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Creativity: it's components relative to intelligence

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Abstract

In this article, the author discusses and reviews the relevant needed aspects of intelligence relative to creativity, the creative process and the creative product. Further, there are elements of personality which also need to be examined. Some suggestions for future research are described.

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Introduction

Creativity is an elusive construct that has been examined from different perspectives by different theorists. Some have postulated that there is a creative personality, others view it as a process, and still others see it as a conglomeration of different aspects and attributes. This paper will focus primarily on creativity as it relates to intelligence and giftedness, but the paper will examine other relevant salient, tangential variables. Creativity is a construct that has been around for quite some time. It seems to have flourished in the Renaissance, and is often seen in music, art, literature, dance, theatre and other realms. There have been attempts to assess it via the Torrance Tests of Creative Thinking (Torrance,1966, 1974) and Paul Torrance has devoted his life to the study of creativity, writing many books about the creative person, process, and personality as well as different cognitive processes. The Torrance tests attempt to ascertain the amount or degree of elaboration, fluency, flexibility and originality. Trained observers also detect other aspects of one's responses to the prompts given on the Torrance Tests. To assess creativity requires a good deal of training- one cannot just pick up the manual and hope to get valid, reliable results on their first administration. Supervision and feedback is needed. One cannot simply pick up a manual and attempt to procure valid, reliable results.

The Realm of the Intelligence Test- and Intelligence

Intelligence tests have been with us since around 1905 when Binet in Paris attempted to differentiate between those that were thought to benefit from school as opposed to those who could not seemingly benefit from education. At that time pejorative words such as "moron, idiot and imbecile" was used to describe those who apparently were of low intelligence- as measured by those primitive measures of the time. Fast forward about 100 years and today we have a wide variety of intelligence tests, based on different theories- but still attempting to measure, directly or indirectly that elusive concept called " intelligence". Some abhor this concept of intelligence, referring to it instead as

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" cognitive processes" or "cognitive ability". This paper will also examine the realms of convergent, and particularly divergent thinking as they relate to creativity and also flexible thinking, a construct developed by Norbert Jausovec (1994) of Slovenia. In his text, he explores the realms of flexible thinking, flexible strategies and the enhancement of this type of thinking and its relevance.

Intelligence and It's Relationship to Creativity

In this section, we shall examine some realms of intelligence, taken from a recent intelligence test to determine some, but not all of the subtests and how they related to creativity, the creative product and creative process. One very preliminary realm- in most intelligence tests-is that of vocabulary. A well-developed vocabulary reflects a good deal of word knowledge, descriptive ability and both expressive and receptive language skills, as well as written expressive skills. Thus, a high verbal individual has the potential of becoming a great creative writer, poet, playwright, perhaps speech writer and editor. These elements in and of themselves, do not always result in a creative writer. There are other variables that may contribute to the success of a Stephen King, J.K. Rowling or Edgar Alan Poe. These are just examples and we shall not here debate who the most creative writers are or were. Suffice it to say that there are many original, imaginative, creative writers in the realms of science fiction, pulp fiction, fantasy, westerns and just about any realm that one can name.

A secondary realm found in most intelligence tests is comprehension. The individuals who score high on this subtest seem to have a comprehensive grasp and knowledge of the world. They may be high in social emotional intelligence and human interaction. Attention- in the short term and also sustained attention (sometimes inferred from other sources) is again measured directly or indirectly from intelligence measures and is part of that global construct we call "intelligence". Indeed, one cannot solve problems, create new paradigms without some sustained attention. Artists require visual attention- to the painting, to the landscape, to the sea, the clouds, the sky in their attempt to "capture" for posterity what they have seized upon in their reflections. Attention to detail is imperative in scientific investigation. If Fleming did not notice something in some lab or petri dish, where would we be today?

Attention to one part of a masterpiece is imperative as witnessed in the Mona Lisa and her cryptic smile. Perceptual-Motor skills are generally tested in most intelligence tests, although the names vary from Performance to Visual Motor Integration. Certainly, artists and musicians need to have good perceptual skills (to read music, to perform, to improvise) and scientists need good eye hand coordination to conduct repetitive experiments that lead to some new anti-bacteria medication. World Knowledge/General Information are terms often used to describe a broad grasp of the world and global information. As the individual grows, he or she absorbs a good deal of information about the world (history, geography, math, science, literature, art, music) and at some point, calls upon these realms to integrate all of this knowledge into perhaps an interesting short story, play or opera. Multi-disciplinary efforts are fruitful for many and result in a cultural amalgamation worthy of being labeled " creative ".

These individuals have absorbed and retained much information over the course of their education and lives and are better able to utilize this knowledge to form new original and innovative ideas Picture Completion- Attention to small, relevant, important details is critical to creativity- as one attempts to utilize not just the big picture- but to also employ the small details and minor elements of life. Some creative individuals are skilled at minute attention to detail and could perhaps spend years working on some project that will revolutionize their field of endeavor. Others, for lack of this skill remain mired in a quicksand of positive thoughts, but no positive outcome.

