Core Knowledge Area Modules Number 2:

The creative process for modern American citizens

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Breadth Abstract

The Breadth section of this KAM includes the identification and exploration of creative processes. The focus of this analysis is modern American citizens. A creative idea is generated by a creative person using some creative process within some creative environment. The theoretical works of Graham Wallas, Jay P. Guilford, and Arthur Koestler are analyzed for insight into the problem of identifying important creative processes of thought. The identification of creative processes allows them to be consciously applied. Creativity that fosters innovation has come to be an important and integral aspect of modern American society.

The paper concludes that exploration, incubation, methodical, redefinition, recycling ideas, serendipity, spontaneous, synthesis and thinking out of the box are the principle creative processes that are employed by people. Each of these creative processes is decomposed and analyzed. The analysis gives further insight into how they play a role in thinking and creative production. Furthermore, an evaluation of the theorists reveals different perspectives and dimensions on each of these processes.

Depth Abstract

The Depth component expands upon the research of the Breadth component which concluded that there were certain creative processes used by modern American citizens. Those creative processes are exploration, incubation, methodical, redefinition, recycling ideas, serendipity, spontaneous, synthesis and thinking out of the box. The exploration process uses investigation to stimulate creativity. Incubation uses time as an asset. The methodical process garners a step by step process to engage creativity. Redefinition transforms one aspect of the problem into another. Recycling uses an idea in one domain and applies it to another. Serendipity employs luck. Spontaneous uses a flash of insight. Synthesis integrates ideas to achieve creative production. Thinking out of the box uses unorthodox thinking methods to achieve original ideas. The contemporary researchers provide further insight and credibility into the creative processes that have been identified. One example of this is the fatigue dissipation and external cues mechanisms of the incubation creative process. New variations on the Wallas stage model of methodical creative process are presented.

Application Abstract

A seminar on the creative process is composed, scheduled, delivered, assessed, and evaluated in this paper. Creativity has become an important element in not only industry but many aspects of modern society. The creative person generates a creative idea using a creative process within some environment. The Breadth and Depth component concluded that the principle creative processes are exploration, incubation, methodical, redefinition, recycling ideas, serendipity, spontaneous, synthesis and thinking out of the box. The goal of the seminar is to deliver information about the conclusions of that research on the creative processes as used by the modern American citizen. An analysis and evaluation is performed on seminar based on the interaction with the audience. The reaction of the audience is assessed and discussed. The lessons learned on how the seminar might have been improved and where the strengths were are also analyzed.

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Learning Agreement

Principles of Human Development

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August 17, 2007

Overview of the KAM

This paper will address a specific focus topic within the area of human development. When an idea is hatched, a creative person produces the creative idea. Furthermore, that person uses some creative process within some creative environment. So there are four principle aspects of creativity, the creative person, the creative idea, the creative process, and the creative environment. This KAM will investigate one of those four aspects, the creative process. The scope of the paper is further narrowed by considering only American citizens. It is further narrowed by only considering them in modern times.

The creative process analyzes the processes that are involved in hatching an idea. What methods or techniques are commonly employed by modern American citizens when they get an innovative idea? In today's economy, creativity, innovation, and originality are prized commodities that serve to differentiate markets, individuals, products, and services.

The KAM will investigate the works of seminal theorists to gain some insight into the creative process. Three theorists were chosen from among a dozen potential philosophers and theorists. Graham Wallas proposed one of the first models of the creative process. His five stage model is commonly referred to as the Wallas stage model of creativity by modern theorists. Jay P. Guilford was chosen because he was the first theorist to identify the difference between *convergent* and *divergent production*. Today, these are more commonly termed convergent and divergent thinking. Arthur Koestler manifested the concept of *bisociation*, whereby two perspectives are blended together.

SBSF 8210: Theories of Human Development

Breadth

Breadth Objectives

1. Analyze the human development theories of Jay P. Guilford, Arthur Koestler, and Graham Wallas.

2. Relate the theories put forth by the seminal theorists to the creative process for modern American citizens.

3. Compare, contrast, and evaluate the theories developed by J. P. Guilford, A. Koestler, and Graham Wallas against the other theorists.

Breadth References

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

Guilford, J. P., Hoepfner, R. (1971). *The analysis of intelligence.* New York: McGraw-Hill Book Company.

Koestler, A. (1949). *Insight and outlook*. New York: The Macmillan Company.

Koestler, A. (1964). *The act of creation.* New York: The Macmillan Company.

Wallas, G. (1926). *Art of thought*. London: Jonathan Cape.

Wallas, G. (1920). *Human nature in politics.* London: Constable Books.

Breadth Demonstration

In a scholarly paper critically analyze, evaluate, compare, and contrast the human development theories set forth by the theorists Jay P. Guilford, Arthur Koestler, and Graham Wallas. The focus of the paper will be to appraise, interpret, and relate the theories to the creative process for a modern American citizen. The paper will be approximately 30 pages in length.

AMDS 8221: Current Research in Human Development

Depth

Depth Objectives

1. Critically analyze the research in the creative process for the modern American citizen from scholarly, peer-reviewed journals published within the last five years.

2. Evaluate the current research on the creative process against the seminal theorists George Wallas, Jay P. Guilford, and Arthur Koestler identified in the Breadth component.

3. Compare and contrast the current research in the focus area of the creative process as it relates to contemporary American citizens.

Depth References

Bleakley, A. (2004). Your creativity or mine?: A typology of creativities in higher education and the value of a pluralistic approach. *Teaching in Higher Education, 9*(4), p. 463-475. Retrieved August 3, 2007, from the Academic Search Premier database.

Cowdroy, R., Williams, A., (2006). Assessing creativity in the creative arts. *Art, Design & Communication in Higher Education, 5*(2), p97-117. Retrieved August 3, 2007, from the Academic Search Premier database.

Díaz-Lefebvre, R. (2004). Multiple intelligences, learning for understanding, and creative assessment: Some pieces to the puzzle of learning. *Teachers College Record, 106*(1), p49-57. Retrieved August 3, 2007, from the Academic Search Premier database.

Erill, S. (2002). What if ...? *Lancet, 360*, p. 420. Retrieved August 3, 2007, from the Academic Search Premier database.

Fourmentraux, J. (2006). Internet artworks, artists and computer programmers: Sharing the creative process. *Leonardo, 39*(1), p. 44-50. Retrieved August 3, 2007, from the Academic Search Premier database.

Gionet, D. (2004). Risking ourselves in the creative process. *PSA Journal, 70*(8), p. 20-22. Retrieved August 3, 2007, from the Academic Search Premier database.

Hill, R., Johnson, L. W. (2003). When creativity is a must: Professional applied creative services. *Creativity & Innovation Management, 12*(4), p. 221-229. Retrieved August 3, 2007, from the Business Source Premier database.

Hummell, L. (2006). Synectics for creative thinking in technology education. *Technology Teacher, 66*(3), p. 22-27. Retrieved August 3, 2007, from the Academic Search Premier database.

Kohtamäki, M., Kekäle, T., Viitala, R. (2004). Trust and innovation: From spin-off idea to stock exchange. *Creativity & Innovation Management, 13*(2), p. 75-88. Retrieved August 3, 2007, from the Business Source Premier database.

Lindström, L. (2006). Creativity: What is it? can you assess it? can it be taught? *International Journal of Art & Design Education, 25*(1), p. 53-66. Retrieved August 3, 2007, from the Academic Search Premier database.

Lonergan, D. C., Scott, G. M., Mumford, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal, 16*(2), p. 231-246. Retrieved August 3, 2007, from the Academic Search Premier database.

Rank, J., Pace, V. L., Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology: An International Review, 53*(4), p. 518-528. Retrieved August 3, 2007, from the Business Source Premier database.

Rothenberg, A. (2006). Creativity - the healthy muse. *Lancet, 368*, p. 8-9. Retrieved August 3, 2007, from the Academic Search Premier database.

Runco, M. A. (2004). Creativity. *Annual Review of Psychology, 55*(1), p. 657-687. Retrieved August 3, 2007, from the Academic Search Premier database.

Segal, E. (2004). Incubation in insight problem solving. *Creativity Research Journal, 16*(1), p. 141-148. Retrieved August 3, 2007, from the Academic Search Premier database.

Shaddock, D. (2006). My Terrible Muse: Cohesion and Fragmentation in the Creative Self. *Psychoanalytic Inquiry, 26*(3), p. 421-441. Retrieved August 8, 2007, from the Academic Search Premier database.

Tamdogon, O. G. (2006). Creativity in education: Clearness in perception, vigorousness in curiosity. *Education for Information, 24*(2), p. 139-151. Retrieved August 3, 2007, from the Academic Search Premier database.

Veale, T. (2006). Re-representation and creative analogy: A lexico-semantic perspective. *New Generation Computing, 24*(3), p. 223-240. Retrieved August 3, 2007, from the Academic Search Premier database.

Depth Demonstration

In a scholarly work consisting of approximately 30 pages, this component will critically analyze, evaluate, and compare the contemporary research in the area of the creative process for modern American citizens. The Depth component will also contain an annotated bibliography of

at least 15 annotations of scholarly, peer-reviewed, articles that were produced within the last five years.

SBSF 8231: Professional Practice and Human Development

Application

Application Objectives

1. Synthesize the theories of Graham Wallas, Arthur Koestler, and Jay P. Guilford, and the contemporary research on the creative process for modern American citizens.

2. Layout, compose, design, and refine a seminar that incorporates the seminal research of G. Wallas, A. Koestler, and J. P. Guilford as well as the contemporary research in the chosen area of the creative process.

3. Assess the seminar and devise commentary that would facilitate its delivery in professional setting of scholarly-practice.

Application References

No further references will be used in addition to those already listed in the Breadth and Depth components.

Application Demonstration

This component will be composed of two parts. The first part will be an informational seminar designed to describe the conclusions drawn from the research and seminal theories for the creative process for a modern American citizen. The material will be a power point slide presentation approximately 15 slides in length. The slide pack will be composed for delivery as a seminar in a professional setting. The second part will be a 10-15 page scholarly analysis and commentary on the lecture.

Core Knowledge Area Modules Number 2 Breadth Essay:

Theories on the creative process for modern American citizens

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September 15, 2007

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BREADTH ESSAY

Introduction

Creativity. What is it? Koestler (1964) noted that creativity is "the act of creation of the conscious and unconscious processes underlying scientific discovery, artistic originality, and comic inspiration." (p. 21). Guilford (1967) considered creativity in terms of divergent production abilities that utilized fluency, originality, elaboration, and mental flexibility. Wallas (1920) noted creativity as "the making of a new generalization or invention, or the poetical expression of a new idea" (p. 79). The Webster's New World Dictionary of the American Language (1984) concisely defined creativity as "creative ability; artistic or intellectual inventiveness" (p. 332). Bleakley (2004) noted that creativity involves the purposeful production of something new through some process.

Creativity is a useful and powerful tool in the mental toolbox of an individual. It allows a person to solve problems, negotiate with other people, and look at the world in a different perspective. Creativity is an important and vital aspect of thinking. Modern American citizens are surrounded by the products of imagination, innovation, invention, ingenuity, and applied creativity.

Consider the creation of an idea. Some creative person is involved. That creative person produces a creative idea. That creative idea was incubated with some process. Finally, the whole process took place within some creative environment. So this forms the four basic aspects of creativity, the creative person, the creative idea, the creative process, and the creative environment.

This paper will analyze the creative process as it relates to the modern American citizen. What creative means, methods, techniques, mechanisms, and steps are employed to generate a

new idea? The answer to this question will be formulated and explored. The answer to this question is a tale that has many twists and turns. A story is formed that identifies a number of different creative processes. Indeed, many have posed a similar question, and many will pose the same question in the future.

The works of Arthur Koestler, Graham Wallas, and Jay P. Guilford are analyzed for some insight into the creative process. Graham Wallas (1926) played a vital role because he developed one of the first formalized concepts about the creative process. Today, the modern researchers pay homage to his pioneering work by referring to it as the Wallas stage model of the creative process. Jay P. Guilford (1967) was a seminal theorist because he delivered the concepts of divergent and convergent thinking into modern parlance. Arthur Koestler (1949) developed the concept of *bisociation* defined as a blending of two perspectives.

The primary creative processes that will be analyzed are exploration, incubation, lateral thinking, methodical, redefinition, recycling ideas, serendipity, synthesis, and spontaneous. Exploration involves a process of curiosity, observation, and discovery on the journey towards the development of a creative product. Incubation saturates an individual with information and then waits for a solution to take shape. The methodical creative process tries an exhaustive combination of solutions. Redefinition involves tweaking the problem to facilitate a solution. Recycling ideas reuses old ideas in new situations. Serendipity integrates chance with creativity. The spontaneous creative process uses a leap of insight. Synthesis involves the integration of different concepts to produce a new idea. Thinking out of the box engages original ingenuity to generate novel ideas.

Theories on the creative process for modern American citizens

Exploration creative process

The creative process of exploration involves a method utilizing discovery. The creative individual explores their environment and all aspects of the problem in a journey of discovery on the road to a new idea. “Intellectual curiosity, the desire to under, is derived from an urge as basic as hunger or sex, the exploratory drive” (Koestler, 1964, p. 87). Facts, conditions, information, experiments, perspectives, and the creative environment are the yeast that keeps new ideas fermenting.

Exploration is also a vital part of learning as much as it is a part of creativity. Koestler (1964) contended that learning occurs by “assimilating experiences and grouping them into order schemata, into stable patterns of unity in variety” (p. 44). When a person has fully explored a situation they are better equipped to come up with solutions to address a problem related to that situation. “The main incentive to its exploratory activities is novelty, surprise, conflict, and uncertainty” (Koestler, 1964, p. 4).

Hand in hand with exploration comes curiosity, observation, and experimentation. Discovery often means simply “the uncovering of something which has always been there but was hidden from the eye by the blinkers of habit” (Koestler, 1964, p. 108). Good observation facilitates more thorough exploration; more thorough exploration opens new avenues of thought, insight, and opportunities. He noted that the result of discovery is “the catharsis of mental tension, that self-transcending wonder and admiration which characterize the satisfied exploratory drive” (Koestler, 1949, p. 270).

There is a psychological aspect to the exploratory drive as well. Koestler (1949) decomposed the *exploratory drive* as a sense between the oceanic feeling and aggressive-defensive attitude. The exploratory drive, he continued, is balance between the contemplative and competitive impulses. “It is this highly sublimated character of both components, and their

mutual balance, which accounts for the emotional neutrality of the exploratory drive" (Koestler, 1949, p. 243). Koestler (1949) chimed that the exploratory drive also sits between the desire to understand, or identify and the desire to react, or self-assert. Koestler (1949) astutely observed that aside from senescence or mental illness, "we can add to our mental equipment, but we cannot subtract from it" (p. 255).

Compared with Koestler, Guilford and Hoepfner (1971) used a more circuitous route to discuss exploration as a creative process. They performed a study that drew from a pool of 8,000 participants over a period of 20 years. This study culminated in identifying fluency, sensitivity to problems, flexibility, originality, analysis, synthesis, redefinition, penetration as the defining characteristics of creativity. They defined penetration as a "creative person that can penetrate further into his experiences, seeing more of things than is on the surface" (Guilford & Hoepfner, 1971, p. 131). The method of peering into a situation, delving into the dark recesses of the problem, and exploring the intricacies leads understanding the problem which facilitates generating solutions and ideas.

Wallas (1920) mentioned that the "need for invention is even more urgent" (p. 206) in certain climates, situations, and structures than others. The different circumstances of governments and individuals will produce a different set of circumstances. The solution to their issues will be different and vary.

Exploration as a creative process entails a careful exploration of the problem space, the environment, and circumstances of the problem, processes, and available resources. The exploration generates ideas and solutions. The seminal theorists and psychologists point to a creative process that involves a careful inquiry of the problem with creative results. An observation should be noted that the creative processes identified in this paper are not mutually

exclusive. The processes might be used simultaneously, in conjunction with each other, or serially.

Incubation creative process

The creative process of incubation involves the fermentation of information to allow the mind time to develop an idea. The available information is allowed to simmer on the back burner for a length of time, while the mind stews on the problem. When the mind is presented with the ingredients of information and allowed to brew the concoction eventually comes to an intellectual boil. That is, eventually, some insight is reached and a solution will appear. By saturating the mind with different aspects of the problem, the solution is allowed to slowly seep into the brain.

To illustrate this creative process, consider the following riddle, "What falls but never breaks, and breaks but never falls?" If a person has run across the riddle before or something similar they will merely draw upon the solution from their memory. If, however, a person has never experienced this particular riddle, they will engage their creative gears to try to solve it. The creative person will consider various objects or things that might appropriate fit into the solution. To allow the reader's mind to incubate on this riddle, the solution will be discussed in the Depth component.

Koestler (1964) described the situation when a person is *blocked*. That is, when they reach a mental impasse and is unable to proceed further on a problem. "When all hopeful attempts at solving the problem by traditional methods have been exhausted, thought runs around in circles" (p. 119). Koestler (1964) discovered a jewel of a quote when after a period of incubation a solution was reached. "Ideas rose in crowds; I felt them collide until pair interlocked, so to speak, making a stable combination" (Koestler, 1964, p. 115).

Koestler (1964) described a process where the unconscious mind festers and feasts on the problem eventually generating a solution. There is a constant and steady flow of traffic between the conscious mind and the unconscious mind. Koestler (1964) explained that conscious learning eventually becomes unconscious habit. In the other direction, Koestler (1964) noted, the unconscious mind, can during "sudden surges of creativity, which may lead to a restructuring of the whole mental landscape" (Koestler, 1964, p. 181).

There are times where an individual needs to take a step back in order to digest the information, situation, and complexities of the problem. "The period of incubation represents a reculer pour mieux sauter" (Koestler, 1964, p. 210). This phrase in the French language means to take a step back in order to make a better jump. "After the creative anarchy emerges the new synthesis" (Koestler, 1964, p. 230). Guilford (1967) similarly echoed this sentiment when he described a condition whereby the creative person becomes fatigued. Guilford (1967) noted that "certain wrong directions have gained such recent value that they inhibit the trying of other directions" (Guilford, 1967, p. 320).

By contrast, Wallas (1920) did not so much write about incubation as a creative process as much as he explained about the mysterious process of the unconscious holding sway and influencing the conscious mind. Wallas (1920) observed that one is "largely unconscious of the actual process of inference, which went on perhaps more rapidly when he was asleep, or thinking of something else, than when he was awaken and attentive." (Wallas, 1920, p. 153). Wallas (1920) devoted quite a bit of mental real estate to investigating the effects of instinct and the unconscious on the waking mind, much more so that Koestler did. Eventually, Wallas (1926) developed a four stage model of creativity that uses incubation as the second step. The

incubation step of his creative process provides a hiatus from problem solving, allowing the mind to work on the problem in the background.

There are times where an idea comes along that are so powerful, and impressive that everyone looks up and takes stock. The idea of the incubation creative process is one of those ideas. All of the theorists acknowledged the power of incubation in the creative process. Guilford (1967) was no exception. “Creative people will testify to the benefits of incubation, if not to its necessity” (Guilford, 1967, p. 320). Guilford (1967) explained that the unconscious mind is churning away on a problem during the incubation period. During a period of working on a problem, fatigue sets in. Afterwards, there is a period of incubation where the mind is allowed to rest, recover, and engage the subconscious mind. Insightfully, Guilford (1967) also described a situation where a period of incubation allows a fresh start on a problem. Guilford (1967) described a situation where failed attempts are allowed to lose their hold on the present. “During the lapsed time of incubation, such information loses its recency value and more fruitful recalls can be affected” (Guilford, 1967, p. 320). In other words, the previous failed attempts, setbacks, failed experiments, or misleading directions lose their power and a fresh start can be engaged.

