refers to one’s ability to perform well in a subject area or with a talent. However, in several definitions, intelligence refers to an extraordinary ability for some to excel in specific areas. If this is true about intelligence, then one who excels in creating and curiosity may have a specific domain. Yet humans often explore various domains allowing them to become well-versed or “intelligent” in varying areas. Creativity and innovation have regularly been referred to as type of intelligence or have been correlated with people who have high intelligence levels. Although there are several varying types of intelligence, a creative mind is recognized by society as an intelligent mind. Mid-century a leading psychologist Joy P. Guilford called for a scientific focus on creativity. Guilford had in mind something that would mirror
intelligence based on a need with an arsenal of measures designating which individuals had the potential of being creative (Gardner 1993).

Divergent thinking according to Author Mark Runco in an interview with Suzanna Henshon based on several methodologies as used by creative expert Runco: “My work on divergent thinking was mostly refinement of existing theory, though I did develop a few methodologies that seem to work well. One is the use of “ideational pools” (an individual’s entire ideational output is examined rather than looking at one idea at a time). More recently I developed a criterion measure, the Ideational Behavior Scale (or RIBS), which also seems to work well. It is based on ideas in the natural environment and allows us to avoid relying on criterion measures, which are inappropriate when studying divergent thinking. Divergent thinking focuses on ideas, so the criterion should as well. And as I said above, ideas are useful in the natural environment.”

Guilford’s challenge in divergent thinking yielded that creativity is not the same as intelligence: psychometric creativity is independent of psychometric intelligence.

Paralleling the psychometric approach, researchers using one paradigm, have examined the personality traits of individuals deemed creative by their community. Typically individuals participating in these studies are asked to select apt descriptions of them and also to respond to ambiguous stimuli in ways to evoke or project their underlying personality structure (Gardner 1993).

Similarly, Howard Gruber did a study on creativity correlating intelligence with well. Gruber speaks of an “evolving systems” approach to the study of creativity; which
is where one monitors simultaneously the organization of knowledge in a domain, the purposes pursued by the creator and the affective experience he or she undergoes.

Intelligence can also be monitored based on emotional intelligence as well. Intelligence factors can rely largely upon intuition, production and demonstration. Sometimes, a creative personality can be demonstrated from an individual strictly because they have a refined emotional intelligence.

Personality: Human beings have multiple forms of intelligence that compose personalities in the creative space. The Multiple Intelligence Theory is that creators’ personalities are visual and special, kinesthetic in body, have a high range of interpersonal intelligence and a wide range of relevant skills and draw on those skills synergistically.

Behavior:

The behaviorists’ perspective is that individuals engage in creative activity largely because of the material rewards they secure (Gardner 1993). Again, pleasure centers, awards, and positive reinforcement are areas of the mind to which encourage creative thinking. Another question that is formed from the behaviorists’ theory, is that if children are assumed to be a product of their environments and/ this is true, then what role does the classroom and family environments and dynamics play in those circumstances? Classrooms are often ran and overseen by teachers and his or her method of teaching. It is probable, that some teachers’ way of teaching increase the likeliness that the creator-type children will thrive.
In a study, children in public schools scored significantly higher on creativity tests than did children in parochial schools. This may be due to the classroom setting; open classrooms vs. non-open or “closed” classrooms. An open classroom is a style of teaching involving flexibility of space, student choice of activity, richness of learning materials, integration of curriculum areas and more individual or small group than large group instruction (Amabile 1983). The public school setting is more of an ample place where the open classrooms are encouraged and utilized. When the teacher sets the precedent to be open to creativity the students usually follow suit.