Mathematical knowledge is certainly relevant to the mathematician working in the realm of Calculus or Numerical Analysis, but some aspects of mathematical knowledge are relevant and pertinent in other realms in addition. Processing- Some aspects of an intelligence test measure the person's ability to process a good deal of information, quickly and efficiently. The creative individual is processing what they have learned in the past, what they may have been exposed to-vis a vis their education and models and lastly what they envision as the final product- in all its glory. Creative writers are processing words, ideas, characters, personalities, plots, twists and turns as well as dialog all at the same time. War and Peace by Tolstoy is an immense work that obviously required a good deal of thought, planning and persistence before the final draft was submitted to publisher.

Similarities- This subtest evaluates the higher order thinking, the conceptualizations that people form and maintain and their analogical skills and abilities. There is a good deal of insight and mental manipulation occurring in this subtest and this subtest also requires a good deal of extensive knowledge, information and vocabulary skills and abilities. Working Memory- Some intelligence tests specifically test for "working memory"- the ability to hold and manipulate information, facts, data, numbers, whatever and then reconfigure them to solve a problem or arrive at a solution. Thus, there is a combination of attention, short term memory, concentration and mental manipulation at work in this

domain. This may also reflect what is termed " executive functioning" which is the sum total of planning and implementing plans for long range success. The novelist needs to keep each chapter integrated with the characters and the plot to arrive at a logical, sequential and yet meaningful end.

The Sum Total- Even today, some individuals are still preoccupied with the global I.Q. concept and believe that one number can reasonably be expected to tell us everything that we need to know about any one individual. The Wechsler Scales have changed from the Verbal- Performance breakdown to a 4-realm approach- for example with the WAIS-IV, we receive breakdown scores of Verbal, Perceptual Reasoning , Working Memory, and Processing Speed.

Deficiencies, for whatever reason, could interfere with an individual's potential to be creative. We now know more and more about teratogens (nicotine, alcohol, caffeine) that can cause birth defects as well as the lack of certain vitamins, proteins and nutrients, (folic acid for example) that can interfere or retard the growth and development of the organism.

The Threshold Concept

Torrance and others have discussed what has come to be called the " threshold" issue. In this perspective, an I.Q of about 120 to 130 is optimal for great creative inventions, discoveries, and advancements. Obviously, below an I.Q. of 80, the individual is somewhat hampered by a lack of overall intelligence, thinking skills and reasoning skills to be able to contribute much to a new invention or discover. Indeed, many of these individuals are surviving from day to day and week to week and their contributions to any field will probably be nil. Those in the average range of intelligence (say, 90 to 110) will in all probability not be contributing mightily to any respective field, nor will they make a huge impact in either the short run or long term.

Creative Synthesis

Years ago, Silvano Arieti (1976) wrote a book entitled " Creativity The Magic Synthesis" which seemed to indicate that the creative person was able to integrate and synthesize a good number of different variables to arrive at a creative product. Often the creative "product " was a painting. Edward Hopper had his own interpretation of the world as did Maurice Utrillo and Piet Mondrian. Each of these individuals was " creative " in their own right, in their own time, and in their own medium. Musicians can be creative in their own mediums- such as jazz or rock and roll and perhaps even the flamenco guitar. The options for artists are endless. But what exactly is synthesized? This bears examination directly and indirectly, and in ways that we can perhaps understand, and in ways in which comprehension is not clear, exact, specific and precise. Some come up with an entirely new, novel, divergent, creative approach to a field or an issue. They look at things from a quite different perspective. There are those who take the "birds's eye view" if you will- the panoramic view perhaps, and those who take the "worm's eye view" and see from an entirely different perspective- for whatever reason.

Arieti (1976) touched on many of the still relevant topics that we explore and examine today---the creative process, imagery, amorphous cognition primitive and conceptual cognition, and the aesthetic process, most recently explored by Cupchik (2016) in Canada. Arieti (1976) did believe, as did John A. Glover and others, that creativity could be nurtured and cultivated. Shaughnessy (2012) has edited a book on mentoring and also on the nurturing of talent, skills and abilities. In that text, an excellent chapter by John Baer discusses the development of creative thinking and the importance of examining this realm.

Science and Inventions

In the realm of science, from the invention of the wheel to the computer, individuals have utilized their thought processes their education, background knowledge, the impact of others as well as simple " Eureka " moments to come up with new , novel, divergent items- such as the toaster. The reader can provide their own version of a new quite novel invention that has perhaps revolutionized their respective domain (Marie Curie in Medicine and the X-Ray machine). In science, we have a product that may be the result of years of study- take Thomas Edison and the light bulb. Alexander Graham Bell and the telephone is yet another example. These inventions revolutionized their zeitgeist and continue to impact society even today. Yet it took years of study, years of hard work, persistence, motivation and in some cases, pure luck to come up with the telegraph or microwave.