Guilford (1967) explained that there are several mechanisms potentially at working during the incubation period. He sagaciously identified that transformation, insight, intuition, emotion, mental state, environment, personality, personal experiences, and motivation play an important role in the incubation creative process. Guilford (1967) explained that information and perspectives can be modified and transformed. Incubation can also allow for a moment of insight. The mind, when allowed, to brew on a problem can develop a chance to see connections, develop perspectives, and visualize solutions. In short, insight is allowed to flower during the incubation period. Intuition plays a role in the incubation process because the mind is fed

information that allows it to get a grip on a potential solution. Intuition is an innate sense of direction that can be taken in order to solve the problem. As more information becomes available to the creative person is allowed to develop perspective that allows an educated guess to take place which facilitates problem solving. Guilford (1967) explained that emotional content plays a role in the incubation process based on "the strength of motivation of the individual, the amount of frustration he may have endured for lack of progress, the size of the intuitive leap, and the importance of the outcome" (p. 321). Mental state can play a role during the incubation process, Guilford (1967) noted, when the mind is allowed to relax. The creative person can foster this through meditation, daydreaming, trances, scanning, dream like mental states, and vivid dreams. The environment can foster creativity during the incubation period, Guilford (1967) expounded, when there is quiet environment. Environments that are free of distractions, interruptions, and chaos can calm the mind and as a result fosters creative thought. Guilford (1967) explained that a personality can influence the creative process as well. He described four relevant types of personality that influence the incubation process which include "guessers, intuitive leapers, poor problem solvers, and steady logical thinkers" (Guilford, 1967, p. 322). Personal experience can play a role in the creative incubation process because past experience can lend insight into the problem and generate ideas. Finally, Guilford (1967) explained that motivation can play a role in the process because it can provide a drive to solve a problem that can "affect the shaping of solution, producing possible transformations during the state of incubation" (p. 324).

One of the most interesting insights that Guilford (1967) described is a similarity between learning and creative production. The effectiveness of learning is enhanced when there is a period of time is allowed to elapse between learning periods. This is similar to the process during the creative thinking process that incubation is engaged.

There common sense explanations as to why this creative process works. When a person works too long on a problem, perhaps fatigue sets in, or the person becomes too close to the problem and keeps visiting the same line of thinking. Taking a break allows the person to rest, or become exposed to different, new environmental stimuli which can take their thinking in a new direction. As a result, creativity is stimulated and a solution is allowed to emerge from the mind.

The incubation creative process uses a period of elapsed time between thinking in order to allow the unconscious mind to gain a foothold on the problem. The incubation creative process starts off by solving a problem using any other method. Information is gathered and processed, and then some possible solutions are proposed. However, a feasible solution fails to emerge. The incubation process then utilizes a period of rest where the unconscious mind is allowed work on the problem. After this period, a new start on the problem allows the creative modern American citizen to take thinking in a new direction. New insights, ideas, and perspectives can also be generated during this incubation period.

Methodical creative process

The methodical creative process involves a planned concerted effort to develop a new idea. This technique deliberately engages and nudges the creative person to produce an innovative thought. The process may involve lengthy and exhaustive planning and work in order to produce a viable idea.

Methodical creativity entails utilizing facts, leveraging experience, and analyzing the situation. “The first act in skilled routine thinking and problem solving is the tuning in of the code appropriate to the task guided by some obvious similarity with situations encountered in the past” (Koestler, 1964, p. 209). The analysis starts off with the problem definition, experimentation, gathering of facts, understanding the circumstances, problem environment, and

principle perspectives. Through a methodical procedure, for example the "differentiation of structure, and integration of function" (Koestler, 1964, p. 416). An exhaustive search of potential solutions results in the emergence of a creative idea. "The last stage, verification, elaboration, consolidation, assimilation, interpretation, and clarification" (Koestler, 1964, p. 225) completes the process.

Some problems require the acquisition of new skills, habits, or complex knowledge. Koestler (1964) explained some learning methods including imitation, imprinting, generalization, abstraction, transfer, and discrimination. Furthermore, Koestler (1949) noted that the social and man-made environmental change of modern society exacerbates the problem of staying current with respect to knowledge and skills.

Guilford and Hoepfner (1971) took a radically different route than Koestler. Guilford and Hoepfner (1971) conjectured that intelligence can be decomposed into three domains, contents, operations, and products. The contents deal with the basic types of information, including figural, symbolic, semantic and behavioral. The products concern how information is processed including units, classes, relations, systems, transformations and implications. Finally, the operations include cognition, memory, *divergent production, convergent production* and evaluation. Taken together using the operations on the contents and products, a methodical decomposition of the problem can be performed. Guilford and Hoepfner (1971) defined that divergent production as the "generation of logical alternatives from given information, where the emphasis is upon variety, quantity, and relevance" (Guilford & Hoepfner, 1971, p. 20). Today, psychologists refer to divergence production as divergent thinking, which is part and parcel of creative thinking. Furthermore, they defined convergent production as the "generation of logical conclusions from given information, where emphasis is upon achieving unique or conventionally

best outcomes" (Guilford & Hoepfner, 1971, p. 20). Similarly, the modern parlance given to this terminology is convergent thinking.

In a more practical approach than either Koestler or Guilford and Hoepfner, Wallas (1920) approached the mechanism of methodical thinking in a more pragmatic fashion, wallpapering the mental walls with practical examples. Wallas (1920) described works being "produced by intellectual calculation" (Wallas, 1920, p. 24). This personifies the essence of the methodical creative process. Indeed, most methodical approaches to a problem are "preceded by a calculation of ends and means" (Wallas, 1920, p. 24). The twin tools of inference and association give a helping hand, and conviction can occur through "a long train of cogent reasoning" (Wallas, 1920, p. 41). Wallas (1920) concluded that people who act on reasoned opinion fall into two distinct camps. The first uses inferences as the principle way to reach "a preconceived end, and secondly, that all inferences are of the same kind, and are produced by a uniform process of reasoning" (Wallas, 1920, p. 98). Wallas (1920) brilliantly penned that methodical thinking tries to "proceed by rigorous and confident processes to exact results" (p. 115). "We must aim at finding as many relevant and measurable facts ... and we must attempt to make them serviceable to ... reasoning" (Wallas, 1920, p. 121). Wallas (1920) described the quantitative and qualitative aspects of collections of detailed facts. They can be employed not just to "general propositions otherwise established, but to provide quantitative answers to quantitative questions." (Wallas, 1920, p. 158). In addition to facts, clear and creative thinking should be applied to the situation. Wallas (1920) noted the "general utility of right methods of thought" (Wallas, 1920, p. 207).

Wallas (1926) brilliantly developed a four stage model of a methodical approach to creativity which he termed *stages of control*. The modern researchers of thinking and creativity still pay homage to Wallas (1926) by referring to it as the Wallas stage model of creativity. An

analysis of a methodical approach to creativity would be remiss without an evaluation on it. The four elements of the Wallas stage model of creativity include preparation, incubation, illumination and verification. The Wallas (1926) stage model of creativity has influenced other similar stage models of creativity.

Doubtless, Guilford (1967) was influenced by the ground breaking work performed by Wallas (1926). Guilford's (1967) careful dissection of the creative methodical process incorporated memory and experience as a vital element of the process. Whereas, Wallas (1926) missed the critical importance that memory plays during the methodical creative process.

Wallas (1926) wrote that during the preparation stage the creative thinker "consciously accumulates knowledge, divides up by logical rules the field of inquiry, and adopts a definite problem attitude" (p. 10). During the preparation stage, the problem is investigated, and information is gathered about the problem that should prove valuable to formulating a solution.

Wallas (1926) explained that in the incubation stage, the creative thinker takes a break from the problem, and gives his conscious mind a hiatus from the intense direct mental activity. An interesting observation that Wallas (1926) made in describing his stage model of creativity was that "incubation was preceded by a Preparation stage of hard, conscious, systematic, and fruitless analysis of the problem" (p. 81).

Wallas (1926) astutely continued that a flash of illumination occurs in the next stage whereby a creative solution is produced. Wallas (1926) wistfully acknowledged that a "direct effort of will" (Wallas, 1926, p. 93) can not influence the illumination stage. In other words, the creative thinker can not merely will into existence a solution to the problem at hand. Wallas (1926) dutifully described that the final flash of illumination occurs through a leap of association, or a successful train of thought, results from the work of the *fringe consciousness.* Wallas (1926)

described the fringe consciousness as the corona border between the focal consciousness and the unconscious mind. Wallas (1926) also described that *intimation* can encourage the illumination stage. Wallas (1926) defined intimation as the point where the "fringe consciousness of an association train is in the state of rising consciousness which indicates that the fully conscious flash of success is coming" (Wallas, 1926, p. 97). In other words, intimation is a point where the creative person knows that a solution is relatively imminent. The illumination stage is the point where the creative solution or creative production occurs. However, the preparation and incubation stages lay the necessary groundwork for creativity.

Wallas (1926) defined the verification stage as a period where "both the validity of the idea is tested, and the idea itself was reduced to exact form" (p. 81). The final stage is the verification stage, Wallas (1926) carefully explained; an unintuitive observation that Wallas (1926) made was that the verification stage resembles the preparation stage because of the conscious work, and logical process that goes into the execution of the two stages. Today, the Wallas four stage model of creativity may seem somewhat intuitive. When an idea is produced, the creative person goes through some preparation, takes a break, and then has a flash of insight, envisions a solution, and then verifies his proposed solution. Perhaps these notions seem obvious today because Wallas planted the mental seed that have sprouted in researchers minds over the decades that followed.

In a more methodical manner than Koestler, Guilford (1967) ventured to explore the methodical creative process. Guilford (1967) termed the process as creative production. He cited the creative process as containing seven steps. The first step was to observe a need or difficulty. This seems to make common sense. Before a person will engage looking to solve a problem there must be a perceived need or difficulty. Guilford (1967) perspicaciously observed that

information is filtered and only after this filtering is a person's attention aroused and directed. Guilford (1967) also explained that information falls into four categories, that of visual-figural, symbolic, semantic and behavioral information. Visual-figural information is data that can be perceived with the eye, such as shapes, objects, colors, and patterns. Symbolic information consists of things that are abstract in nature, such as mathematical expressions, names, signs, musical notes, and chemical equations. Symbolic information deals with "verbally meaningful" (Guilford, 1967, p. 315) concepts, such as truth, justice, beauty, and liberty. Behavioral information has psychological content. The second is to formulate a problem. The next step involves trying to compose, describe and express the problem. The defect or need must be transformed in such a way that it can be solved the creative person. The third step is to survey available information. As ammunition for a solution before it is fired out of the mind, information must be gathered. The fourth is to formulate a solution. The creative person tries to concoct a way to solve the problem. The fifth step is to critically examine solutions. Guilford (1967) astutely observed that "The operation of evaluation is also quite generally distributed, for there can be testing of information at any step of the way" (p. 314). The next step is to formulate new ideas. Once a solution is formulated, defects can be discovered and evaluated. Afterwards, new contingencies, and alternatives can be composed to sidestep pitfalls and shortcomings of the original solution. This is at the heart of the creative process. Finally, in the last step the idea is tested and accepted.

The methodical approach to problem solving and creativity utilizes many dimensions of thinking. Many aspects of the problem are methodically analyzed; different aspects of the information to pertaining to the problem are processed. This method is, of course, well suited to those kinds of problems that could lend itself to an exhaustive search of the problem space. This

is also amenable to a modern American citizen because of their access to cheap and powerful computing resources.

One important aspect of the methodical process of creativity that is analyzed by Guilford and Hoepfner (1971) but missed by Koestler (1964) is that of engaging reasoning to augment creative potential. Guilford and Hoepfner (1971) identified reasoning methods such as manipulating symbols, defining problems, testing hypotheses, sequencing, identifying principles, spotting trends, visualizing systems, isolating relations, analyzing forms, seeing common elements, classifying, correlation, drawing inferences, and using syllogisms.

Recycling ideas creative process

Reusing ideas is another creative technique that can be employed to generate ideas. Recycling ideas might entail the use of one idea in a particular application and transferring it to a different discipline. Another process might use an idea that worked before for one problem and tweaking it to cope with a new situation. Koestler (1964) pointed out that ideas and progress are "neither continuous, nor cumulative in the strict sense, its discoveries are often forgotten or ignored, and rediscovered later on" (p. 253).

One common way to recycle ideas is through analogy. Making a comparison between two systems requires thoughtful creativity. Koestler's (1964) manufactured the concept of bisociation to describe the situation when "two previously unconnected frames of reference are made to intersect" (p. 320). Koestler (1964) also discussed cross-references, hidden analogies, metaphor, and associative context as a means to transcend one frame of reference into a new one. Analogy can be used effectively when one well understood concept is employed to draw parallels to a new situation. The intention being that the well understood concept can help identify some structure that would allow an individual to gain insight into the problem. Likewise,

the analogy can be used to help identify a new solution. Perhaps the parallel structure might carry over into parallel functionality as well.

Koestler (1964) illustrated the use of analogy in the recycling ideas creative process. A young person tries to direct a group of goslings with a stick. The analogy is drawn to that same person but older, trying to direct a group of young dancers with a parasol. In this analogy, the young geese are likened to young dancers. Both of these groups are uncoordinated, youthful, and learning to take their first steps. The creative person might draw some functional parallels in the two situations. The director of the group might have a hard time managing the goslings or the dancers because they are unaccustomed to such instruction. The goslings and dancers both lack grace, composure, form, coordination, and style.

Recycling old ideas into new contexts, new frames of reference, new applications, and new disciplines can be a source of creativity. However, they can also impede the production of new ideas through the stubborn entrenchment of habits. Koestler (1964) warned that "the stubborn powers of habit, the antithesis of habit and originality" (p. 235). Habits can be broken, Koestler (1949) foresaw, when they are inadequate to a specific task. Thus, habits are then subject to *original adaptation* when they undergo *creative stress* (Koestler, 1949, p. 248).

Wallas (1920) by way of contrast to Koestler (1964) considered recycling ideas from a more basic perspective. Wallas (1920) described how "old *a priori* methods which we have inherited" (Wallas, 1920, p. 154) play a significant role in our current thought processes. How an idea comes to be recycled, resurrected and reused is a mechanism of creativity rooted in our past experiences and the past experiences of mankind.

Guilford (1967) in contrast to Koestler and Wallas did not emphasize the use of recycling of ideas. However, he stated "that many problems are capable of solution by different routes"

(Guilford, 1967, p. 344). The creative process of recycling ideas capitalizes on the idea that there are many ways to solve a problem, and that some of those solutions will be similar to solutions used in other disciplines.

Guilford (1967) explored perhaps the most important part of recycling ideas, that of the role of memory in problem solving. "Recall is dependent upon retention and retention is dependent upon learning" (Guilford, 1967, p. 303). Guilford (1967) cited a number of factors the influence the recall of memory for use in the creative process, these include "general relaxation, completeness of the instigating situation, *replicative recall*, *over-learning*, recency of exercise, confidence of the individual, transfer recall, suspended judgment, search, localization, clustering, and scanning operations" (p. 303). Relaxation refers to the ability to calm the mind which facilitates in the recall of information. Completeness of the situation refers to how well the creative person observed the situation which produced the memory. Replicative recall brings back memories based on cue which jog a person's memory. Over-learning is defined as study, practice, or learning after proficiency has been attained. Guilford (1967) noted that over-learning improves discrimination of details in recalling memories. Recency of exercise refers to how close in time the memory was brought into conscious thought. Confidence of the individual refers to self-assurance in trying to bring back memories. Guilford (1967) defined transfer recall as the "retrieval of information instigated by cues in connection with which the information was not committed to memory storage" (p. 303). Suspended judgment is the reduction of judgment and evaluation during recall. Deliberately searching for memories can help to produce them. Localization refers to organizing information in such a way as to aid recall. Structuring and organizing memories into patterns and categories allows a person to recollect memories in order to effectively use them to recycle ideas. Clustering of information into classes can assist in

recalling information. Finally, Guilford (1967) astutely noted that scanning operations are akin to mental radar scanning the skies for memories.

The creative process of recycling ideas produces ideas through the use of solutions that have worked in other disciplines, or applications. The recollection of memory and experiences is one of the principle mechanisms by which a modern American citizen can recycle ideas. Solutions that are experienced in on application are reused in a new context. Analogies are another way that ideas can be conceptual transferred for new applications.

Redefinition creative process

Redefining the problem is another creative process that is employed to generate ideas. When a problem seems intractable, the creative person can alter the parameters by which the problem needs to be solved. A creative redefinition of the problem can relax the stringent constraints of the problem, facilitating ideas.

Guilford and Hoepfner (1971) identified redefinition as a fundamental way to generate creative solutions. Redefinition can be defined as "an organism revises the way in which he uses an object" (Guilford & Hoepfner, 1971, p. 130). They stated that creative effort is required in revising the accepted and known ways of utilizing an object and adapting it to new forms. Redefinition arrives through a "shift of function" (Guilford & Hoepfner, 1971, p. 131). That is, finding new or uncommon uses for common objects. It also implies finding uses for objects other than their original design. Redefining the application of an object is another aspect of redefinition. This aspect of redefinition might not alter the goals; however, the items involved in the problem undergo a redefinition.

Guilford and Hoepfner (1971) proclaimed sensitivity to problems as a primary mechanism that creative people employ. They defined this as the "awareness of needs for change

or for new devices or methods, or the awareness of defects and deficiencies in things as they are known to exist" (Guilford and Hoepfner, 1971, p. 125). This definition implies that creative people who have this awareness are able to translate that awareness into a problem statement that could then search for a solution. The ability to generate new problems to solve is at the heart of redefinition. If a modern American citizen can identify something that needs to be fixed, or a deficiency in something, or a need waiting to be fulfilled that is a problem waiting to be solved. Similarly, if a person is currently working on a problem, and they are sensitive to problems, they might find a new tact to take the problem in. Likewise, a creative person might reconceptualize the problem entirely by redefining what needs to be solved.

Koestler (1949), unlike Guilford and Hoepfner, did not discuss redefinition directly. However, Koestler (1949) indirectly implied that redefinition could be used as a way to solve problems and generate ideas. By visualizing the problem in a different light a problem can be solved. Koestler (1964) proffered a couple of examples which utilized redefinition as part of the strategy to solve the problem.

Serendipity and luck creative process

Serendipity and luck use chance to identify a new idea. Of course, a creative individual can not depend on luck to produce an idea. However, some diligent preparation, and keen observation will persuade fortune to come knocking at the door. "The history of discovery is full of such arrivals at unexpected destinations, and arrivals at the right destination by the wrong boat." (Koestler, 1964, p. 145).

Serendipity involves laboring to generate a solution and then stumbling upon a solution. The definition of the word serendipity involves looking for a solution to a problem and then stumbling over the solution to a problem. The newly found idea is typically the solution for an

altogether different problem than the one the creative person had originally set out to solve. Serendipity also involves luck. However, here again fortune favors a well prepared individual. One must be seeking in the first place in order to find a solution to something. Chance smiles kindly on the well prepared individual.

Koestler (1964) contended that the discovery of a solution was more probable the more preparation there was. Koestler (1964) coined this effect the *ripeness* of discovery. That is to say, adequate preparations for a situation allow a researcher, scientist, investigator, or explorer a greater probability of actually making a discovery. “The more ripe a situation is for the discovery of a new synthesis, the less need there is for the helping hand of chance.” (Koestler, 1964, p. 109). So, the creative process of serendipity starts with the thorough and careful preparation in search of a solution or creative idea. Serendipity requires an individual to do his homework and make adequate preparations, saturating his mind with the details of the problem. Serendipity then requires an element of luck as the spark to set of the powder-keg of creativity.

Koestler (1964) discussed the term *trouvaille*. This French term has come down in the English language to mean a lucky find, or an ingenious idea. Koestler (1964) employed the term to mean, “The discovery of a felicitous poetic comparison” (Koestler, 1964, p. 320). Trouvaille captures the spirit of this creative method.

Koestler (1964) described one of the most famous examples of fortune smiling upon the creative hopeful. The discovery of an anti-rabies vaccine by Louis Pasteur in 1879 was made by chance and gave birth to modern immunology. He had been studying cholera in chickens and happened to leave his cultures sit for a season. When he returned to his work, he found that chickens given the old cholera culture became resistant to injections of the active disease. Had he

not been interrupted at the beginning of the season we might not have vaccines today to inoculate people against diseases.