When children seen their own teacher as more intrinsically oriented toward work, they perceive themselves as more competent and more intrinsically motivated. Thus children’s intrinsic motivation (and hence, creativity) might be enhanced by teacher attitudes toward autonomy and self-director in work (Amabile 1983). The educational environmental factors are hypothesized to tie into a ‘mentor’ factor. Much like we have seen with the creators like Einstein and Gandhi, when there is a mentor or advisor or role model in a creator’s life, he or she usually strives to follow that mentor. A teacher is often a child’s first impression of a role model or mentor and if a teacher is intrinsically motivated to work and support creativity, the student will feel more comfortable in his or her creative domain.

When children leave the classroom however, they are then left to the encouragement of their parental figures. Parenting is one environmental theory that can attribute to a child’s creativity or not. There is ample evidence that children tend to be more creative when their parents feel personally secure and relatively unconcerned about conforming to society’s behavioral inhibitions or rules on status and roles. In a study of
high school boys in California, and their fathers, the fathers of highly creative boys showed less conventional sex-role stereotyping on a number of measures than the fathers of uncreative boys. In addition, they (the high school boys), scored significantly higher on the femininity scale of the California Psychological Inventory (Amabile 1983). Much like the open classroom, creative children thrive in “open households”, so to speak. Households who do not place emphasis on societal conformity harbor places for children to progress creatively. Children who enjoy a special family position (as a result of either birth order or some other circumstance) tend to perform more creatively than the children who do not. Families likely to foster creativity in children are characterized by a low level of authoritarianism and restrictiveness an encouragement of independence and a somewhat cool interpersonal distance between parents and children (Amabile 1983).

Despite the evidence above however, we have learned that one of the largest environmental factors contributing to some of the ‘great’ creators’ greatness is the exposure to adversity. It is likely that modern creativity is more attributed to the classroom and home environments of children rather than socio-economic atrocities and religious contribution, at least in America currently.
Chapter 6:

Explaining Creative Endeavors in Modern American Society

As discussed in chapter 4, great creators often have several environmental factors attributing to their creative endeavors. It is easy for one to observe the great works of Picasso and Einstein as they were revolutionaries in their time eras. Again, time determines the success of the creator, and if modern creations are not valued by a new invention or discovery, then what are the determining factors of modern creativity? How do people in today’s society become creative and what does society NOW value as creative and valuable. It’s no longer sufficient to create a produced, a service, an experience or a lifestyle that’s merely functional. Today it’s economically crucial and personally rewarding to create something that’s also beautiful, whimsical or emotionally engaging (Pink 2005).

In the truest form, Pink is saying that in American society in this decade, the value of creativity is often placed in employment settings. How is creativity going to generate money? Along with innovations improving the greater good of humanity, they are now trying to think of products that will be marketed, and often times artists or graphic designers are those who sell the invention—another example of when art and science and innovation all work together to be successful. The wealth of nations and the
well-being of individuals now depend on heavily artists in the room. In a world enriched by abundance, but disrupted by the automation and out sourcing of white-collar work, everyone, regardless of profession, must cultivate artistic sensibility (Pink 2005).

Society now places different value on creativity than previous societies. Some societies weren’t even aware they were creating when they invented devices or produced artworks. When looking at modern cities and inventions, the future of creativity is in technology. The lines between art and science are going to become more blurred and cohesive as time goes on, but most likely it has already happened in this first decade of the 2000’s.

Since the value of creation in a domain is determined by society, it is important to remember what domain is thriving in this era. Technology is the domain that modern society is constantly producing in. Technological advances have improved everything from medicine to artwork and almost all creative livelihoods and hobbies use some sort of product made in the technology domain to create and innovate. Creative people have been improving on existing models that improve society. The most successful creators in modern society are those who can initiate the most unlikely ideas that can integrate the most forms of technology. Today, a product that was made in the technology domain like the cellular telephone is not just used to make calls. It is now used for several communication platforms. The technological domain is always changing and is currently one of the most rapid changing domains in our society which is dominating creative production in other domains. Even art, like graphic design, uses technological advancements to improve on that domain. Of course not all domains use technology, but modern society uses technology and it’s improvement on society as a point of reverence for creators.
Conclusion:

“Some high achievements lack creativity. Creativity is not the same as fame. You can be famous but not creative, or creative but not famous. That sounds simple, but is contradictory to what is implicit in my social, product, achievement-oriented theories of creativity,” – Mark Runco

Creativity and innovation, is forever changing because it is a determined by an amount of products in a certain domain and how the domain is changed by an individual and how society determines the value of that change. Creativity is defined loosely which is why the research will never be complete and certain on this topic. My findings with the research have presented a few consistencies that aid in securing an understanding of creativity and innovation. The main criterion in the above research is based on a few of the following. A creator must have a sense of wonderment and curiosity. Curiosity is a fact that several creativity theories are based upon and used as the beginning point of reference when divulging into the mind and personality of a creator and/or innovator. Several theories regarding the root of creativity have questions as to where the sense for wonder and discovery originates, but the research above reveals that in order for children to keep their curiosity levels high and pursue their creative endeavors, their environmental factors must be supportive. All children are born with a sense of curiosity and it’s a matter of how the environment and experiences that child has influences his or her mind and personality to pursue creation.

An additional criterion that acts as a determinant whether one is a creator or an innovator is the social relevancy of his or her creations and innovations. The theories supported with this research has the notion that in order for creativity to be socially
recognized, it needs to be accessed by a domain and supported by a field, but can also pertain to an individual.

There are two types of creativity when using social relevancy as a determinant for creativity and innovation. The two types of creativity are: domain specific creativity and individual specific creativity. The creation or innovation can be socially relevant because it improves a domain, but it also can be important because it could define an individual as a creator. One could produce a large number of paintings, but it might only be one that gains social relevancy. Social relevancy is, too, an environmental determinant of creativity.

While no specific common themes emerge in the lives of creators, commonalities in environments can flourish creative thought and behavior. So, while one can create and shape a domain, he or she can also create and innovate on a personal level depending on his or her amount of exposure to an environment that supports creativity. Again, this thesis research supports that environment is the most important factor when discovering what qualities of mind, personality and environment influence creation and innovation.

The scientific reasons cannot be proven but environmental elements can be studied and evaluated. Chapter 4 outlined the environments of historical creators that have historically documented evidence of their lives recorded. Reasons to why human beings began to create before history was recorded are unknown, which is why it is so important to understand the environments and lives of recent creators who have shaped history. Creativity and innovation can be evaluated by tangible evidence when looking at creators’ lives; but the scientific evidence isn’t as tangible and easily studied in this topic.
Because all brains are alike and there is no scientific difference in brain pattern for creative individuals it means that environmental factors are most likely the key elements in unlocking creativity. By examining the lives of creators that are historically and socially recognized as progressive innovators, the conclusion can be drawn that there are mostly environmental factors driving the curiosity. If environment develops conditions for creativity, then there are also environmental factors that change the potential to create. The research distinguishes that distractions and laziness can tentatively be non-motivators for those who are curious and creative by nature, which is why it is so important to study children. Studies that evaluate classroom environment show that those who are in “open” classrooms as young students thrive in creative ventures. This concludes that the children who are curious and have not been distracted have a more open forum to explore, which shows that the potential to create a product is greater when encouraging creative environments are available. This idea is the same in evolution as well. When examining the scientific factors of the juxtaposed reasoning for creativity and innovation desire being more prevalent in some more than others, it’s important to look at evolution.