Simmons (1996) has an excellent book entitled " The Scientific 100: A Ranking of the most influential scientists, past and present". This book reviews the creative endeavors of the top 100 scientists from Archimedes to Neils Bohr and beyond. Their discoveries could be considered the result of creative endeavors, creative study of the work of others or the integration of creative scientists that came before them. In order to acknowledge the creative endeavors

of female scientists who changed the world, Swaby (2015) has compiled a brief summary of 52 women who apparently changed science and the world through their various creative endeavors, research and discoveries.

Motivation and Persistence

The creative person, engaging in the creative process, to produce a creative product has to use their creative personality over time in order to bring their ideas to fruition. They may have been mentored along the way, or they may have worked in isolation. However, they had to have some sort of internal motivation, belief in themselves or in their ideas to bring their creative spark to fruition. Then of course, the painting, poem, play , has to be brought to the public to see if it will stand the test of time. Many artists, inventors and others are not acknowledged or recognized until after their death. The plays of Shakespeare are continually performed in the West End, while the Bard rests in peace.

Emotions

Many creatives, many inventors, many successful discoveries were perhaps due to the affective state of the individual. Much has been written about the depths of depression that some scientists found themselves, and the melancholy experienced by still other painters, writers, authors and poets. Cupchik (2016) has clearly examined the realms of aesthetics and emotion as they relate to creativity and the artistic process. Since emotions are subjective, they are not as easily quantifiable for pure research but nevertheless we are impacted by the affective domain and the emotional realm is often the driving force behind creative endeavors. Many creative people are "driven" to express themselves either via art, music, dance, public performance or writing or just about any other medium. Choice of a medium may reflect early exposure to some domain or perhaps relocation to a cultural center or city. Parents here also play a role when they take their children to a musical concert where the child may hear a French horn or piano concerto or some similar performance.

The Realm of the Environment

Children grow up in a certain environment. Some of these environments are nurturing- parents are scientists themselves, or teachers or musicians and the result is a child that is stimulated, not just in school but in the home environment. Parents often expand the environment of the child by taking the child to the museum, to the local library or historical sites such as Versailles in Paris. Some early experiences impact that child and result in the child becoming a life-long learned with an unquenchable appetite to learn more about some topic or creative endeavor of a genius of times past. A nurturing environment nurtures exploration and investigation and the thought processes that lead to inventions and creativity. Some may make the case that the genetic make-up of the parents is the sole contributing factor to creative endeavors and products-but we have had inventors and most creative people who seem to bloom like a rose in the desert- a description of James Joyce.

Obstacles to Overcome

Currently, education has become somewhat "stalled " due to the Covid crisis and pandemic. Yet there have been other times in our history in which things have been "stalled". In London during World War II, the education of the nation was " stalled " yet the defiant power of the human spirit was not quelled. People recovered, students recovered, and creative endeavors continued. For some inventors and scientists, they have overcome incredible medical and physical challenges to become leaders in their field. Lack of funding remains problematic for many who want to "stand on the shoulders of giants" and continue the research of past generation and come up with new novel developments.

Incubation

A word that has been bandied about. But only superficially researched is the term " incubation" which apparently refers to a certain period of time wherein a person may ponder, examine, mull over, think about some problem or creative endeavor and this time period is apparently necessary for some creative individuals to bring their initial thoughts or ideas to fruition. Why some individuals need this period of incubation to examine their thoughts or perhaps form associations is not clear. Why some creative individuals receive insight and are able almost immediately to come up with an answer or solution or perhaps even some product is also not clear. Recent innovations in SPECT scanning and EEG and MRI's of the brain are allowing us to examine and explore what exactly goes on in the various parts of the brain as the subject attempts to solve problems or come up with a solution or devise some new approach to a problem in a creative manner.

Recent Conceptualizations

Recently, Mauzy and his associates (2003) have conceptualized creativity as " Big C and Little c " reflecting the fact that there are major life changing creative discoveries and inventions and then smaller devices that, while being novel and original and marketable are not paradigm shifters. This is another realm that needs further exploration in the field

of creativity. Specialization has also caused scientists and scholars and researchers to become more highly focused in their endeavours.

Summary and Conclusions

The realm of creativity is still undergoing exploration and examination as well as research. Conferences continue to bring colleagues together either face to face or via Zoom—another creative invention so to speak which fulfills a need. There is a vast literature that touches on creativity, but that literature is scattered although there are a few excellent handbooks (Glover, Ronning & Reynolds, 1989; Sternberg, 1998; Kaufman and Sternberg; 2005) but they need updating and revision and new vistas need to be explored. Specifically, the impact of the World Wide Web on creativity and the creative process. While personality has been tangentially reviewed in the past, more contemporary investigations are needed in this electronic, sophisticated, technological age.

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