Serendipity and luck utilizes fortune to produce a windfall. The process starts off with thorough preparation in search of a solution. With the proper preparations in place, the normal process of discovery, experimentation, and invention proceed. Perhaps, many of the other creative processes are also engaged. Eventually, with luck and careful observation a solution can be generated.

Spontaneous creative process

The spontaneous creative process capitalizes on the mind's ability to spontaneously generate ideas. This uses a flash of insight, a spark of intuition, or a stroke of genius to produce a solution. The spontaneous generation of ideas can produce ideas out of thin air. "The solution of a problem popped up spontaneously and ready-made, as it were, from the depths of the unconscious" (Koestler, 1964, p. 164).

There are times where ideas seem to spring out of nowhere, pouncing upon the mind in a burst of inspiration. "Spontaneous intuitions, unconscious guidance, and sudden leaps of imagination" (Koestler, 1964, p. 208) are engaged to germinate new ideas. One of the unique human endowments is the ability to produce an idea out of nothing. In addition to Koestler's sentiment Wallas (1920) added that each person has unique and individual mental facilities. "Every man differs from every other man in his interests, his intellectual habits and powers, and his experience" (Wallas, 1920, p. 172).

Perhaps the most famous example of the process of spontaneous creativity lies with the ancient Greek scientist, Archimedes. Koestler (1949) spun the tale of Archimedes trying to determine the weight of Hiero's crown. If the volume of the crown could be found, that could be

multiplied by the specific weight of gold, which would determined if the crown were indeed made of pure gold. If he could melt down the crown into a cube it would be easy to attain its volume. Later, when taking a bath, Archimedes had the spontaneous flash of insight required to solve the problem. He noticed that the volume of water displaced is equivalent to the volume of the object immersed in the water. Upon producing the solution, he ran through the streets shouting, *Eureka*! Eureka in the Greek language translates to mean *I have found it*. In this example, Archimedes has immersed himself in his problem. He had studied the situation thoroughly. He had set the stage for discovery.

From a different angle than Koestler, Guilford, and Hoepfner, Wallas (1920) considered spontaneous thinking from impulse and instinct. He states that people assume that every act is "the result of an intellectual process, by which a man first thinks of some end which he desires, and then calculates the means by which that end can be attained." (Wallas, 1920, p. 21). He warned that the acts that people choose to undertake are often not the result of "a deliberate search for the means of attaining and ends." (Wallas, 1920, p. 21). In other words, there are times where spontaneous impulses and instincts influence thinking. Wallas (1920) pointed out the difficulties in trying to ascertain the root causes of a mental process. He stated that there are no easy ways to draw sharp distinctions between mental states. He compared the states to the strings of a harp being strummed altogether, "so that emotion, impulse, inference, and the special kind of inference called reasoning, are often simultaneously and intermingled aspects of a single mental experience" (Wallas, 1920, p. 99).

The spontaneous creative process, like the serendipity process involves setting the stage. Careful preparation, study, experimentation, investigation, and searching for a solution create the backdrop for creativity to spring forth. The mind is capable of wonderful leaps of insight and

producing powerful intuitive ideas. Under the right conditions and proper preparation, ideas can spring forth from the mind.

Synthesis creative process

Synthesis is the merging of two concepts into a new idea. Synthesis is the integration of component parts into a whole. Synthesis can be used as a creative process to take separate ideas, separate things, separate concepts, and fuse them into a new idea. A simple example of this is the hybrid automobile, where an internal combustion engine is synthesized with an electric engine resulting in an automobile that can achieve phenomenal gas mileage efficiency.

Guilford and Hoepfner (1971) defined synthesis as being "concerned with organizing parts into wholes" (p. 129). In other words, this is the ability to combine things together to form new wholes. The ability to integrate parts into new wholes is certainly a valuable asset in thinking out of the box. Guilford and Hoepfner (1971) also mentioned *gestalt completion, object synthesis,* and *concept synthesis* as another aspect of synthesis. Gestalt completion is the ability to assemble things from fragmented parts. Object synthesis involves combining simple objects into a new conceptual object. Concept synthesis integrates two ideas used in conjunction to suggest a new idea.

Koestler (1964) proposed a similar assertion to Guilford and Hoepfner (1971). He insightfully explained, "The creative act, by connecting previously unrelated dimensions of experience enables him to attain a higher level of mental evolution" (Koestler, 1964, p. 96). This powerful technique occurs so frequently when people try to solve problems, that it has come down into common parlance in the phrase, "putting two and two together". Koestler (1949) argued that creative synthesis arises from the cross-fertilization of different frames of reference, or associative contexts.

Koestler (1964) placed more emphasis on the process leading up to the insight that allows for a synthesis of ideas than Guilford and Hoepfner (1971). Koestler (1964) described the exploration of one of the component ideas, contexts, frames of reference, or concepts in the quest for a solution before it becomes synthesized with another one. Guilford and Hoepfner (1971), by contrast, explored various resultant types of synthesis. In other words, Koestler (1964) did not directly consider the various kinds of synthesis that can be employed.

Like Koestler and Guilford, Wallas (1920) saw the usefulness of associating ideas. During the process of thinking, one mental process "may call up another, either because the two have been associated together in the history of the individual, or because a connection between the two has proved useful in the history of the race" (Wallas, 1920, p. 101). So there is another interesting aspect that Wallas (1920) brought up which neither Koestler nor Guilford notice. That is the power of synthesis by way of connecting the accomplishments of mankind. Wallas (1920) wrote of arranging mental associations to discover truth, or attain a particular end. Wallas (1920) explained that "exact reasoning requires exact comparison" (Wallas, 1920, p. 115). Many of the fruits of science have been produced through these exact comparisons. Wallas (1920) noted that abstracted quantities can be compared and that inferences can be drawn about the behavior of two different things under similar circumstances. Indeed, one can see how useful this could be to science.

For every idea there is an equal and opposite idea. For every black there is a white, every yin there is a yang. Wallas (1920) warned of flaws with the use of synthesis. This is unlike Koestler and Guilford, who focused only on the productive aspects of associations. "But even in our personal affairs our memory is apt to fade, and we can often remember the association between two ideas, while forgetting the cause which created that association." (Wallas, 1920, p.

104). All that is left, he continued, are vague impressions, a vivid belief. But if confronted or cross-examined a person would not be able to recall the finer details. As if that were not enough, Wallas (1920) also described the even more disturbing situation. That is, one where "a vivid association once formed sinks into the mass of our mental experience, and may then undergo developments and transformations with which deliberate ratiocination had little to do" (Wallas, 1920, p. 107). Finally, a person might adopt a train of thought by suggestion, internalize it by habit but he "does not necessarily feel the need of comparing them with other trains of arguments already in his mind" (Wallas, 1920, p. 112). Of course, this can lead to a confused jumbled of mental spaghetti.

One simple example of synthesis available to a modern American citizen is a hybrid gasoline-electric vehicle. The car uses the concept of an electric engine with that of an internal combustion engine. Thus it is capable of using either electricity or gasoline as a source of energy. Together hybrid vehicles are far more fuel efficient than an ordinary automobile powered only by a gasoline powered internal combustion.

Synthesis as a creative process uses associations to connect disparate concepts into a new whole. Guilford (1967) identified figural systems and *semantical systems* thinking as an important aspect of divergent thinking. This aspect of creative thinking is characterized by combining component elements into a whole system. The synthesis process involves a deliberate integration of two concepts, fusing them together into a new concept.

Thinking out of the box creative process

The creative process of thinking outside of the box uses a deliberate act of creativity. The cliche thinking out of the box has come to mean unusual, exotic, atypical, outlandish, or

eccentric thinking in order to stimulate creativity to generate a meaningful idea. Thinking out of the box allows the creative individual to deliberately craft an unusual solution to a problem.

Koestler's (1964) insightfully used the classification of the sage, artist, and jester to represent discovery, art, and humor through the process of comic comparison, objective analogy, and poetic image. The scientist reasons by the logical application of analogy. Koestler (1964) described a unique creative process that utilizes out of the box thinking. The basic process that Koestler (1949) described is a *bisociative* technique. The bisociative technique involves one *frame of reference* transcending onto another frame of reference. Another situation occurs when two frames of reference are fused together and a new solution is created. Koestler (1964) asserted that independent frames of reference can collide which ends in humor. He stated that when frames of reference fuse it ends in an *intellectual synthesis* (Koestler, 1964, p. 45). It can end in confrontation which results in aesthetics. Humor often jumps the tracks of one line of thinking onto another in order to make a point. Koestler (1964) called this effect *bisociative shock* (Koestler, 1964, p. 91).

Koestler (1964) provided a number of brilliant examples illustrating this bisociative effect taking place. Koestler (1964) cited an example of a chimpanzee learning how to use a stick as a tool to get a piece of fruit that is out of arm's reach. The chimpanzee previously used the stick as a toy. So the frame of reference for the stick is that of a play thing, not a tool with utility purpose. The chimpanzee must transcend the initial frame of reference at some point, allowing it to transcend to frame of reference where the stick is a tool that can be used to retrieve objects out of reach. The illustrative example of a chimpanzee using a stick to get a piece of fruit employed by Koestler (1964) was a good example of the process of thinking out of the box.

There are varieties of ways in which out of the box thinking can manifest itself. Koestler (1964) mentioned analogy, paradox, satire, caricature, irony, allegory, deformation, displacement, simplification, exaggeration, pun, optical pun, reversal, association, symbolization, verbal formulation, merging form and function, making the abstract concrete, repetition, and implication as creative tools. Koestler (1964) identified that the creative artist uses empathy, transference, projection, illusion, rhyme, repetition, affinity, puns, analogy, selection, satire, allegory, nonsense, comic verse, exaggeration, simplification, dramatic conflict, integration, confrontation, archetypes, to produce ideas.

Guilford and Hoepfner (1971) focused on a similar but different set of basic tools from Koestler (1964) that facilitates thinking out of the box. They favored syllogisms, association, visualization, analogy, classification, consequences, expression, common sense, and synthesis. One thing seems apparent comparing Guilford and Hoepfner to Koestler, that there are a multitude of ways to think out of the box.

Unlike Koestler, Guilford and Hoepfner (1971) analyzed the psychological aspects of creativity. Aside from specific methods, Guilford and Hoepfner (1971) described some important psychological characteristics exhibited by creative individuals associated with out of the box thinking. These are fluency, flexibility, originality, and synthesis. Remote associations, Guilford and Hoepfner (1971) astutely observed, are associated with originality because a person can "see more tenuous and less obvious connections between things and between ideas" (p. 121).

Guilford and Hoepfner defined *fluency* as a sort of mental dexterity, the ability to generate "multiple answers to the same given information, in limited time" (Guilford & Hoepfner, 1971, p. 126). Clearly, the ability to think on one's feet is an invaluable trait that can be employed in thinking out of the box. Mental fluency suggests the ability to make associations

in order to stimulate creativity. They identified the words *fluency, associational fluency,* and *ideational fluency* (Guilford & Hoepfner, 1971, p. 132) as different aspects of fluency.

Flexibility was clearly defined by Guilford and Hoepfner (1971) as composed of three parts, "sign changes, freedom from inertia of thought, and spontaneous shift of set" (p. 127). Primarily, they discussed flexibility as the ability to adapt to changing circumstances. Thinking out of the box is facilitated by breaking free from the shackles of the inertia of thought. A shift of set is the ability to change the category of a concept from one line of thinking to another.

Originality goes hand in hand with creative thought. Guilford and Hoepfner (1971) characterized originality in a lucid manner. They described it as "uncommonness of response, remote associations, seeing uncommon uses for objects, and cleverness" (Guilford & Hoepfner, 1971, p. 128). Originality should seem obvious as an important characteristic of thinking out of the box.

As stated before, Jay P. Guilford coined the term divergent production which has come down into today's psychological parlance as divergent thinking. A probe into the workings of creative thinking would be remiss without discussing divergent thinking in more detail. The aspects of divergent thinking are related to the thinking out of the box creative process. Guilford (1967) defined numerous different aspects of divergent thinking each of which add a potential methods to think out of the box. Guilford (1967) termed these *figural* units, figural classes, figural systems, figural transformations, figural implications, symbolic units, symbolic classes, symbolic relations, symbolic systems, symbolic implications, semantic units, semantic classes, semantic relations, semantic systems, semantic transformations, and semantic implications.

Aspects that deal with figural things involve visual perception, or visual manipulation. This concerns the pattern, color, shape, size, volume, dimension, or other visual characteristics of

an object. Thinking out of the box can utilize figural, or visual, information in order to use it to the creative person's advantage. Symbolic information relates to abstract concepts. Examples of this include mathematical equations, chemical symbols, map signs, labels, and names. This gives a person trying to think out of the box conceptual tools during the creative process. Consider, for a moment, how common the use of a name or label is. Modern American citizens create new labels and names for mass-manufactured products, discovered things in nature, and artificial constructs. Modern marketing techniques use symbolic information to label products that will capture the mind's attention. Semantical information is laden with verbally meaningful content. For example, abstract concepts that are captured with a word. Some examples of semantical data are nationalism, liberty, power, and meaningfulness.

A brief description of each of Guilford's (1967) divergent production aspects is given here. Guilford (1967) first elaborated on figural units, which corresponds to visual acuity and manipulation of visual input. Figural classes denote a skill with grouping objects visually. That is, clustering figures into classes. Figural systems involve synthesizing visual-figural parts into wholes. Figural transformations deal with adaptive flexibility, or the ability to mentally shift one visual structure into another. In other words, this is the ability to sport the mental agility and flexibility for visual acrobatics. Symbolic units correspond to word fluency, the ability to vary letters and words. Symbolic classes deals with symbolic classification. In other words, the ability to vary, group, analyze, and manipulate symbols. Symbolic relations deal with symbolic manipulation. That is the ability to combine or re-conceptualize numbers and symbols. Symbolic systems deal with organized verbal discourse. Symbolic implications pertain to symbolic elaboration, or the ability to represent and manipulate equations that employ symbols. Semantic units describe semantical classification. This is the ability to prescribe class properties to things,

the ability to consider consequences, plots and the utility of objects. Semantic classes are characterized by spontaneous flexibility. In other words, this is the ability to adapt ordinary objects for unusual purposes. Semantic relations concerns associational fluency. In other words, this is the ability to find associations between two concepts. For example, an analogy is a synthesis using associational fluency. Semantic systems capitalize on expressional fluency. This aspect entails the organization of syntactical structures, and the organization of ideas. Next, Guilford (1967) explained that semantic transformations are characterized by originality. This is the ability to transform the semantical use of a thing. Originality, Guilford (1967) claimed, is characterized by unusualness, remote associations, cleverness, and ingenuity. Finally, semantic implications "entails an ability to think of details" (Guilford, 1967, p. 160).

Wallas (1926) observed that the modern American citizen has been shaped by a history of pragmatism, accomplishment, and invention. Wallas (1926) noted that Americans are "all occupied in trying to accomplish something. The keyword to America is achievement" (p. 190). That is, the modern American citizen is used to thinking out of the box; the habit has been developed through a legacy of invention. Wallas (1926) contrasted this attitude with the European attitude centered on enjoyment. Wallas (1926) noted that "certain ways of using the mind are characteristic of nations, professions and other human groups" (p. 14). This lends insight to the thinking out of the box creative process. A key part of the process is the environment produced by an optimistic, diligent, inventive, and persistent attitude.

Guilford's (1967) carefully thought out decomposition of divergent thinking characterizes thinking out of the box. More so than the other creative processes, Guilford, Koestler, and Wallas, set off mentally for the four corners of thinking. Guilford (1967) methodically tried to decompose the thinking out of the box process into separate distinct aspects.

Koestler (1949) by contrast, took a big picture view of thinking out of the box. He considered the process of thinking out of the box as a gestalt, and observed that new ideas come from the clash of different frames of reference that become bisociated. Finally, Wallas (1926) subsumed out of the box thinking into his illumination step.

The theorists have identified a plethora of techniques that are engaged in order to think out of the box. Thinking out of the box is a process that searches for solutions in by deliberately jumping the channels of typical thinking. Bisociation, proposed by Koestler (1949) is one possible method of transcending one frame of reference onto a different associative context in order to think out of the box. Guilford (1967) proposed that thinking out of the box employs divergent thinking. Divergent thinking is a basket of methods that can be creatively applied to a problem. These methods foster originality, ingenuity, originality, and independent thinking in order to produce novel, striking ideas.

Conclusion

Many of the most promising intellectual pursuits begin by posing a thought provoking question. The analysis, exploration, and investigation of a well posed question can lead to insights. This paper started off by posing the question, what are the creative processes that modern American citizens use? Through the analysis of the theorists Graham Wallas, Arthur Koestler, and Jay Guilford, a number of principle creative processes were identified.

This paper concludes that creative processes are exploration, incubation, methodical, redefinition, recycling ideas, serendipity, spontaneous, synthesis, and thinking out of the box. Exploration encourages intellectual curiosity to plumb the depths of the problem. Incubation inspires creativity by allowing the solution to gestate. The methodical creative process solves problems through an organized, systematic search of the problem space. Redefinition changes

the context or use of objects, or redefines the problem to facilitate solution. Recycling ideas engages creativity by reusing a solution in one discipline and applying it in a different context. Serendipity sets that stage for a solution and calls upon fortune. The spontaneous process uses a flash of insight to spark new ideas. Synthesis integrates two different concepts into a new fusion. The thinking out of the box process uses unusual thinking methods to stimulate creativity.

Breadth References

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

Guilford, J. P., Hoepfner, R. (1971). *The analysis of intelligence.* New York: McGraw-Hill Book Company.

Koestler, A. (1949). *Insight and outlook*. New York: The Macmillan Company.

Koestler, A. (1964). *The act of creation.* New York: The Macmillan Company.

Wallas, G. (1926). *Art of thought*. London: Jonathan Cape.

Wallas, G. (1920). *Human nature in politics.* London: Constable Books.

Guralnik D.B. (Ed.). (1984). *Webster's New World Dictionary* (2nd ed.). New York: Simon and Schuster.

Core Knowledge Area Modules Number 2 Depth Essay:

Current research on the creative process for modern American citizens

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Citation 1: Bleakley, A. (2004). Your creativity or mine?: A typology of creativities in higher education and the value of a pluralistic approach. *Teaching in Higher Education, 9*(4), p. 463-475.

Critical Summary

This insightful article takes a stab at breaking down creativity into ten different and distinct modes. The different modes listed are: Creativity as an ordering process, creativity as rhythm and cycle, creativity as originality and spontaneity, creativity as the irrational, creativity as problem solving, creativity as problem stating, creativity as inspiration, creativity as serendipity, creativity as resistance to the uncreative, creativity as withdrawal and absence.

Creativity as an ordering process involves structure, boundary, method, principles and classification. Creativity as rhythm and cycle sees creativity as renewal through recycling, patterns, and equilibriums. Creativity as originality and spontaneity emphasizes innovation without replication or reformulation. Creativity as the irrational seeks to transcend order, regulation, and rigidity. It emphasizes instinct, experimentation, impulse, and ambiguity. Creativity as problem solving emphasizes hard work and due diligence. Creativity as problem stating is the careful definition of a problem. Creativity as inspiration cultivates imagination and metaphor. Creativity as serendipity through planned fortune. Creativity as resistance to the uncreative is an effort to break routine and habit. Creativity as withdrawal and absence tries to generate mental distance from the situation.

Critical Analysis

Many of the descriptions were confusing and not very well supported with research. For example, the creativity as rhythm and cycle claimed that creativity comes from ecologically-oriented creativity back up by a story about the Garden of Eden from the Bible. This is an

altogether confusing notion. Some of the modes of creativity, such as originality and spontaneity were obvious, not requiring much in the way of back up material. However, some of the kinds of creativity that were described were excellent. For example, the creativity as problem stating, that uses holistic patterns for structuring understanding was insightful.