The research in chapter 2 that examines evolution, shows that survival for humans was often determined by creating products that improved society, which may be one theory as to why humans began to innovate. However, initiatives towards creative goals may have been stifled in evolution as well. Environmental research shows that when survival needs require all of one’s attention, none is left over for being creative. If one is distracted, they do not possess a strong desire to create and the curiosity that is resilient in children often gets put secondary to survival needs. Similarly to scientific evolution and
the survival needs of humans being put first, so is the same for cultural needs in evolution. As culture evolves the domains evolve. Domains are transformed by the curiosity and dedication of a few individuals. Those individuals could be influenced from a variety of scientific, personality and environmental factors, but regardless domains change with culture and culture ultimately supports or demolishes creative endeavors and production. I can conclude with the research that if a society’s main concern was to be warriors, for example, their creativity would be based on the survival of that society through warfare. The creators might thrive in weapon artistry in that domain because that is the determinant of the society. An individual who is concerned about the attacks of a rival society would not spend time exploring curious thoughts, but rather, survival and social relevant innovations and ideas.

Whether it is through evolution, mental illness, environment or the classroom, creators thrive in circumstances that nurture the creative and innovative spark within them. Through evaluating the life of some of the most famous creators, we can now see some similarities and differences in when and how these creators got their start and conducted their brilliance. Brilliance and fame and intelligence however, are all subject to the audience and critics that participate in evaluation of products and ideas. When understanding creativity it is important to keep in mind myths like “What came first, the chicken or the egg?” and “if a tree falls in the forest and no ear is around to hear it, does it still make a sound?” This is the same for creativity. One might say that Picasso was less intelligent for not grasping the concept of mathematics; however, his genius was in finding those figures into symbols and shapes that he later used in his artwork. Another aspect of a creator that is agreed on in all of the research above is that creators draw
inspiration and ideas from experience. Without experience some ideas would never be born or shaped into various domains. Creators usually have two things that nurture their curious and sometimes rebellious personalities. Creators often have a talent and skill that differentiates them from others in the same domain, and positive role models and influences as children. This is a generalization however and can be subject to change, but the creators listed in this research paper have demonstrated a personality equipped to support talent and skill and an environment to aid in the flourishing of curiosity.

Discovering influential factors for creativity and innovation in a human being is a very abstract topic and is open for interpretation and is a subject with several generalizations. To attempt to understand creativity is to understand sociology and psychology, as those are two subject areas backing creative minds, personalities and the innovation process. Because those subjects are developmental factors in determining creativity levels and productive innovation, the results may vary. A sociological perspective on creativity will not be the same a psychological perspective or scientific study. Sociological, psychological and behavioral aspects however, homogenize in this research study to give some explanations and deductions regarding the interworking of creative minds and personalities and how environments and experiences shape the encouragement of creators or deflection of their curiosity.

Creativity and innovation does not simply mean that one gets recognition or that one is appraised by culture. Creativity is much like beauty; it is in the eye of the beholder and appreciated and revered by society and sociological nuances. Although it is more recognizable at certain times rather than others, being a creator or innovator can be done through various outlets. The most intriguing finding during research of this topic is that
creation and innovation is not limited to right-brained activities. Science and logic regularly influence the outcome of any creation or innovative production. Art and science are not that different and as I have written in earlier chapters, even the double helix of a DNA strand has been replicated in several pieces of artwork. When seeking definite truths about creativity and innovation it is always important to remember that strides can be made in order to get to that creative level. Creativity and innovation is a process. The process most likely starts with the individual in childhood, then progresses based on his or her environmental factors, and is found useful by society and encouraged in the mind of the creator by scientific and psychological facts. There is no genetic or chemical cause for creativity, but rather an abundance of abstract triggers that enhance creators’. Some argue that creativity is in fact a talent, but there is no scientific evidence for talent as that is another broad word that is composed of varying characteristics. One element through all of this research is for certain; that all individuals have the ability to create and innovate. Every individual has some type of creativity whether is demonstrated through invention, personality or artwork. The question I answered through research is what qualities enhance creativity and innovation. In order to correctly identify creation and innovation and individual, sociological factors and environment must always be considered. The end conclusion of this research is that society and environment shapes creators and can be the catalyst to creative relevance and also the deterrent. The goal is to find the right environment, experience, and receptive mind to manifest the highest level of creativity for the individual and the society to embrace it.
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