In general, the article presented a thoughtful and well designed typography of the different kinds of creativity. Bleakley made a valiant attempt at trying to make sense of all the different kids of creative acts that occur in the wild. Creativity comes in all different sizes and shapes, just as the problems they try to address. It is not easy to categorize a pack of zoo animals as there is a deliberate diversity of creativity animals. Bleakley's claim that there are ten fundamental forms of creativity is a stretch but defendable.

Bleakley's work fits well into this paper because it provides further insight into various creative processes. Indeed, the focus of his paper was to discuss various creative processes.

Citation 2: Cowdroy, R., Williams, A., (2006). Assessing creativity in the creative arts. *Art, Design & Communication in Higher Education, 5*(2), p97-117. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Cowdroy and Williams analyzed creativity from many different angles. They considered how to define creativity, and how it has come to be understood. They considered how to distinguish between different kinds of creativity and levels of creative talent. They described three levels of hierarchy for creativity. They identified conceptualization, schematization, and actualization as the critical components of creative ability. They described how creativity can be learned through three basic learning strategies. The first learning strategy uses memory, based on the effects of rote memorization, recognition and repetition. The second learning strategy uses thinking based on dialectic, diagnosis, and debate. The last learning strategy deals with exploration, experimentation, and extrapolation.

Critical Analysis

Cowdroy and Williams did a good job at thinking through what constitutes and nurtures creativity. They could have explored more on the creative capabilities of the individual. They did a superb job at posing insightful questions which they then later answered. They could have also utilized more contemporary research to give their work more dimensions and areas for investigation. Their conclusion was not as well thought out as the rest of their paper and should have drawn everything together into a tightly knit cohesive whole.

Their research will play a vital role in the development of this paper because they describe important mechanisms of learning and associate it with the creative process. Their description of the basic mechanisms of creativity and how conceptualization, schematization and actualization play a role will prove to be vital.

Citation 3: Díaz-Lefebvre, R. (2004). Multiple intelligences, learning for understanding, and creative assessment: Some pieces to the puzzle of learning. *Teachers College Record, 106*(1), p49-57. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Diaz-Lefebvre lamented about a situation in society where there is too much emphasis placed on basic verbal and basic mathematical skills. Not enough emphasis is placed on understanding, comprehension, simply the regurgitation of information through standardized tests. Creativity and real world challenges require taking ideas and concepts and using them in new situations. Thinking through a problem is an important step in conquering a problem.

Specifically, the focus of Diaz-Lefebvre's paper concerned the educational system. He described a dire situation where students are not understanding, or comprehending the material. Creativity and critical thinking should be fostered along with creative thinking. He touted alternative testing methods as a way of measuring student aptitude and comprehension from instruction.

Critical Analysis

Diaz-Lefebvre hits a nerve center in the educational system. His message rings true in the hallowed hallways of the mind. Education can do more to stimulate critical thinking, independent thought, and creativity. He falls short when it comes to a structured, cogent plan of attack however. More of his paper could have been spent on dissecting the problem and addressing each of the pieces with a cogent strategy.

Diaz-Lefebvre's paper will play an important role in the Depth component of this paper because education is an important creative environmental factor. Additionally, he noted that creativity can be fostered through the exchange of ideas, fostering different perceptions, and using multiple intelligences.

Citation 4: Erill, S. (2002). What if ...? *Lancet, 360*, p. 420. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

The focus of Erill's article was provoking mental thinking through exploring possibilities of alternatives. Erill employed numerous examples where provocative questions stimulated creativity that resulted in important discoveries. For example, when observations of the movement of planets resulted in scientists asking what if the orbits of the planets were elliptical rather than circular. His articles focused around the two words "what if?" He considers the power of a well thought out, and well timed question.

Erill considered how thought provoking questions have influenced history. The source of inspiration and creativity he stimulated through a simple, yet powerful question. A good question can induce exploration of an issue or problem.

Critical Analysis

Erill explored an important aspect of thinking, composing and asking good questions. Of course, this is a fundamental aspect of thinking that can stimulate thinking and guide thinking.

Erill fell short where he could explore the consequences of his thesis more. He fails to back up his thesis with much work from seminal theorists. However, he did use historical examples where provocative questions resulted in important discoveries. Erill does a good job of utilizing historical precedents for his thesis. While well thought out, he did not utilize the work of contemporary researchers to strengthen his claims. Finally, he failed to describe any credible studies or experiments that might lend his claim more credibility.

Erill's work plays an important role in the Depth component because asking an insightful question is an important part of the creative process. His paper serves to add some credible insight into the analysis of creative processes.

Citation 5: Fourmentraux, J. (2006). Internet artworks, artists and computer programmers: Sharing the creative process. *Leonardo, 39*(1), p. 44-50. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Fourmentraux described a creative collaboration between programmers and artists. In a virtual, on-line cooperative effort coordinated through the internet a creative program named Des_frags was produced. This program takes still images and creatively modifies them to create a mosaic of images.

The key element of this work is the description of the creative process. Fourmentraux philosophically explored what it means to create art, how to collaborate, and the nature of a cooperative venture. He also described the technical aspects of the project, and details of the inner workings of the computer program. He described the different dimensions, exchanges, appropriations, negotiations, collaborations, motivations, and other aspects of the project. Fourmentraux finally concluded with some retrospective analysis of the project.

Critical Analysis

Fourmentraux did not back up his work so much with seminal theorists or other researchers. His team and the collaborative project he described are paving new ground simply by describing the work. However, he could have improved his credibility and stature by doing some background research to bolster his claims. His strength and forte, is the clear and lucid exposition of his work, he accurately and vividly described the creative process.

Fourmentraux's work gives some invaluable insight into the creative process. This is particularly true for the area he focuses on that is group, collaborative creative efforts. As such, his research will fit nicely with an analysis on the creative process. Finally, he discusses an incumbent aspect of life in modern American society, the on-line experience.

Citation 6: Gionet, D. (2004). Risking ourselves in the creative process. *PSA Journal, 70*(8), p. 20-22. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Gionet described the creative process as it pertained to photography and the visual arts. Gionet argued that when works become more famous, more exposure of the creative individual is opened up to the world. The creative works of the creative individual also serve as a mechanism whereby a window into the emotions, feelings, and nature of the artist become well understood. Gionet also described the products of perseverance and hard work in the creative arts, recognition, self-esteem, and dignity.

Gionet also described the creative process through observation, persistence, determination, integrity, perception, emotional understanding, and insight. The individual composes his work so that eventually an audience will accumulate. Finally, he described the process of experience and maturation of skill over time as part of the process of learning and growing with a creative work.

Critical Assessment

What Gionet lacked in the form of a legacy of thinkers, he makes up for in spunk. The major shortcoming of Gionet is that he did not build up his rather interesting thesis that the creative process includes maturation and individual insight with any contemporary research or seminal theorists. He was not completely devoid of historical matter, but it was one area where he could improve. Nonetheless, he made a strong argument that part of the creative process is an unveiling of an individual's emotional self.

Gionet's work provides further research and insight into the creative process. A new dimension which was not explored by the other researchers and theorists is that maturation of the creative person over time. This will be useful in the paper.

Citation 7: Hill, R., Johnson, L. W. (2003). When creativity is a must: Professional applied creative services. *Creativity & Innovation Management, 12*(4), p. 221-229. Retrieved August 3, 2007, from the Business Source Premier database.

Critical Summary

Hill and Johnson considered the creative process as it pertains to a modern economy. The businesses and professionals that utilized applied creativity were the centerpiece of their exposition. Hill and Johnson looked at the various products of applied creativity, and also considered the ramifications of the creative industries within a modern economic system. They also analyzed the impact to management of creative services, and the management of creative individuals responsible for providing those services.

Hill and Johnson performed a survey of advertising managers and developed a way to gain insight into the creative process, and the perception of the importance of creativity in professional settings. They discussed five important steps in the creative process which include problem finding, immersion or preparation, idea generation, idea validation, and application and outcome assessment.

Critical Analysis

Hill and Johnson are a pair of shining stars among the mass of contemporary researchers that were used for this Depth component of this paper. Their work was thorough, and well investigated. They balanced data, information, theory and analysis. They drew upon the works of seminal theorists and acknowledged important research that had come before their work. Their decomposition of the problem and analysis of the creative process were well thought out and executed.

The work of Hill and Johnson will play an important role during the methodical creative process, because they discuss that process during their research.

Citation 8: Hummell, L. (2006). Synectics for creative thinking in technology education. *Technology Teacher, 66*(3), p. 22-27. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Hummell described a creative process called *synectics* which is designed to stimulate original thought. It is based on making something new from the old and making the strange familiar. The basic steps in the process involve defining the problem, producing analogies, and then examining the analogies for original and creative ideas. The second basic process aims at exploring the problem in order to foster better understanding. The creative individual through this better understanding can draw out new analogies, create original solutions, and produce new ideas.

Critical Analysis

Hummell provided some excellent examples to illustrate the thesis of her paper. The paper revolved around a worksheet that is designed to engage students in order to get them to apply the techniques outlined in the paper. The survey had very clear instructions and was clearly designed to stimulate creativity. Hummell's paper was well thought out, planned, and prepared. Hummell provided solid theoretical underpinnings to her work. The descriptions used were very clear and easy to understand. Hummell could have explored more carefully the ramifications of the creative processes that are stimulated through the techniques that she described. Each step could have stood more explanation and descriptive details to explore the intricacies of the process that the paper revolves around.

Hummell described a number of insightful steps which will prove useful in the Depth component of this paper. The techniques that are described are perfectly the steps necessary to think outside of the box.

Citation 9: Kohtamäki, M., Kekäle, T., Viitala, R. (2004). Trust and innovation: From spin-off idea to stock exchange. *Creativity & Innovation Management, 13*(2), p. 75-88. Retrieved August 3, 2007, from the Business Source Premier database.

Critical Summary

Kohtamäki, Kekäle, and Viitala considered trust and creativity from a corporate and economic viewpoint. They dissected the important and mechanics of trust during the innovation process. They outlined several stages of a new business coming into existence, which includes the creativity stage, direction stage, delegation stage, coordination stage, and collaboration stage. The creativity stage deals with the innovative and entrepreneurial work. The direction stage the new organization develops and evolves. The delegation stage sees the young organization rising in power, complexity, and strength. The tasks, people, projects, and resources must be delegated carefully. The coordination stage described the organization in the mature stage, even some shrinkage. The coordination of a large organization is one of the most important concerns. The collaboration stage uses teams, negotiation, and partnerships in order to achieve success. They describe the objects of trust as individual, community, institution and systems. Next, they identify the mechanisms of trust as propensity, reputation, calculation, knowledge, and identification. Finally, they called attention to the eight antecedents of trust, predictability, capability, integrity, benevolence, honest, deterrence, community and reciprocity.

Critical Analysis

Kohtamäki, Kekäle, and Viitala did a thorough job at producing a thoughtful, well investigated, carefully organized, and insightful paper. The only shortcoming they had was they could have used some more theoretical background in addition to the contemporary research that they sighted. This research will be useful to the Depth component of this paper because of the perspicacious insight that they had during what they termed as the creativity stage.

Citation 10: Lindström, L. (2006). Creativity: What is it? can you assess it? can it be taught? *International Journal of Art & Design Education, 25*(1), p. 53-66. Retrieved August 3, 2007, from the Academic Search Premier database.

Critical Summary

Lindstrom asked some of the most important and time-honored questions concerning creativity that could possibly be posed. He considered what creativity is, how it could be measured, and could it be taught. He discussed seven criteria to judge creative effort which includes the clarity of intention, composition, craftsmanship, investigation, originality, modeling, and the ability to self-assess.

Lindstrom described a maturation process of the individual, with respect to the creative process in four major categories including investigation, originality, modeling and self-assessment. He described distinct qualities and aspects that characterize the maturation within each of these categories. For example, for investigation, the person goes from minimal cursory work to thorough, self-motivated investigation engaging multiple drafts.

Critical Analysis

Lindstrom did a brilliant job of dissecting creativity within a relatively short article. The work is really quite impressive. He considered many aspects of creativity which are organized in a well thought out fashion which reflects his methodical nature. He fell short only in that he could have provided more theoretical background for his research. One vital aspect of his research was that he performed a study trying to test people for their creativity.

His paper will provide invaluable insight into the creative process. Lindstrom's decomposition of the four qualities of creativity and their maturation are an entirely different perspective that no other researcher or theorist has yet delved into. His descriptions will be useful in the methodical creative process because they involve a fresh perspective.

Citation 11: Lonergan, D. C., Scott, G. M., Mumford, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal, 16*(2), p. 231-246. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Lonergan, Scott and Mumford described the evaluative aspects of creativity. They contended that the evaluation process is creative. When a creative idea, innovation, or product is appraised, evaluated, examined, revised, reformed, or reshaped it undergoes a creative evaluation. The powers of the creative mind are engaged in order to generate the next revision of the innovation.

They described an important aspect of the evaluation process as forecasting, the ability to determine possible outcomes from an undertaking so as to revise the innovation. To put their theory to the test, they produced, executed, and analyzed a study of undergraduate students. They drew several conclusions including the importance of standards; standards of appraisal and revision; task characteristics; and, the originality of ideas.

Creative Analysis

Lonergan, Scott and Mumford performed one of most astounding acts of mental acrobatics among all of the researchers. They drew from an ocean of research and carefully organized the wake of research that others had left behind. Additionally, they performed their own study to further bolster their conjectures. Surprisingly, they were missing a conclusion section. Their conclusions were buried in the discussion section of their study. This is surprising because the quality of their research was outstanding.

The research of Lonergan, et al. will be useful to this paper because they investigated in depth the evaluative aspects of the creative process. More so than any other research or theorist, they delved deeply into the intricacies and consequences of evaluation.

Citation 12: Rank, J., Pace, V. L., Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology: An International Review, 53*(4), p. 518-528. Retrieved August 3, 2007, from the Business Source Premier database.

Creative Summary

Rank, Pace and Frese described the importance of personal initiative, voice behavior, and cross-cultural differences with respect to creativity. At the onset they acknowledged the important of creativity and innovation to the modern economic engine. Furthermore the growing importance of collaborative creative efforts within large organizations needs to be understood.

Self initiative, or the ability to assert personal opinions, is important to creativity because it allows ideas to be heard and a direction to be taken. Voice behavior governs how well the individual manages language and the ability to convey ideas. Cross-cultural differences are important because in a diverse American society that plugs into the international scene understand cross cultural differences becomes an imperative. This is important because global initiatives, international projects, and collaborations have come to dominate society.

Creative Analysis

Rank et al. wrote in a convincing manner that allowed them to convey their principle ideas in a succinct manner. They used a good amount of theoretical research and theorists to back up their claims. The structure of their paper was clear and well thought out. They could have explored the link between creativity and problem solving as it relates to personal initiative more. Some of the terminology they chose to use was needlessly confusing.

This research will be useful in this paper because of the aspects of personal qualities that are discussed. They outlined a clear creative process moving from the generation of a creative idea to socialization of that idea to innovation and then outcome. This lends some new insight into the creative process from a different perspective.

Citation 13: Rothenberg, A. (2006). Creativity - the healthy muse. *Lancet, 368*, p. 8-9. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Rothenberg wanted to emphasize that creativity and unorthodox thinking does not stem from pathological problems, rather creativity is a healthy outlet for a healthy mind. He identified several processes that are related to creativity. The first one he described was articulation. The articulation process describes separating concepts and simultaneously weaving them into an overall whole. This would be analogous to threads of thinking that get woven together into a coherent tapestry. The second he described was the Janusian process. The Janusian process involves mentally holding in a person's mind two opposing concepts. Rothenberg was careful to point out that this was neither a blending nor combination. The last one he described was the homospatial process, which is picturing two things occupying the same physical space.

Creative Analysis

Rothenberg's article was insightful because he described some very interesting creative processes. However, the article was not very well structured; he could have organized his article into sections for each of the processes. The article was well written, it fell short on the thoroughness of his research. However his description of the creative processes was lucid and easily understood. He could have gone into further details and other dimensions of each of the creative processes.

Rothenberg's research will be useful for this paper because he described some vital aspects of the creative process that were not investigated by other researchers. His descriptions of the articulation, janusian process, and homospatial process will be incorporated into the thinking out of the box creative process. His insightful perspectives on creativity will lend new vistas of insight into the paper and lend credibility to the research.

Citation 14: Runco, M. A. (2004). Creativity. *Annual Review of Psychology, 55*(1), p. 657-687. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Runco explored various aspects of creativity, and surveys a basic history of creativity research. He noted that creativity is an important problem solving process, allowing an individual to remain flexible, and cope with changes. Runco also acknowledged several basic divisions of the creative person, the creative process, the creative press, and the creative product. He identified a number of creative processes including synthesis, experimentation, association, incubation, and brainstorming. Runco identified a wealth of factors related to creativity including behavior, motivation, imagery, imagination, meta-cognitive processes, divergent thinking, social influence, problem solving, cognitive processes, intuition, emotion, education, health, personality, environment, culture, humor, leadership, willpower, and neurobiology. Runco argued that creativity should be analyzed by behavioral, biological, clinical, cognitive, developmental, history, organization, psychometric, and social disciplines.

Creative Analysis

Runco performed a more thorough and overarching history of creativity than any other researcher. His background research, analysis, and investigation were more complete than any of the other contemporary researchers. He performed a fantastic survey of creativity, and the basic research that has been performed with regards to creativity as a whole. The organization, prose, ideas, and descriptions were clear and succinct.

Runco's work will be incorporated into this paper because none of the other researchers describe the brainstorming technique. His identification of creative processes reinforces many of the conclusions and analysis performed in this paper. His work will also provide further credibility to the analysis performed in the paper.

Citation 15: Segal, E. (2004). Incubation in insight problem solving. *Creativity Research Journal, 16*(1), p. 141-148. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Segal explored different dimensions of the incubation process. The incubation process is a period of respite that a creative person takes before the creative product or idea occurs. In the *fatigue-dissipation hypothesis*, the incubation period serves to dispel the torpor that sets in when the problem has been worked on for too long. The *unconscious hypothesis* suggests that the unconscious mind continually works on the problem while the conscious mind takes a break during the incubation period. In the *selective-forgetting* hypothesis certain solution that do not work are mentally discarded. In the external-cues hypothesis certain triggers to memory are activated which allow a creative solution to be achieved. In the *attention-withdrawal* hypothesis the creative person's attention is diverted from an improper line of thinking. In the *prepared-mind* hypothesis the person encounters things which help a solution be reached. In the *returning-act* hypothesis the mind is diverted from false things that prohibit a solution from appearing.

Creative Analysis

Segal provided by far the most comprehensive analysis of the incubation creative process of all of the modern researchers. In fact, Segal provided explanations, analysis, and an evaluation that were clear, lucid, and thorough. The article was thoroughly researched and the homework that was done is readily apparent. The structure of the article was well organized, planned and well thought out. The only thing that Segal could have expanded on was to present actual studies or live research results to bolster the claims made. Segal's article will prove to be invaluable in this paper because of the thorough accounts of the incubation creative process. No other researcher or theorist gave such an insightful perspective of the incubation creative process.

Citation 16: Shaddock, D. (2006). My Terrible Muse: Cohesion and Fragmentation in the Creative Self. *Psychoanalytic Inquiry, 26*(3), p. 421-441. Retrieved August 8, 2007, from the Academic Search Premier database.

Creative Summary

Shaddock described the creative process as composed of five principle steps. He defined these steps are preparation, inspiration, realization, completion, and objectification. The preparation step involves laying the groundwork for creative production. Inspiration entails finding things that will foster and encourage creativity. The realization step is characterized by the idea, a new direction, or concept that the creative person can pursue. The completion stage is characterized by a long stretch of work that will be necessary to complete the work and carry the idea to fruition. The final stage is objectification, where the creative product is objectively analyzed. Shaddock also described transformational objects, idealizing experiences, the role of the muse, mirroring experiences, and community as ways to bolster creativity. Then he analyzed some of the pathological conditions that can deter creativity. He identified addition, narcissism, vertical split, depression, and isolation as the principle psychological problems that serve to block creativity. Finally, he concluded with a case study.

Creative Analysis

Shaddock organized his research very well; however his writing leaves something to be desired. Were it not for his outstanding organization and planning, I would have been lost in his obtuse and archaic writing style. He needlessly introduced confusing terms to add insult to injury. However, his ideas are sound and practical. More interestingly he is one of the few researchers that gave some good insight to creative psychosis, or psychological impediments to the creative process. His research will prove useful to this paper because of his perspective on the creative process. His work will be mainly incorporated into the methodical creative process.

Citation 17: Tamdogon, O. G. (2006). Creativity in education: Clearness in perception, vigorousness in curiosity. *Education for Information, 24*(2), p. 139-151. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Tamdogon described a conceptual model that is composed of connectivity, content, community, communication and commerce to stimulate curiosity, creativity, reception, learning, and thinking. Finally, he analyzed a study that he did and classifies the responses from the participants into the 5C model. In this model, creativity starts with curiosity, which begins with learning and knowledge. Connectivity allows a person to relate to associations that assist in creativity. The content involves the object of the problem solving efforts. Community refers to the social environment that a person must engage within in order to achieve creative products. Communication refers to the use of language and socializing ideas. Finally, the commerce is the value that an idea has in order to gain currency. Tamdogon affectionately dubbed this model as the 5C method. He also described the brainstorming process as a systematic approach to help stimulate creativity and generate ideas.

Creative Analysis

Tamdogon described an interesting mechanism to spur on curiosity and he argued that this would in turn foster creativity. His model was, however, very poorly explained. The organization of the research was such that it was extremely difficult to untangle the key ideas and their meaning from the chaff. He could have used clearer cut succinct descriptions and sections to compartmentalize his key concepts. After several readings through his work, the main ideas became evident and they were original and useful. His research will be useful. In particular, Tamdogon wisely identified community, communication and commerce as vital elements to the creative process.

Citation 18: Veale, T. (2006). Re-representation and creative analogy: A lexico-semantic perspective. *New Generation Computing, 24*(3), p. 223-240. Retrieved August 3, 2007, from the Academic Search Premier database.

Creative Summary

Veale described the mechanisms of redefinition and explored numerous mechanisms by which redefinition can occur. The most common mechanism is analogy and metaphor. Aside from the time honored mechanisms of analogy and metaphor, he described a number of other mechanisms that include relational abstraction, re-representation, structural inversion, structure mapping, re-conceptualization, and structural rarefaction. Relational abstraction finds associations between abstracted elements. Re-representation takes a perspective and represents it in a different manner. Structural inversion uses external references for the source of redefinition. Structure mapping is a technique to methodically achieve redefinition. Re-conceptualization takes concepts and applies them in a different light. Structural rarefaction uses structural signatures to map new associations. Veale described the various redefinition mechanisms using the example of a software language translation program.

Creative Analysis

Veale had perhaps one of the most Byzantine and obtuse articles I have ever encountered. While the concepts introduced are powerful and novel, their definition remained elusive and steeped in useless examples and hard to understand narration. The article was structured intelligently. Without his good planning, most of it would not be comprehensible. The primary reason for this is that the examples were a difficult to understand software structural decomposition. However, none of the other researchers provided such valuable insight into the redefinition creative process. The article will be incorporated into redefinition creative process because it presented a number of valuable mechanisms which none of the other researchers saw.

DEPTH ESSAY

Introduction

Creativity is useful for dreaming up new ideas or sparking revolutionary inventions. “Around the world, governments are coming to recognize the importance in sheet economic terms of a range of services that can be said to exhibit applied creativity” (Hill & Johnson, 2003, p. 221). Creativity has woven itself into the modern American economy and become a vital part of American society. “Professional services, whose core is applied creativity ... is also evident in consumer settings such as portrait photography, domestic architectural design and even in the activities of the local tattoo artist” (Hill & Johnson, 2003, p. 222). This sentiment is echoed by Kohtamäki, Kekäle, and Viitala (2004). They wrote that “competition in capitalist economies consists of entrepreneurs using innovation to enter established markets” (Kohtamaki, et al., 2004, p. 75). They also noted that ”the role of individuals in developing new innovations and creating new businesses is crucial” (Kohtamaki, et al., 2004, p. 75). To add to the notion, Runco (2004) stated that creativity engenders flexibility, empowers problem solving, makes thinking flexible, opens opportunities, and increases the individual’s ability to cope with change. Clearly, creativity has become vital to the modern American economy and contemporary American society.

When an idea is hatched, some creative person had the idea. That person went through some process to have the idea, and the idea took place in some environment. This paper describes the creative process with the special focus of a modern American citizen.
The creative process is the topic on this paper, and the theorists are synthesized with the contemporary research.

The creative process is the method that a creative person employs in order to produce an idea. Upon first inspection it may seem as if ideas magically appear in the mind. This might be true for some ideas; however, there is some manner by which the idea hatches in the mind. This paper will set out to analyze some of the mechanisms that have been researched. The principle creative process mechanisms that are discussed are: exploration, incubation, lateral thinking, methodical, redefinition, recycling ideas, serendipity, luck, spontaneous, synthesis, and thinking out of the box.

Theories on the creative process for modern American citizens

Exploration creative process

One type of creative process involves exploration. This involves getting out and exploring the surroundings and environment. Exploration entails a thorough search of the problem space, different aspects of the problem, gathering data, and understanding the problem assumptions. As these things are explored, curiosity is stimulated, a map of the problem terrain is developed, and creativity is bolstered. Runco (2004) astutely noted that experimentation, demonstration, research, and exploration have the potential to stimulate creativity. The most likely reason for this is that it stirs up curiosity and awakens the imagination. Exploration is a fundamental process that people use to understand the world around them.

Exploration as a creative process corresponds to Bleakley's (2004) typography classification of creativity as originality and spontaneity. Bleakley (2004) employed the concept that children are naturally playful, and stimulate creativity while they explore the world around them. "Play and spontaneity are seen as essential ingredients of innovation" (Bleakley, 2004, p. 468). In this form of creative process, the creative person takes the time to explore, wander, discover, search, and rummage through the problem space. Exploration encourages creativity as

the hopeful individual comes to understand the problem better through a careful exploration of some aspect of the problem.

Another aspect of exploration is captured by Bleakley's (2004) concept of creativity as resistance to the uncreative. Exploration can be a deliberate breaking of "mundane, literal, dull, mediocre, mechanical, trivial, habitual, predictable, and routine" (Bleakley, 2004, p. 473) tasks, activities, and notions. In other words, exploration can be seen as moving away from the common and into the unknown. This makes a good measure of common sense. Exploration embodies the notion of venturing out into the unknown, to boldly go where someone has not tread before.

In a similar line of thought to Koestler (1949) and Bleakley (2004), Diaz-Lefebvre (2004) offered exploration as an important part of creativity. The creative person, as part of the exploration process needs to "get out of comfort zones, be creative, and have fun" (Diaz-Lefebvre, 2004, p. 52). Diaz-Lefebvre (2004) listed numerous disciplines that an individual could explore such as creative dance, painting, creative journal writing, music, mime, acting, and poetry. Diaz-Lefebvre (2004) also indirectly identified another mechanism to explore a problem. This other mechanism pertains to other people, through "the exchange and dialogue of ideas" (Diaz-Lefebvre, 2004, p. 56).

Erill (2002) explored an important aspect of exploration. He elucidated the power of asking a probing question to stimulate creativity. Erill (2002) claimed that discoveries are often fostered by the question "how curious?" Creativity is stimulated because a good question can engage the mind. Exploration can often start with asking a probing question. Problems can also be solved by asking a question that will point the thinker in a direction that will solve the problem. "The puzzle was readily solved with the help of a simple question ... What if?" (Erill,

2002, p. 420). One should notice that a deliberate, premeditated, meaningful, and purposeful attempt at stimulating creativity is actualized by posing a probing question.

Asking good questions can stimulate creativity. The exploration creative process often begins with an astute question which prompts the creative modern American citizen to take stock, look around, and explore their problem space. Fourmentraux (2006) followed in the footsteps of Erill (2002). He began his exploration of the creative process by posing some insightful questions about the process itself. Describing the collaborative creative process, he considered how different perspectives will affect the process. He further considered how people will share their activities during the creative production. Formentraux (2006) posed some illustrative questions that stimulated his investigation into the creative process. By way of example, he showed that the exploration creative process can be bolstered by a carefully composed, probing, and insightful question at the start of the journey.

In a similar but slightly different fashion, Gionet (2004) highlighted the importance of observation. He stated that keen observation plays a vital role in the exploration creative process. Once a modern American citizen has worked on his sense of observation, "our ability to see and our sensitivity to our surroundings will be sharpened" (Gionet, 2004, p. 21). The ability to sense a person's surroundings in order to perceive a need or difficulty was also highlighted by Guilford (1967). When the creative person is able to clearly understand their surroundings, they can perceive the need for a problem to be solved. This stimulates the exploratory drives. Gionet (2004) mentioned that paying attention to visual elements, visual components, repetitive patterns, and natural surroundings would help an individual perceive their environment better. Runco (2004) also acknowledged that exploration can arm a creative person with knowledge. "Declarative and factual knowledge may supply the individual with options" (Runco, 2004, p.

667). Good observation skills pay handsome rewards in all manner of activities. When it comes to exploration, keen observation is an essential tool.

Lindström (2006) described an essential aspect of the exploration creative process, that of investigative work. Indeed, investigation is nearly synonymous with exploration. Lindström (2006) pointed out that investigation requires an individual to formulate, test, revise, reflect, communication, and critically assess their situation in order to gain a greater understanding of their environment or problem.

The most insightful aspect of Lindström's (2006) was the characterization of a development of the investigative skill. Lindström (2006) emphasized this important aspect of the exploration creative process much more than other researchers and theorists. When an individual begins to develop investigative skills they will not venture out on their own very much. The analogous visualization could be that of a new born puppy who does not stray very far from their mother. As an individual become more skilled at investigative work, they develop a degree of patience, autonomy, self-direction, and patience. The creative person "does not give up in the face of difficulties, preferring to concentrate on a particular approach that she begins to develop and refine" (Lindström, 2006, p. 58). Someone who has good investigative skills will have developed their own perspectives, and will be able to approach problems in several different ways. Clearly investigation and the formulation of ways to gain more insight into a problem are crucial aspects of the exploration creative process.

It has been said many times before that brilliant minds think alike. Shaddock (2006) presented a five step model for creativity. The five steps in his model include preparation, inspiration, realization, completion, and objectification. His preparation step corresponds to Lindstrom's (2006) emphasis on investigation. Furthermore, other researchers and theorists, such

as Wallas (1926), and Guilford (1967) proposed similar conjectures. The start of any creative journey is preparation and exploration. However, Shaddock (2006) emphasized that the preparation stage also requires the creative person to embrace uncertainties, mysteries, and doubts. This allows a person to cast off into the unknown which is a necessary element of exploration.

Incubation creative process

A common form of creative process involves incubation. This utilizes a period of time where an infant idea is allowed to gestate before it is brought into the world. This period of incubation allows the mind to stew on the problem and work on a solution in the background.

This notion corresponds to Bleakley's (2004) assertion of creativity as withdrawal and absence. The mind sometimes needs to digest information, situations, and events before it can produce a novel solution. This creative process is characterized by "knowing when to leave well alone, timing, judgment, appropriateness, sensitivity, withdrawal, and creation of appropriate distance" (Bleakley, 2004, p. 473). This period of rest allows the creative latitude necessary to produce an idea.

The opposite effect can happen when not enough latitude is given. Bleakley (2004) mentioned that creativity can be "crowded, cramped and interfered" (Bleakley, 2004, p. 473) with under the opposite circumstances. If not enough latitude is given to the creative person, or ideas are judged too quickly, the creative process can be choked before the process has time to work itself out. Likewise, when a person makes a decision without the necessary information, they will be likely to judge a situation too hastily.

Gionet (2004) unlike any of the other theorists and researchers adroitly described an interesting psychologically aspect of the incubation creative process. He explained that "the

creative process is more than just practicing our art" (Gionet, 2004, p. 20). The creative process can be utilized as a mechanism to peer into the depths of an individual's psyche, emotional states, and beliefs. "Throughout history, man has always needed to communicate his deepest feeling sand has been able to achieve it through art and its different branches" (Gionet, 2004, p. 20). Gionet's (2004) insightful comments concerning the creative process over long periods of time bring to light the psychological impact that successes can have upon the creative individual. Furthermore, as passion develops, successes build, the individual's sense of self worth and dignity are improved. Improved experience and perspective, in turn, boost the incubation process because the creative person is able to draw upon their successes and apply effective and efficient creative techniques based upon a foundation of successes. Furthermore, Gionet (2004) continued, the creative person will be more apt to persevere in the face of difficulties and challenges. Also, Gionet (2004) added, an individual who understand themselves and is in touch with their values, beliefs, psyche, emotions and feelings will have a clearer sense of direction which fosters the incubation creative process.

In the Breadth component of this paper, the puzzle was posed, "What falls but never breaks, and breaks but never falls?" Presumably, a period of time has lapsed between the exposure of this conundrum to the discussion of the possible answers here. The incubation creative process could have taken many guises. As the theorists and researchers have pointed out, a good understanding of the evidence and problem definition prepares the mind for the incubation process. For example, an individual might consider objects which fall. Inanimate objects can fall, bricks of gold, people on bicycles, airplanes, balloons and so forth. But none of those things quite fits the parameters of the problem. When sufficient time is allowed to elapse, an insightful individual will probably identify a number of things which fall, but when it hits the

ground do not break. Some examples of such things are balloons, automobile tires, beach balls, basketballs, solid blocks of metal, feathers, sheets of paper, rubber bands. So consideration of the second constraint poses the more challenging task. Some objects which break but never fall are breakfast (the break of fasting from the previous night's sleep), breaking a leg, a break-up (as in a relationship between two people), a prison break, break dancing, break out (as in break out your thinking caps), taking a break (as in rest from an intensive activity). However, further reflection will show that these do not match the first constraint. Eventually, through a period of incubation the person will hit upon, water, day/night. Day breaks but never falls, and night falls but never breaks. Secondly, water (drops) break (when they hit the ground) but never fall (in the sense of tripping), and water falls (as in a waterfall), but waterfalls never break when they hit bottom. This example illustrates the thinking process involved in the incubation process because the problem is defined, information is investigated, the stage is set with the necessary preparation to solve the problem, and time is given to the creative individual to allow the mind to generate a solution.

Runco (2004) in a similar fashion to Wallas (1926) acknowledged that incubation is a valuable method to stimulate creativity. "Time is indeed an important resource" (Runco, 2004, p. 662). When time is allowed to passed, remote associations are allowed to occur. Furthermore, Runco (2004) stated that the incubation period allows the creative person to move away from the problem, to find new associations, and develop investigation in new avenues of thinking. "People should take their time if they want a creative idea or solution" (Runco, 2004, p. 662).

Segal (2004) provided a more thorough account of the incubation creative process than any other researcher or theorist. The insights provided by Segal (2004) made the original accounts of the incubation creative process by Wallas (1926) look like the scribbles made by a

child by comparison. Segal (2004) described the *unconscious hypothesis* as a mechanism whereby the unconscious mind recombines ideas and selectively retains the most effective ones. Segal (2004) also explained that in the *fatigue-dissipation hypothesis*, the incubation time works to dispel the exhaustion that arises from continuous exertion working on a problem. Segal (2004) continued by defining the *selective-forgetting hypothesis* where the "decay of irrelevant material occurs in the working memory during shifts of attention away from the problem." (Segal, 2004, p. 142). In the *external-cues hypothesis,* Segal (2004) described a situation whereby environmental triggers stimulate the critical insights necessary to solve a problem. Segal (2004) explained the *attention-withdrawal hypothesis* where an impasse is overcome because attention is diverted and a sudden flash of creative insight is allowed to occur. Segal (2004) noted that the *prepared-mind hypothesis* is a situation where the mind has been sufficiently prepared for the creative production of an idea. Segal (2004) shrewdly explained the *returning-act hypothesis* where attention of the solver is diverted and thus false assumptions are eliminated. These false assumptions block the proper, correct, and true assumptions which would lead to a functional solution. Clearly there are many possible avenues for the incubation process to do its magic. There insights suggest that a number of techniques exist through the incubation process to foster creativity.

Methodical creative process

Another principle mode of creative production is methodical creativity. The creative person hunkers down and tackles a problem in a deliberate and planned fashion. The methodical creative process utilizes a step by step method to drive the creative gears.

This creative process can be effective when a problem that has a finite number of possible solutions. Some examples include a checkers game, a Rubik's cube, or the proper filament to use in an electric light bulb.

Cowdroy and Williams (2006) in a similar line of thinking to Wallas (1926) defined a multi stage process for creativity. The methodical creative process they defined was composed of three phases. The first phase was conceptualization. This is much like the preparation and incubation stages of Wallas (1926). They claimed that conceptualization was the highest level of creativity because it is a purely intellectual pursuit. The conceptualization stage is also where imaginative and original ideas are born. Next, Cowdroy and Williams (2006) defined the schematization stage where the idea gets developed through intellectual and creative efforts. The idea that was conceptualized becomes more evolved. The final stage involves actualization. This is a stage that "involves combinations of procedural memory and procedural thinking for thinking out the final work, and iterative ability and crafting abilities for final realization of work" (Cowdroy & Williams, 2006, p. 105). This last step in the creative methodical process corresponds to Wallas' (1926) verification stage where the final product is produced, verified, and applied. Clearly, the theorists and contemporary researchers allude to a methodical creative process that has some discernable structure.

The methodical creative process as envisioned by Cowdroy and Williams (2006) is fairly similar to the stage model of Wallas (1926). They can be likened to the development of a story with a beginning, middle, and an end. Another analogy would be the lifecycle of a living creature. The creature is born; it develops over time, learns, adapts to new situations, and eventually comes to term with its existence. So, in many ways, the stage model is one that makes sense and

caters to common sense. By decomposing the process down into stages, a researcher can better understand the process. Each stage can be analyzed and dissected to produce more detail.

Inventing something that is novel and creative through a deliberate, premeditated and planned manner is a common form of creative endeavor. Bleakley (2004) described this process of creativity as a progressive activity that "invokes structure, boundary, method, principles, and classification" (Bleakley, 2004, p. 467). In other words, the creative process utilizes mechanisms that allow the creative person to tackle the problem in a methodical fashion. Methodical creativity corresponds to Bleakley's (2004) notion of creativity as an ordering process.

Suppose, for example, that a person wanted to put together a puzzle. The puzzle could be assembled in some creative manner such as taking pieces and using a shaker machine to see if they will fit together. However, the methodical method would be to try every puzzle piece side against every other puzzle piece side to see if there is a match. An astute observer might question whether there is anything inherently creative about putting together a puzzle. This simple example merely serves to illustrate that a methodical search of the solution space is one way to tackle a problem. Sometimes it is enough just to start the journey and watch what happens along the way. Bleakley (2004) summed up, "There is no breakthrough without the sweat of preparation" (Bleakley, 2004, p. 469).

Like two pieces of a jigsaw puzzle fitting together, Kohtamäki, Kekäle, and Viitala (2004) drew similar conclusions to Bleakley (2004). Kohtamaki, et al. (2004) described the early phases of the development of a new business venture as the *stage of creativity*. This stage is characterized by innovation, niche formation, creativity, and hard work. What differentiates an individual or company in modern American society is innovation. They discussed several important elements to achieve success in the stage of creativity, including trust, vision,

motivation, entrepreneurial spirit, coordination, integrity, competence, planning and communication. Kohtamaki, et al. (2004) have provided an interesting perspective of the methodical creative process. In brief, the methodical creative process entails fostering virtuous qualities that will in turn nurture creativity. A good idea and a lot of honest hard work go a long way to turning a dream into a reality. Furthermore, Kohtamaki, et al. (2004) underscored an important reason why it is important to understand the creative process for modern American citizens. In a highly competitive world that values innovation, creativity, and progress, a good understanding of the creative process will serve to be invaluable in education, business, politics, and nearly all walks of life. A process that becomes well understood can be learned. In this way, a single individual can come to intelligently adopt the best practices in applying the process to their own endeavors.

Formentraux (2006) carefully described the collaborative creative process. In many ways, this mirrored the decomposition of the methodical creative process done by Wallas (1926). Formentraux (2006) outlined the principle steps in the methodical creative process to be evaluation, planning and conceptualization in the first step. Formentraux (2006) stated that in this step the initial concept is translated into a creative intention. The second step was to produce solution, develop a solution, overcome technical hurdles, and pin down the requirements. This second step, Formentraux concluded, often requires understanding people's perspectives, organizing human resources, discovery of intentions, sharing suggestions, exploring options, investigating dimensions of the plan, engaging in negotiations, exchanging conceptions, defining boundaries, understanding interests, decomposing tasks, assigning roles, fostering communication, defining a common purpose, translating values, and resolving debates. The last step Formentraux (2006) described was the evaluation of the solution. Furthermore, he stated

that “Each of these stages went through numerous mediations, technical, human, and institutional, and indicated a progression in the collaborative process” (Formentraux, 2006, p. 46). One conception of the methodical creative process is a thorough, careful, exhaustive exploration of the problem space in quest of a creative solution. Formentraux (2006) insightfully described a different aspect of the methodical creative process, a step by step procedural breakdown of the process from inception to finalization.

Along the lines of theorists Guildford (1967) and Wallas (1926), Hill and Johnson (2003) cited a methodical creative process that was composed of five steps. The first step dealt with finding a problem. This corresponds to the Guilford’s (1967) description to observing a need or difficulty and then formulating a problem which addresses the problem. Hill and Johnson (2003) astutely observed that the identification of a problem can be derived from an internal source or have its roots from an external source.

The second step deals with the immersion or preparation for solving the problem. This step directly corresponds to Guilford’s (1967) step of surveying available information and Wallas’ (1926) step of preparation whereby information is gathered. Hill and Johnson (2003) stress that an individual who is engaged in the creative process will be motivated to solve the problem. During this step the collection and processing of information is vital. Hill and Johnson (2003) clearly explained that the role of memory and recall can play an important part in this step. Indeed, Guilford (1967) also noted how important memory played during the creative process. The second step prepares the stage for the creative work.

The third step involves idea generation. Hill and Johnson (2003) astutely noted that “experience, knowledge, and imagination play a part” (Hill & Johnson, 2003, p. 227) in this stage of the methodical creative process. This stage sees the birth and delivery of a creative idea.

One can imagine that many of the other creative processes analyzed in this paper might be simultaneously employed or nested within in this step. This stage corresponds to Guilford's (1967) description of the formulation of solutions, and Wallas' (1926) illumination step. In this step proposals that might solve the situation, problem, or issue are defined. Alternative solutions are hatched in this step of the methodical creative process. Hill and Johnson (2003) observed that this step is "unambiguously the preserve of the creative professional" (Hill & Johnson, 2003, p. 227). That is, the creative modern American citizen is responsible for producing the creative idea in this step of the methodical creative process.

The fourth step deals with idea validation. The proposed solutions must be measured against some metric whereby they can be deemed worthy. Both the theorists Guilford (1967) and Wallas (1926) describe similar steps in their work. Guilford (1967) explained that solutions need to be critically examined to see if they adequately address the problem. The verification step of the Wallas (1926) stage model of creativity checks for the viability and feasibility of proposed solutions. Testing a solution to see if it matches the criteria of the problem is intuitively an important step. If a solution is generated that has no bearing on the original problem, it must be revised. But few solutions are so blatantly in error, the proposed solutions are matched against the desired outcomes, the requirements, the problem definition, and the stated goals. This step of the methodical creative process is the last gate before the solution is let out into the wild.

The last step in the methodical creative process involves application and outcome assessment. A proposed solution is selected, adopted and implemented. In this final step the proposed solution is delivered into the customer, or user's hands. The creative process does not end there. Hill and Johnson (2003) noted that the adopted solution is monitored for deficiencies and opportunities for improvement. Guilford (1967) also acknowledged that the solution once

rendered, can then be later harnessed for new solutions that overcome the failings of the original implemented solution. This process is a methodical way to tackle any problem through a creative mechanism. Hill and Johnson (2003) astutely noted that this step is "largely the preserve of the client" (p. 227). In other words, the customer of the idea will play a large role in the acceptance of the idea and its refinement for future applications.

In an about face from the other researchers, Rank, Pace, and Frese (2004) described two other interesting aspects of creativity which conforms to the methodical creative process. The ability to "persuade other stakeholders" (Rank, et al., 2004, p. 520) and the ability to translate intentions into goal-directed behavior are important in the creative process. Rank, et al. (2004) identified the qualities of extraversion, action orientation, external demands, charismatic leadership, uncertainty avoidance, individualism, and intellectual autonomy as important characteristics of the creative individual. While this is not a paper on the creative individual, it lends insight into aspects of the creative process. Notably, these include communicating ideas to other individuals, and how potentially creative notions are transformed into a kinetic goal-oriented vision. Clearly the qualities identified by Rank, et al. (2004) are engaged during communication, persuasion, and translating intentions. For example, they argued that "charismatic leadership may be less conducive to idea generation than to implementation" (Rank, et al., 2004, p. 521). These two important steps also conform to common sense. At some point during the creative process, a notion must be injected with a heartbeat by turning it into a more tangible, functional form. Likewise, most ideas will require either the support of other individuals in a collaborative effort, or disseminating them to other people through persuasion, teaching, or careful description.

In the footsteps of Rank, Pace, and Frese (2004), Tamdogon (2006) described the importance of community, communication and commerce in his 5C creativity model. The other two components of his model are connectivity and content. One of the vital elements of the methodical creative process is at some point in the process, the idea must be communicated to a wider community and it must bring some perceived value. For the creative process to be fully realized, Tamdogon (2006) argued, communication between peers, or the broader society are large will be necessary. The creative person "gests involved in interaction and exchanges with others in concrete terms ... who have already formalized the knowledge they produce in more abstract terms" (Tamdogon, 2006, p. 143). Furthermore, Tamdogon (2006) argued, the community will eventually need to be involved in order to socialize and spread any idea widely. Finally, Tamdogon (2006) noted, for an idea to be useful it must have some commerce. That is, it must have some value to the people who might want to use the solution. Furthermore, the commerce can also stimulate curiosity and creativity by pointing the creative individual to fulfill a need. Ideas are not produced in a vacuum; a vital part of the creative process entails communicating ideas to a broader community and demonstrating its commerce. Creative products can result by observing commerce in an idea. Creativity can be stimulated through exchanging ideas within a community by way of communication.

Perhaps the most famous of methodical creative processes is the brainstorming method. Many people have heard of brainstorming. Runco (2004) cited the key features of brainstorm as the suspension of judgment, the focus on quantity over quality, and piggybacking upon other people's ideas. Brainstorming is intended to be used as a deliberate and methodical technique to stimulate creativity. Runco (2004) mentioned that brainstorming is generally used in groups, but individuals can employ techniques that are equally effective in coaxing creativity.

Shaddock (2006) described a five step model for creative production. His description of a methodical approach to creativity was similar to the Wallas (1926) five stage model of creativity. The Shaddock (2006) five step model was composed of preparation, inspiration, realization, completion and objectification. During the preparation stage, an exploration of the problem space is performed, and relevant information is gathered. During the inspiration step, the creative person arrives at some insight and gets the idea for a solution. In the realization step, the creative act is transformed into material form. In the completion phase the work begun in the realization step must be finished and carried to term. In the final step of objectification, the solution can now be quantified. The solution is able to reach a broader market and comes into the service of a greater social context.

Recycling ideas creative process

One creative method uses ideas from one discipline and transfers it to another. Taking an idea that worked in one place and trying it in another should seem like one obvious way to solve a problem. Recycling ideas from one domain and transferring it to another is an efficient way to stimulate creativity.

Bleakley (2004) identified creativity through rhythm and cycle as one of the principle categories of creativity. In this typography, he defined creativity as "renewal through recycling emphasizing self-sustaining equilibrium" (Bleakley, 2004, p. 467). Bleakley (2004) implied that progress is downplayed, in favor of reusing existing infrastructure to tackle issues at hand.

Diaz-Lefebvre (2004) took a similar tack as Guilford (1967). He noted that learning strategies are most effective by using memory techniques that have a good connection with the material. Guilford (1967) carefully described a gamut of memory techniques that can assist in memory recall. Personal experiences can be used to recycle ideas because solutions from that

solved on problem can be used to generate ideas that can be applied in a different application or situation.

When it comes to recycling ideas, the role of memory plays an important part. When a creative person generates a creative idea, one of the primary mechanisms that the person will use to draw upon is his memory and past experiences. The human mind is capable of an amazing amount of memories and experiences which serve as a storehouse of information from which to draw upon. This warehouse of past solutions to problems can then be transferred to other applications. This is the crux of the recycling creative process. Guilford (1967) performed some groundbreaking work in drawing the link between creativity and memory. Guilford (1967) defined several mechanisms of memory including "general relaxation, completeness of the instigating situation, *replicative* recall, *over-learning*, *recency* of exercise, confidence of the individual, transfer recall, suspended judgment, search, localization, clustering, and scanning operations" (Guilford, 1967, p. 303). Compare this to the contemporary research of Cowdroy and Williams (2006) who identified emotional memory, declarative memory, and procedural memory as the principle types of memory that are involved in creativity.

Cowdroy and Williams (2006) defined emotional memory are unconscious expansions of meaningful elements to previous experiences. They defined declarative memory as the application of facts and information to present conditions. The link between declarative memory creativity occurs because the creative person is "extrapolating from them a new plan of arrangements, innovations and inventions" (Cowdroy & Williams, 2006, p. 104). Finally, procedural memory deals with the memories that are associated with mastering skills. Cowdroy and Williams (2006) identified structures of memory that were quite different than Guilford (1967). Guilford (1967) focused on elemental aspects of memory. That is component parts of

memory are dedicated to specific functional aspects. Meanwhile, Cowdroy and Williams (2006) wrote about overarching categories of memory. Both of these perspectives are important in understanding how memory plays a role in thinking, and recycling ideas.

Furthermore, Cowdroy and Williams (2006) identified how these aspects of memory play a role in the creative recycling process. They discovered that emotional memory is important in conceptualization, imagination, and originality. The use of the unconscious to draw new patterns, insights, and perspectives is a crucial aspect of the creative recycling process. Cowdroy and Williams (2006) stated that "declarative memory appeared to be closely associated with schematization, recollection, orientation, extrapolation, planning, innovation, and inventiveness" (p. 104). Clearly, declarative memory, which is crucial in producing facts, and past experiences allows a creative modern American citizen to identify examples of successful solutions and reapply them elsewhere. Finally, they described the role of procedural memory with creativity. Cowdroy and Williams (2006) claimed that procedural memory is related to actualization, and the abilities used to create innovations and inventions. Another important aspect of recycling ideas is actually following through with the concept. It is important to see if the idea could actually be a feasible invention. Thus, procedural memory also plays an important part in the creative recycling process.

Closely related to the application of memory is the development of learning skills. How a person learns about new information is closely related to how memories are formed. How memories are formed is important to the creative recycling process. This aspect is closely related to Guilford's (1967) description of recency, completeness of the instigating situation, and over-learning. Cowdroy and Williams (2006) described three learning strategies that they termed *RRR*, *DDD*, and *EEE*. The RRR stands for rote, recognition, and repetition; DDD expands to for

dialectic, diagnosis, and debate; and EEE represents exploration, experimentation, and extrapolation. All of these mechanisms of learning are basic ways in which new memories and skills are developed. Once these are in place they can assist in the creative production. Thus, learning is an important step in the creative process.

Redefinition creative process

If the problem at hand stubbornly resists all attempts at a solution, one creative way to solve the problem is to redefine it. This creative process involves redefining the problem in such a way as to make it tractable and solvable. Runco (2004) identified that redefinition can stimulate creativity. He claimed this could happen by "making a problem operational and workable" (Runco, 2004, p. 675).

This creative process corresponds to Bleakley's (2004) concept of creativity as problem stating. By taking the time to carefully state the problem a better understanding of the problem can be gained. Instead of spending effort to solve an intractable problem, the creative individual could redefine the problem in such a way as to make it tractable. One example of this is the art of negotiation. One good way to make a deal between two parties uses the creative process of redefinition. In this example, the two parties would restructure the problem in such a way that an acceptable solution to both parties can be readily reached.

Lindström (2006) identified a similar mechanism as Bleakley (2004) did. He termed it inventiveness, but defined it as the ability to show initiative in reformulating problems. Perhaps the most insightful observation that Lindström (2006) made was that this basic process of reformulating problems undergoes some development over time. As an individual becomes more skilled with redefinition they become more adroit and exhibit different creative characteristics. Lindström (2006) explained that someone who does not have a very well developed ability a

reformulation will show very little sign of experimentation. In other words, they will not be very adventurous. This makes a measure of common sense, if an individual is to reformulate the problem, or redefine the use for an object, they need to be good at moving out their of their comfort zone. Lindström (2006) pointed out that as an individual becomes better at reformulation, they will become more experimental, and change different aspects of the problem or object slightly. During this step in the developmental process, "she developers her knowledge, experiments fairly often and sometimes finds unexpected solutions to problems" (Lindström, 2006, p. 58). Finally, at the pinnacle of reformulation capabilities, Lindström pointed out that the individual is comfortable with reformulating problems and is inclined to take risks. As a result they will often discover unexpected solutions to problems.

Trekking off in an orthogonal mental direction from Bleakley (2004) and Lindström (2006), Lonergan, Scott, and Mumford (2004) claimed that evaluation is an important aspect of the creative process. In their carefully researched analysis bolstered by a study of undergraduate students, Lonergan, et al. (2004) concluded that the process of revision and redefinition that results from the creative evaluation process requires and further stimulates creativity. The focus of their research correlated to the verification stage of Wallas' (1926) model of creativity. Thus, it is insightful to note that an important step in the redefinition creative process is that of evaluation. When an idea is evaluated, it is assessed against the problem definition. During the evaluation, Lonergan, et al. (2004) claimed that the evaluative process itself is creative, reshaping, restructuring, reformulating, altering, recomposing the ideas, concepts, problem, and things involved in the problem. This captures the very essence of the redefinition creative process.

Another insightful observation that Lonergan, Scott, and Mumford (2004) made was that forecasting is an important aspect of creative evaluation. They concluded that forecasting plays an important role by asking what the mechanisms are involved in idea evaluation. They concluded that forecasting is one of the most important aspects. Lonergan, et al. (2004) defined forecasting as the predictive ability to foresee the outcome of an activity. In retrospect, this seems to make a measure of common sense, if a modern American citizen has a well developed sense of forecasting, they will be able to visualize the consequences of their actions, and creative endeavors. When an individual can picture the aftermath, and repercussions of an action they will be able to either redefine the problem to be solved, redefine the tasks that will be used to solve the problem, or redefine the elements within the problem in order to adjust the attendant ramifications. They also insightfully noted that "the quality, originality, and feasibility of problem solutions will be highest when more original ideas are appraised" (Lonergan, 2004, p. 234).

Lonergan, Scott, and Mumford (2004) intelligently argued that the principle characteristics that a solution is judged against are quality, originality, and feasibility. The quality of a solution concerns the logical content, the coherency, and structure exhibited by the solution. The originality of the nominated solution concerns uniqueness, or cleverness. Finally, the feasibility of the recommended solution concerns whether the solution is useful, workable, practical and realistic. In other words, feasibility is a measure of how likely is it that the proposition could be actually implemented given the environmental circumstances and resources available. To sum up, evaluation is part of the redefinition creative process. Lonergan, et al. (2004) concluded that creative evaluation is fostered by forecasting; and that solutions are usually judged against quality, originality and feasibility.

The most innovative and thorough analysis of the redefinition creative process came from Veale (2005). He presented a treasure trove of concepts that represented different mechanisms of the redefinition process. The principle methods that Veale (2005) wrote of were analogy, metaphor, re-conceptualization, paradigm shift, structure mapping, relational abstraction, re-representation, structural inversion, and structural rarefaction. Veale (2005) wrote of analogy as the "controlled generalization in one domain and re-specialization into another" (Veale, 2005, p. 223). Veale (2005) defined metaphor as the "transference of meaning from one concept to another" (Veale, 2005, p.223). Veale (2005) explained that re-conceptualization as taking one concept as shirting it to another application. A paradigm shift is defined as the transformation of one mental world view into another. Veale (2005) demonstrated that structure mapping takes conceptual structures and organizes it into a structure which allows it to be analyzed and restructured. Veale (2005) noted that relational abstraction is used to "derive new semantic structures from old." (Veale, 2005, p. 237). Veale (2005) described re-representation takes one representation and applies it to a new use. Veale (2005) defined structural inversion as a mechanism that "allows a system to look outside a concept to obtain a new semantic perspective from the vantage point of other concepts" (p. 237). Veale (2005) concluded that structural rarefaction is the use of structural signatures. These signatures "allow important semantic similarities to be highlighted, while unimportant dissimilarities are forced into the background." (Veale, 2005, p. 237).

Serendipity and luck creative process

Sometimes the creative process involves nothing more than luck and a trained eye. Serendipity represents a situation where the creative person was searching for the solution to one problem and happens to stumble upon the solution to another one. In general, this creative

process represents a means by which a knowledgeable person stumbles upon the solution. This chance event occurs by luck. Of course, one can not deliberately depend on luck as part of any creative process. However, fortune favors preparation and a trained mind. First, the concept of serendipity entails a certain amount of sweat equity being put into a problem. Second, it depends on the person's ability to recognize the solution to a problem. The problem might not have been the one that was originally intended to be solved, but nonetheless a solution was achieved.

The creative process of serendipity corresponds to Bleakley's (2004) assertion that one type of creativity can be categorized as serendipity. Bleakley (2004) concisely defined it as, "fortunate chance that seems to arise more often (or is noticed) where there is preparedness – openness to imaginative possibility." (Bleakley, 2004, p. 472). Furthermore, useful inventions and discoveries can be made through error, meandering, chance, or hard work. Bleakley (2004) mentioned that "mistakes can be fortuitous, or produce interesting side effects. Accidental by-products are commonly reported" (Bleakley, 2004, p. 472).

Perhaps one of the more unusual perspectives on the Serendipity creative process was put forth by Lindström (2006). Lindström (2006) identified an important aspect of this process, that so the capacity for self-assessment. He explained that this capacity can be fostered if people "are given many opportunities to assess their own performance and to get feedback from peers" (Lindström, 2006, p. 63). A person who is good at self-assessment will be able to find the strengths and weaknesses of their own work. Because they can identify the merits and shortcomings of their work, the will be able to adequately find contingencies, and make the proper preparations which are the essential ingredients that are required for fostering luck and serendipity. Furthermore, Lindström (2006) continued, an individual will be able to clearly explain why something occurred the way that it did. In other words, they will be able to wisely

assess a situation. Finally, Lindström (2006) took a page from Formentraux (2006), by stating that an individual good at self-assessment will also be good at assessing the works of others. They will be able to give creative criticism, which in turn fosters collaboration. Good coordination and collaboration paves the way for serendipity.

Spontaneous creative process

Genius. Some creative people simply arrive at a solution with a flash of insight. There is no apparent process, merely a Eureka moment. The creative process produces a solution out of thin air. None of the contemporary researchers gave much further insight into the spontaneous creative process directly. However, many of the other processes, such as incubation have an insight moment.

Synthesis creative process

The synthesis creative process principally centers on the idea of combining ideas and concepts in order to form new ideas. The fusion of two disparate ideas from different domains, or applications can be a source of creativity. The theoretical groundwork for the use of synthesis as a creative process was acknowledged by Guilford and Hoepfner (1971), and Wallas (1920). The synthesis of ideas also entails the association of concepts, linking the separate things together into a useful, unified whole.

Runco (2004) described synthesis as a creative process that can be used to generate new ideas. Runco (2004) explained that one perspective, a thesis, is synthesized with the opposite viewpoint. Runco (2004) compared this to dialectical materialism. Runco (2004) also acknowledged that associative processes can be used to facilitate the use of synthesis in creative thinking. Synthesis allows a creative person to integrate disparate ideas together to form a new whole. Two concepts are fused together into a new synthesis. Runco (2004) described the

synthesis process as "the insight that results from spontaneous integration of previously learned responses" (Runco, 2004, p. 664). Lastly, Runco (2004) wisely identified that logic (left brain thinking) can be synthesized with intuitive (right brain thinking). "Productive thought involves the integration and coordination of processes subserved by both hemispheres" (Runco, 2004, p. 664).

Lindström (2006) described the synthesis process as the ability to use models. A model "integrated production with perception and reflection" (Lindström, 2006, p. 63). Lindström (2006) used the term model as a synthesis of concepts. The ability to integrate ideas together to form a model is a useful creative process. This ability allows an individual to generate creative ideas, or models, by integrating ideas from elsewhere.

One of the most astute things that Lindström (2006) described was that the ability to generate models develops as a person gains more experience. In the early stages, a person will not generally be willing to combine or integrate ideas together. As their aptitude expands, the individual will show interest in combining ideas, concepts, objects, visualizations, and thoughts from different places. They will have the ability to find concepts that are suitable for their intentions. Finally, as they attain a good command of synthesizing concepts, people will "actively search out models to emulate and can use them in her work in a multifaceted manner, independent, and well integrated way" (Lindström, 2006, p. 58). Clearly, the ability to fuse ideas together to generate a new concept is a useful mechanism to employ. In light of Lindström's (2006) research, perhaps, part of the creative synthesis process should simply be to develop the ability to integrate ideas. The development of an individual's skill at generating models can be seen as a step within the creative synthesis process.

Thinking out of the box creative process

Finally, one creative process involves deliberately trying to think exotically. This is commonly called *thinking out of the box*. Thinking out of the box techniques are designed to spur on creativity as a cattle herder urges on his herd. Unorthodox thinking, unconventional methods, unusual concepts, and original methods of thinking are encouraged during this process.

Hummell (2006) described a process called *synectics.* Hummell (20060 explained that synectics as a variation of brainstorming that helps creative individuals overcome mental blocks when trying to produce creative ideas. The thirteen step process is designed to help the creative individual to think out of the box. The first six steps are involved with making something new from the old. Hummell (2006) then clustered the second seven steps into making the strange familiar. Clearly thinking out of the box can be fostered through clever techniques which allow an individual to stimulate his creativity.

Hummell (2006) explored the first cluster of steps designed to make something new from the old. The first step was to define or describe the current situation or problem. For example, the creative individual might define a problem that needs to be solved and detail the defect that needs to be addressed. The second step is to write down ideas about direct analogies. Hummell (2006) provided an example drawing an analogy between a bridge and a house, posing the question of how they are alike. The third step, Hummell (2006) described involves writing down reactions to personal analogies. The fourth step explored compressed conflicts and to form an oxymoron. Hummell (2006) provided the example of describing "how a bridge is both awkward and well coordinated" (Hummell, 2006, p. 22). The fifth step has the creative individual write down new direct analogies. Finally, Hummell (2006) outlined the sixth step of "reexamination of the original situation or problem." (Hummell, 2006, p. 23). The creative individual is encouraged

to design something new using the analogies that have been produced and using the new insights gained from the first five steps.

The next cluster of steps involved making the strange familiar. Hummell (2006) explained that these set of steps are designed to familiarize the creative individual with the unknown. The first step, Hummell (2006) explained is substantive input. In other words, the person must investigate the situation and gather enough information that they have sufficient background to address the problem. The second step involves creating direct analogies. A list of relationships can be described so that synergies, associations, and creativity can be stimulated. The first step involved identifying with the direct analogies that were created. The idea of this step is to personalize the associations, conditions, issues, and similarities. The fifth step involves explaining the differences between the old and new analogies. The sixth step involves exploring the original topic. This is similar to the exploration creative process. The last step that Hummell (2006) described is to produce "their own direct analogies and carefully explore how they do or don't fit together" (Hummell, 2006, p. 23).

By comparison to Hummell (2006), Rothenberg (2006) identified only elements of unorthodox thinking. Specifically, Rothenberg (2006) described three unorthodox methods that can stimulate creativity. The first method is articulation, the second the janusian process, and the last the homospatial process. Rothenberg (2006) described articulation as the ability to separate a thing into individual elements, and simultaneously find a way to connect the elements together. For example, a flowing narrative is composed of individual thoughts, plots, characters, ideas, and chapters, yet the overall story is tied together into a single overarching framework. Rothenberg (2006) explained that the janusian process involves the ability to entertain opposing viewpoints, concepts, ideas, or beliefs together. Something that is white and black together is grey or

something that is at once sweet and bitter. Lastly, Rothenberg (2006) identified the homospatial cognitive process as one that can engage creativity. This "consists of actively conceiving two or more discrete entities occupying the same space" (Rothenberg, 2006, p. 59). Two things are physically superimposed to stimulate visual creativity.

Like Rothenberg, Runco (2004) acknowledged that unorthodox thinking is at the heart of thinking out of the box. "Many creative individuals have rebelled and resisted convention" (Runco, 2004, p. 669). Creative individuals are willing to take risks, foster originality, and break with conformity. Runco (2004) cited that creativity is often associated with originality, and that "original behavior is always contrary to norms, all creativity is a kind of deviance." (Runco, 2004, p. 677). Runco (2004) also noted, "Original behavior is always contrary to norms, all creativity is a kind of deviance" (Runco, 2004, p. 677). Runco (2004) noted that inflexible thinking causes people to overlook original options because they are unwilling to escape established knowledge and procedures.

Conclusion

Creativity is useful for creative production, novelty, and adaptability. While it is often associated with problem solving, Runco (2004) noted that "not all creativity involves problem solving, and not all problem solving requires creativity." (p. 680). Runco (2004) astutely remarked, "Creativity facilitates and enhances problem solving, adaptability, self-expression, and health" (Runco, 2004, p. 677).

The creative process gives birth to a creative idea. A creative person produces a creative idea through some creative process within a creative environment. The theorists Graham Wallas, Arthur Koestler, and Jay P. Guilford helped to identify creative processes.

This paper concludes by identifying the principle creative processes involved in creative production. The creative processes discovered are exploration, incubation, methodical, recycling, redefinition, serendipity, spontaneous, synthesis, and thinking out of the box. The exploration creative process uses investigation and discovery to stimulate creativity. The more the problem, its circumstances, environment, and aspects are explored, the more potential opportunities are opened up. The incubation creative process uses a period of relaxation to allow the mind to stew on the problem. Many of the theorists and researchers discussed the incubation creative process and produced some insight into the process. The methodical creative process involves step by step processes to generate creative products. The recycling process takes ideas from one application and applies them to another one. The redefinition creative process takes aspects of the problem, or the problem definition transforming the nature of the problem to be solved. The redefinition creative process might also transform the application of things. The serendipity creative process establishes a thorough background understanding of the problem. After exhaustive and detailed preparations, the serendipity creative process engages a bit of luck to help stumble upon a solution. The spontaneous creative process leaps out of the dark corners of the mind to pounce upon the problem with a solution. The synthesis creative process entails the integration of two ideas in order to produce a new innovative idea. Finally, the thinking out of the box creative process employs unusual thinking techniques and unorthodox methods in order to stimulate creativity.

The contemporary researchers each added valuable insights into the various creative processes. Some of them gave more credibility to the creative process by affirming them through their research. Many of the modern researchers paid homage to the seminal theorists

demonstrating that the creative processes identified had validity. Finally, new dimensions of many of the creative processes were described by the contemporary researchers.

Depth References

Bleakley, A. (2004). Your creativity or mine?: A typology of creativities in higher education and the value of a pluralistic approach. *Teaching in Higher Education, 9*(4), p. 463-475. Retrieved August 3, 2007, from the Academic Search Premier database.

Cowdroy, R., Williams, A., (2006). Assessing creativity in the creative arts. *Art, Design & Communication in Higher Education, 5*(2), p97-117. Retrieved August 3, 2007, from the Academic Search Premier database.

Díaz-Lefebvre, R. (2004). Multiple intelligences, learning for understanding, and creative assessment: Some pieces to the puzzle of learning. *Teachers College Record, 106*(1), p49-57. Retrieved August 3, 2007, from the Academic Search Premier database.

Erill, S. (2002). What if ...? *Lancet, 360*, p. 420. Retrieved August 3, 2007, from the Academic Search Premier database.

Fourmentraux, J. (2006). Internet artworks, artists and computer programmers: Sharing the creative process. *Leonardo, 39*(1), p. 44-50. Retrieved August 3, 2007, from the Academic Search Premier database.

Gionet, D. (2004). Risking ourselves in the creative process. *PSA Journal, 70*(8), p. 20-22. Retrieved August 3, 2007, from the Academic Search Premier database.

Hill, R., Johnson, L. W. (2003). When creativity is a must: Professional applied creative services. *Creativity & Innovation Management, 12*(4), p. 221-229. Retrieved August 3, 2007, from the Business Source Premier database.

Hummell, L. (2006). Synectics for creative thinking in technology education. *Technology Teacher, 66*(3), p. 22-27. Retrieved August 3, 2007, from the Academic Search Premier database.

Kohtamäki, M., Kekäle, T., Viitala, R. (2004). Trust and innovation: From spin-off idea to stock exchange. *Creativity & Innovation Management, 13*(2), p. 75-88. Retrieved August 3, 2007, from the Business Source Premier database.

Lindström, L. (2006). Creativity: What is it? can you assess it? can it be taught? *International Journal of Art & Design Education, 25*(1), p. 53-66. Retrieved August 3, 2007, from the Academic Search Premier database.

Lonergan, D. C., Scott, G. M., Mumford, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal, 16*(2), p. 231-246. Retrieved August 3, 2007, from the Academic Search Premier database.

Rank, J., Pace, V. L., Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology: An International Review, 53*(4), p. 518-528. Retrieved August 3, 2007, from the Business Source Premier database.

Rothenberg, A. (2006). Creativity - the healthy muse. *Lancet, 368*, p. 8-9. Retrieved August 3, 2007, from the Academic Search Premier database.

Runco, M. A. (2004). Creativity. *Annual Review of Psychology, 55*(1), p. 657-687. Retrieved August 3, 2007, from the Academic Search Premier database.

Segal, E. (2004). Incubation in insight problem solving. *Creativity Research Journal, 16*(1), p. 141-148. Retrieved August 3, 2007, from the Academic Search Premier database.

Shaddock, D. (2006). My Terrible Muse: Cohesion and Fragmentation in the Creative Self. *Psychoanalytic Inquiry, 26*(3), p. 421-441. Retrieved August 8, 2007, from the Academic Search Premier database.

Tamdogon, O. G. (2006). Creativity in education: Clearness in perception, vigorousness in curiosity. *Education for Information, 24*(2), p. 139-151. Retrieved August 3, 2007, from the Academic Search Premier database.

Veale, T. (2006). Re-representation and creative analogy: A lexico-semantic perspective. *New Generation Computing, 24*(3), p. 223-240. Retrieved August 3, 2007, from the Academic Search Premier database.

Core Knowledge Area Modules Number 2 Application Essay:

Professional practice for the creative process of modern American citizens

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APPLICATION ESSAY

Introduction

This paper analyzes and evaluates the seminar that was composed for the creative processes for modern American citizens. The paper will be separated into sections that describe the nature of the seminar, the package contents, and assumptions. This is followed by sections which evaluate the effectiveness of the seminar in providing information to the participants. An assessment is made of the level of comprehension and reaction to the information. Finally, sections are presented on how to improve the seminar and the stumbling blocks encountered.

Creativity is an innate human capability whereby new ideas are generated using originality, ingenuity, and unique thinking. A creative person produces the creative product using some creative process within some environment. The conclusions arrived at in the Depth and Breadth component is that the principle creative processes that modern American citizens use are exploration, incubation, methodical, recycling, redefinition, serendipity, spontaneous, synthesis, and thinking out of the box. Each of these processes is described during the seminar with the seminar presentation package as a presentation visual aid.

There are numerous functions that presentations are used for. Among other things, presentations can inform, instruct, persuade, evoke emotion, incite action, or entertain. The seminar related to this paper was used to educate, inform, and present the research findings from the Breadth and Depth components regarding the principle creative processes. As such, a lecture style format was chosen as the delivery mechanism.

Seminar Analysis

Seminar package description

The seminar package is composed of sixteen slides. The presentation was delivered to corporate employees at Alcatel-Lucent, colleagues at my location in Whippany, New Jersey. The presentation package is roughly sectioned into three sections. The first section is an introduction and build up to the creative processes. The second section describes each of the principle creative processes in detail. The final section concludes the presentation and lists the references used to compose the presentation and the research.

The introduction starts off with a description of what creativity is. Several theorists are used to present a thorough understanding of the concept. A dictionary definition also bolstered the definition of creativity. Creativity is essentially the production of something new using original or inventive thinking. Another slide in the introductory of the presentation describes that a creative person generates a creative idea using some sort of creative process within some environment. My first KAM focused on the creative environment, and this presentation focuses on the creative process. The last slide of the introduction deals with the definition of process. A process is essentially a series of actions or activities that achieves some ends.

The next section discusses each of the principle creative processes starting with the exploration creative process. The format of each of the slides was to provide some key indicators which capture the essence of that creative process. The contribution of each of the foundational theorists and the contemporary researchers were concisely captured for each creative process. For example, in the exploration creative process, curiosity, experimentation and part of the learning process were mentioned by Koestler (1964). Gionet (2004) noted that observation was important to the exploration process. Guilford and Hoepfner (1971) astutely conjectured that sensitivity to problems would stimulate exploration which in turn would facilitate a creative

solution. These examples and the others on that slide represent an early or significant contribution from the thinkers for the exploration creative process.

Additionally each of the principle creative processes had a representative picture associated with that process. The exploration creative process had a picture of the Eagle lunar module that landed on the moon to symbolize the exploration of space. The picture was taken by me from the National Air and Space museum in Washington, D.C. Pictures used to symbolize each of the creative processes can improve memory retention by engaging other parts of the brain and coding the idea of exploration instead of just remember the words. An egg with a timer we chosen to represent the incubation creative process since eggs are symbol of something that needs to incubate before something hatches out of them. The picture was taken by me with the objects on my furniture in my residence. The Vitrivian man is a famous drawing by Leonardo da Vinci. This was a picture from a postcard that I acquired when I visited Florence, Italy. The Vitrivian man was chosen to represent the methodical creative process because of its association with patterns, science, and intentional method. A picture of the recycling symbol was used to represent the concept of recycling ideas. A picture of a butterfly emerging from a cocoon represents the transformation that a caterpillar takes. This is symbolic of a redefinition of the creature, and so it was chosen to represent the redefinition process. The serendipity creative process pictures a light bulb because a light going off in one's mind is often associated with a an idea being produced in the mind. The lighting of a match was chosen to represent the spontaneous creative process for the burst of insight that comes with a spontaneous production of a creative idea. This picture was taken at my residence using a digital camera on a tripod with a multiple capture timer delayed setting. Post editing of the picture was used to blur out the words on the matchbook. The synthesis creative process is symbolized by a network of power lines

coming together at a junction point. This picture was taken during my trip to India in 2003. The pole resides in town of Kanpur, with a population of two million inhabitants. Finally, a box was chosen to symbolize the thinking out of the box creative process for obvious reasons.

Assumptions

After a researcher has read hundreds if not thousands of pages on a particular subject, there can be no question that they have become familiar with the subject. Such is the case with my research into the creative environment and creative process for modern American citizens within modern American society. The assumptions and pitfalls to familiarity are that you assume your audience also has some knowledge about the subject. However, because I knew that I was familiar with the subject and that I might start assuming some knowledge on the part of the audience I was able to temper this assumption and attenuate its affects during the presentation.

The above can be illustrated with an example. One participant did not quite understand how forecasting was related to redefinition. Lonergan, Scott and Mumford (2004) proposed that forecasting the form of a solution helps to redefine the potential uses or reshape the problem. I had anticipated that the concept of forecasting had assumed knowledge embedded within it. I slowed down the presentation at that point. I believe this assisted in comprehension. Even then, I still got a question to clarify further. The key is that situation could have been much worse.

Besides assumed knowledge on the part of the participants, there is an implicit assumption that the research space represented by the theorists and contemporary thinkers in the field cover a significant conceptual area with regards to the study of creativity. Any field of study of course can command dozens of researchers plumbing the depths for new ideas, paving new conceptual landscapes. The assumption is that the principle creative processes identified by this research are relatively complete, and that they truly represent key creative processes. Of

course, the thesis of the Breadth and Depth component argue that these nine creative processes take center stage during creative production.

Finally, an assumption that these creative processes are useful in business is a tacit assumption made by me. In hindsight, this probably should have been mentioned on the slides for the presentation. A description of the importance of creativity in modern American society, business applications, and economic entrepreneurial enterprises has been discussed in the introduction of the Breadth and Depth components. However, as the main section of the seminar was presented, it became apparent that the audience could more easily visualize the importance of creativity in their everyday lives.

Bias

Bias is perhaps one of the hardest things to pin down. When you evaluate the work of another researcher, philosopher, thinker, or theorist you need to peer into their mind through their reading. You need to read in between the lines. Yet, this is often not enough because perhaps the author did not even realize they had a particular bias. Compounding the problem is that people have a penchant in most topics. The bias may be unconscious or unspoken, but often some preference exists. Perhaps, the untainted mind simply has not yet been exposed to that thought.

For an author to assess their own work requires some careful contemplation into how they perceive the world. One might ask if a bias had been identified by the author could not the author simply eliminate the bias in their own work. The capacity for self assessment was identified by Lindström (2006) as an important aspect of thinking. However, not all biases are so easily worked out of the system. Furthermore, bias is not necessarily bad. It adds character to a work. Nearly all written endeavors have some sort of bias, if for no other reason than the

author's perspective, understanding, and available knowledge is infused within the work through the choice of words and composition of thoughts within it.

The primary bias of the presentation revolves a particular viewpoint on a creative process. In other words, the aspects of a particular creative process that were highlighted were based on the works of preeminent theorists and contemporary researchers. The Breadth and Depth components analyzed these perspectives and synthesized them. Specific points that were discussed by the theorists were evaluated against other points made by researchers. However, it is possible that both the theorists and researchers missed something. The way that a specific theorist thought about the problem influenced, or biased, contemporary researchers, which in turn has tugged gently on the form of this presentation. A delicate balance exists, like a mental ecosphere, between striding forth with new aspects of the creative processes and wanted to build upon a solid foundation of existing and accepted thinking on the subject.

An example of bias towards the theorists and researchers aspects can be found in all of the creative processes identified. As one specific example, consider the methodical creative process. Wallas (1926) put forth a four stage theory on the methodical creative process. He identified preparation, incubation, illumination and verification as the four stages in creative production. Today, this four stage model has become so fundamental that contemporary researchers often refer to it as the Wallas four stage model of creativity. The bias then, upon contemporary researchers is apparent. The words Wallas (1926) used to label the four stages have also come down through the ages and his thoughts have echoes through the halls of psychological literature. The construct that Wallas (1926) made was carried upon the high seas of history and made landfall onto my paper crashing through the analysis like a runaway train.

Was this bias bad? The bias of previous pioneering thinkers and contemporary researchers is present. This fact can not be denied. However, one could astutely pose the question whether this bias is necessarily bad. It was evident to me from the questions and interactions that I had with my audience that many of them had never heard of some of the cornerstone concepts proposed by the eminent philosophers and thinkers. In this way then my seminar has biased the thinking of a fresh mind to the subject of the study of creativity. In other words, I have tainted the thinking of otherwise unwary thinkers as to the means, mechanisms, mechanics, and dimensions of the creative process. Perhaps they might have come up with some other interesting aspects by reflecting upon the problem themselves. The opposing viewpoint is that this exposure to the past is not necessarily bad. Understanding those who have worked on the problem before provides a basis upon which to think about the problem in the future. Furthermore, the participants were exposed to ideas that they probably would not have otherwise been exposed to. Perhaps it is the case that some of the attendees would have specifically given thought to the creative processes for modern American citizens on their own time. They might have sat back in a comfortable chair and contemplated the meaning of creativity and how creative production occurs. But it could also have been the case that they wandered aimlessly throughout their lives and never stumble upon the beauty of the human imagination and how creative production actually occurs.

The real danger to bias perhaps then is not so much that it exists, but rather than it is wrong. Consider a historical, well know, and famous example of planetary orbits. At one point in man's history we thought that the sun revolved around the earth. Later, through evidence we discovered that the earth actually revolves around the sun. That the bias is present in modern scientific understanding was true today as it was thousands of years ago. So if this bias of

thinking were still present in the majority of the population while the truth were understood by a relatively small cadre of scientific researchers the danger would be this schism of understanding, as it could cause confusion, misdirected policies, harassment, intolerance, and any of a number of other social maladies and stigmas. To sum up, the fact that historical bias exists is not necessarily a bad thing because it can serve as a basis for further research, proper acknowledgement, and an understanding failed attempts. The real danger of historical bias comes when it closes the mind to new avenues of thought, new horizons, new dimensions, and new perspectives.

Participant reaction

The participants received the presentation warmly and enthusiastically. Having given hundreds of presentations to a variety of audiences, I find that adult audiences tend to be more receptive to educational material. Furthermore, the audience was composed of co-workers at my place of employment, and I recognized the audience members.

Gauging the level of interest and understanding of an audience can be done through numerous methods. The principle method used within the seminar was simply questions and answers through an interactive dialogue during the presentation. Participants were encouraged to ask question, to clarify knowledge, and to see if they understood the principle concepts being presented. There were a number of questions about terminology or how the concept related to some aspect of the creative process.

To give an illustrative example, the concept of Bisociation put forth by Koestler (1964) in the thinking out of the box creative process caused a fair amount of confusion in at least a couple of the participants. I first described the concept of bisociation on the slide concerning thinking out of the box. I described it as two perspectives being intermingled in a way. Koestler (1964)

described it as two frames of reference interacting to create a new perspective, or idea. The interaction, he noted, stimulates creative production. However, I only initially spent some number of seconds describing bisociation. Koestler (1964) interwove the concept of bisociation throughout his lengthy work. It was difficult to convey a complex concept in only a few minutes during a seminar. An entire presentation could have been developed just describing Koestler's (1964) concept of bisociation.

The participants wanted to understand the terminology introduced by the researchers and inaugural theorists. This indicates a level of interest. Secondly, the words they choose, the response they made to my descriptions also indicate attentiveness and curiosity. Of course, it is difficult to convey within a short time all of the information that was absorbed to produce this research. Thousands of pages of ideas on thinking, psychology, creativity, and the creative processes were used as input during the Breadth and Depth components. These ideas were evaluated specifically looking for insights into the creative processes used by people.

Perhaps the best question posed by an attendee was if these creative processes are used together or individually. Indeed of the numerous questions asked this one was probably the most interesting. It demonstrated learning and attentiveness. The answer to the query is that the processes are not mutually exclusive. It is possible that a creative person might start off with the exploration creative process, hit a dead end and stop thinking about the problem. That person might then sit on the problem for a while, gathering steam, and building up mental reserves through the incubation creative process. Then the person might finally engage the thinking out of the box creative process to solve the problem. Of course, as it was presented each of the creative processes are viable methods that might have been used to solve problems, or generate creative new ideas. The interesting thing is that most of the question by the attendees of the seminar

focused on just the material presented, asking for clarification or further description. However, this question jumped the rails of the normal line of thinking and showed evaluation based on higher order thinking. Of course a seminar on thinking that generates thinking is very appropriate.

Participant comprehension

The concepts and processes discussed probably fall into three categories. The concepts were either based in common sense, or they were unintuitive, but readily comprehensible, or they were synthetic and not easily understood. In other words, many of the concepts abided by common sense, a person who was asked to produce what they thought were creative processes could have produced these ideas. In this case I think most of the participants understood these concepts. For the common sense aspects of the creative processes, I usually got silent nods or an absence of questions. In this case the researchers and theorists lend some credible backing to ideas that would probably have been generated by most people pondering the question of what creative processes are used to generate creative production. An example of this common sense category is idea rediscovery described by Koestler (1964) in the recycling creative processes. Ideas used in one problem are rediscovered and used to help solve a new problem.

The second category of things fell into the unintuitive but readily comprehensible camp. Many of the attendees asked questions which demonstrated comprehension here. But most of the questions did not in and of themselves generate further questions or discussion once they were explained. An example of this was the selective forgetting aspect of the incubation creative process put forth by Segal (2004). The selective forgetting aspect described by Segal (2004) indicates the situation where a person has gone down the wrong thinking path and hit upon a dead end. If the person were to continue along that road not solution would be evident. Perhaps the person might have also come upon some situation which developed their thinking down a

particular incorrect path. The incubation process allows for these dead ends to work themselves out and to be selectively forgotten. It is not readily intuitive that this should be a mechanism of the incubation creative process, however when described to the participants they were able to comprehend the concept. Many times during the seminar I asked the attendees if they understood or had questions. Through direct questioning I could ascertain that the concepts that fell into this category were understandable by the people that attended the seminar.

The last category of aspects of the creative processes was ones that were created by the theorists and researchers. Either they synthesized new terminology to describe an idea that they developed, or used relatively uncommon words to label a complicated idea. Probably the best example of this is the bisociation term invented by Koestler (1964). He created a new term to describe an aspect of thinking out of the box which involves blending two frames of reference, or two perspectives together into a new concept, or as a way to solve a problem. For example, if a person had a hole in their home created from a broken window they temporarily use a folding table to cover the window. The frame of reference that a window should be fixed with glass is the typical perspective for that object. A folding table should be used as a flat surface upon which to place objects. These two frames of reference must be bisociated in order to think out of the box and temporarily use the table as a cover to the hole left by the broken window. Some of the participants did not readily absorb a few of the concepts represented by the new terminology. This is to be expected as numerous examples and lengthy descriptions are employed by the researchers and principle theorists who have built up a perspective and more thorough understanding of their ideas through their writing.

Another interesting question posed by a participant who demonstrated comprehension was what creative processes did the researchers and theorists use in order to come up with their

insights on the creative processes? Of course, there is no one simple answer to this question. I answered this question by stating that contemporary researchers frequently use studies and experiments to gain insight. Modern researchers also have the luxury of building upon the efforts of the foremost theorists. So how did the seminal theorists first come upon their ideas? What process did they use? Wallas (1926) used a methodical creative process, sitting back and producing his magnum opus based on pure cognition. Guilford and Hoepfner (1971) performed a study involving participants. They used methodical creative methods. Koestler (1964) explored the problem and also produced a methodical description of the creative act. Of course, whether the premier theorists actually used other creative methods to produce is unknown. If they did not write about it explicitly you have to do some guesswork and read between the lines.

Seminar evaluation and assessment

The purpose of the seminar was to inform the attendees of the creative processes used by modern American citizens. The purpose of the seminar was explicitly stated at the start of the presentation and I asked the attendees if they felt like they had a better understand of those processes at the end of the seminar. The response that I got from the people was positive and encouraging.

Part of the evolution process for the seminar should be what the problems were and how the presentation could be improved. These are in fact discussed in the following two sections. By far the most challenging thing in producing the seminar was trying to encapsulate thousands of pages of text into a few slides. The most critical ideas which were pertinent to the creative processes were identified. In some cases there were so many ideas that the slide had to capture an abundance of ideas in a small amount of slide real estate. The typical presentation slide should have around five to seven major points on it. I tried to abide by this rule of thumb. If too many

points needed to be made, I tried to cluster the sub-points into larger aspect groupings. I was able to effectively convey the important ideas for the most part.

I would say the seminar was a success as the participants walked out with a better understanding of the creative processes used by people than they had when they walked in. The original theorists and modern researchers had numerous ideas which were evaluated, synthesized, and analyzed to produce the central concepts used in the presentation. The seminar exposed these ideas to the attendees.

Another aspect of assessment is not just the effectiveness of the presentation, but the efficiency. Up to this point mostly the effectiveness has been discussed, how effectively was the information conveyed, how effectively did the participants absorb the information, how effective was the seminar as a delivery vehicle to convey the principle ideas that comprise the creative processes used by people. The efficiency measures how concise the solution is. Two solutions might be equally effective; they might both adequately solve the problem. However one might use fewer resources, or capture the ideas more concisely, or be more elegant than another one. That is to say, one solution might be more efficient than another one. Efficiency implies an ease of motion, a dancer's gracefulness. Could there have been a more efficient solution than the one that was chosen to convey the information? Because the information was bundled one principle creative process per slide and all of the principle aspects for that creative process were captured on the slide, I would contest that the presentation was effective as well as efficient.

Seminar stumbling blocks

In any good analysis some effort is spent determining the problems that occurred. In a study involving participants there are numerous sources of potential error. For example, Trochim (2001) mentions various types of error in studies including measurement, problems in

instrumentation, maturation in subjects, history threat, testing problems, mortality issues, and regressions bias. In a seminar, similar sorts of problems might pervade the people who attended. If the attendees had been chosen from a population of psychologists, or researchers on thinking they would exhibit a natural history threat. Trochim (2001) defines a history threat as some external cause that influences the participants. In this case, the history threat is prior knowledge on the subject. Another example of a problem is regression bias. Trochim (2001) explained that this is a statistical phenomena produced by using a non random sample of the population, which results in an imperfectly correlated. For example, if a researcher is trying to perform a study on thinking in order to understand reasoning within modern French suburban citizens. If the researcher garnered a group of people who were abnormally intelligent, or already well versed in methods of reasoning his research would exhibit a regression bias. In my seminar, the goal was simply to impart information to the participants. However, it is not a stretch to turn this into a study. Trochim (2001) lays down the foundation for such a study. A pre-test could have been given to two participant groups assessing what creative processes they used. The seminar is given to one group, the treatment group. The second group, the control group, is not given the seminar, or treatment. Then, a post-test is given to both groups presenting a series of problems requiring creativity to solve. The study would then evaluate if the seminar ideas made an impact on the treatment group using the control group for comparison.

On a less theoretical note, and from a more practical perspective, an assessment can be made of some of the basic stumbling blocks in the seminar. Based on the questions posed by the people who attended the seminar, and the interaction with those participants, the principle stumbling blocks were the concepts that were created by theorists. For example, the use of the French term, *trouvaille* by Koestler (1964) in the serendipity creative process to roughly mean a

lucky find. Another example is the concept of *bisociation* proposed by Koestler (1964), which he created to mean an integration of two frames of perspective in order to stimulate creative production. In a pedagogical situation where the purpose of the seminar is to convey principles, ideas, theories, and concepts, there is perhaps no greater stumbling block than terminology that defies comprehension. Of course, in the actual lecture I was able to eventually convey the meaning behind concept by spending time to stop and explain the complex idea to people.

Another stumbling block was simply that different people exhibited different aptitudes for learning. Some people seem to comprehend the ideas faster than other people. This will probably be true of any application that involves the powers of human thought. This was not a major stumbling block because the people who did not at first comprehend the ideas were given an opportunity to ask questions and interact with me until they got the basic idea. Of course, it might have been the case that many of the participants were disinterested, or didn't speak up. There was only so much interaction that I had with the people who attended the seminar, and I did not perform any sort of pre or post-test to assess understanding. So the perception that some people learned faster than others is subjective, and based on my judgment.

Seminar possible improvements

There are several possible improvements that could be made to the seminar. Probably the most obvious one would be to reduce the number of elements on each of the slides to five to seven per slide. I knew that this could have been done when I was producing the slides and made the conscious decision to include all of the principle interesting ideas instead of eliminating some thereby favoring others. Instead I chose to cluster them into a group of concepts in those situations. Another possibility would have been to use six elements and then create a set of backup slides which listed in more detail the other secondary concepts.

Another possible improvement might have been to change the format of the seminar. The interaction with the participants took the form of short interactive dialogues which had the purpose of explaining some point which was confusing for a particular participant. Another way to improve this might have been to pass around index cards and let people write down questions which could be answered. This has the effect of allowing those participants who are too shy to ask a question to gain clarity in understanding. No assessment or evaluations were made which would have unfortunately lengthened the seminar. While this might have been an improvement it would have cut back on the time available to spend on describing the concepts. As with most things in life, there are tradeoffs. Each of the improvements comes at the expense of something else.

Conclusion

This KAM began with the Breadth component by asking what creative processes existed for modern American citizens. It concluded that exploration, incubation, methodical, recycling, redefinition, serendipity, spontaneous, synthesis, and thinking out of the box are the main methods by which creative products are generated. Details for these processes were hinted at by the theorists. The Depth component continued the investigation and reinforced the creative processes arrived at by providing further insight through contemporary research. Finally, in this component, the research was bundled into an informative seminar and delivered to a professional audience. An assessment was made which concluded that overall the seminar had achieved its intended purpose, but, there is always room for some improvement.

Appendix Seminar Presentation Package

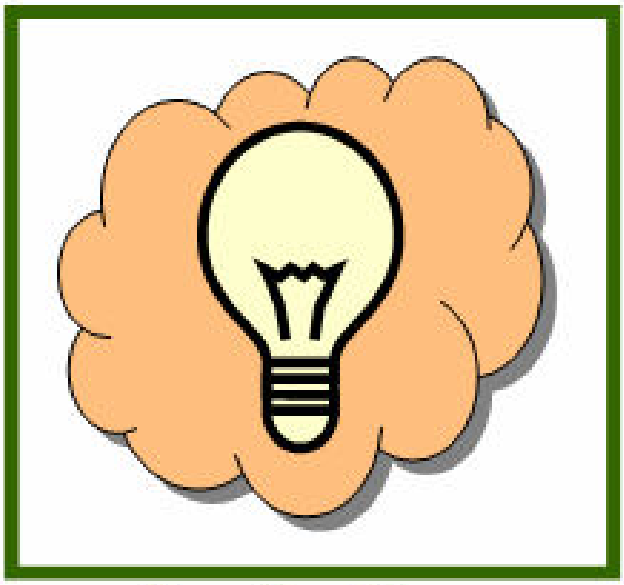
The creative process for modern American citizens

by Benjamin Cheung

Prepared September 2007

Having an idea

Creative Person



Creative Idea

Creative process

Creative environment

Creativity Processes for modern American citizens 2

Creativity

- "The act of creation of the conscious and unconscious processes underlying scientific discovery, artistic originality, and comic inspiration." (Koestler, 1964, p. 21).
- Divergent production abilities that utilize fluency, originality, elaboration, and mental flexibility. Guilford (1967)
- "The making of a new generalization or invention, or the poetical expression of a new idea" (Wallas, 1920, p. 79).
- Creativity is creative ability; artistic or intellectual inventiveness (The Webster's New World Dictionary of the American Language, 1984).
- Creativity involves the purposeful production of something new through some process. (Bleakley, 2004)

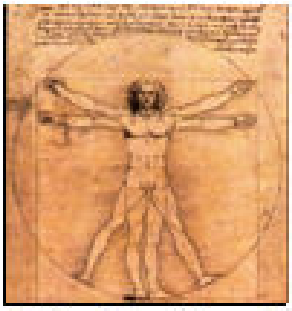
Creative Process

- Merriam-Webster defines ***Process*** as
- 1 a : Progress, Advance <in the process of time> b : something going on : Proceeding
- 2 a (1) : a natural phenomenon marked by gradual changes that lead toward a particular result <the process of growth> (2) : a continuing natural or biological activity or function <such life processes as breathing> b : a series of actions or operations conducing to an end; especially : a continuous operation or treatment especially in manufacture

Creative Processes

Exploration

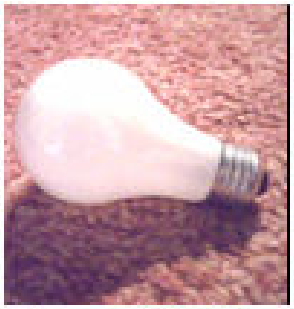
Incubation



Methodical

Redefinition

Recycling



Serendipity

Spontaneous

Synthesis

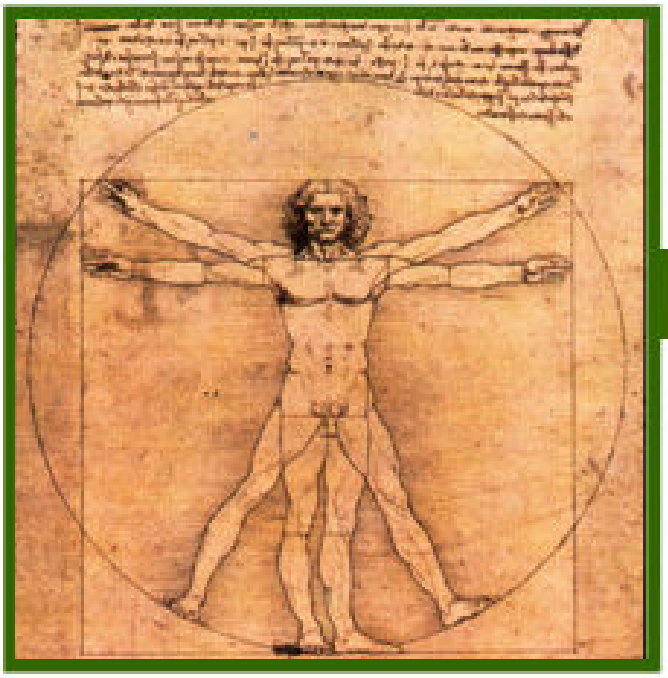
Out of the Box

Exploration

- Curiosity, Experiment (Koestler 1964)
- Observation (Gionet 2004)
- Part of Learning (Koestler 1964)
- Sensitivity to problems (Guilford & Hoepfner 1971)
- Experimentation, Demonstration (Runco 2004)
- Originality, Spontaneity, Play (Bleakley 2004)
- Probing Question (Erill 2002)
- Investigation (Lindstrom 2006)

Incubation

- Blocks (Koestler 1964)
- Unconscious mind (Koestler 1964)
- *Reculer pour mieux sauter* (Koestler 1964)
- Fatigue dissipation, Selective forgetting, External cues, Attention withdrawal, Prepared mind (Segal 2004)
- Transformation, insight, intuition, emotion, mental state, environment, personality, experiences, motivation (Guilford 1967)



Methodical

- Wallas stage model [Preparation, Incubation, Illumination, Verification] (Wallas 1926)
- Reasoning methods (Guilford & Hoepfner 1971)
- Stages [Conceptualization, Schematization, Actualization] (Cowdroy & Williams 2006)
- Stages [Problem finding, Immersion, Idea generation, Idea validation, Assessment] (Hill & Johnson 2003)
- Persuasion (Rank, Pace & Frese 2004)
- Brainstorming (Runco 2004)
- Stage [preparation, inspiration, realization, completion, objectification] (Shaddock 2006)

Recycling

- Idea rediscovery (Koestler 1964)
- Memory [Relaxation, instigation, *replicative* recall, over-learning, *recency*, transfer recall, judgment, search, localization, clustering, scanning operation] (Guilford 1967)
- Emotional memory, declarative memory [schematization, recollection, orientation, extrapolation, planning, innovation, inventiveness] , procedural memory [actualization] (Cowdroy & Williams 2006)
- RRR [Rote, recognition, repetition], DDD [dialectic, diagnosis, debate], EEE [exploration, experimentation, extrapolation] (Cowdroy & Williams 2006)

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Redefinition

- Function shift (Guilford & Hoepfner 1971)
- Defect awareness (Guilford & Hoepfner 1971)
- Problem restatement (Runco 2004)
- Reformulation (Bleakley 2004, Lindstrom 2006)
- Evaluation (Lonergan, Scott, Mumford 2004)
- Forecasting (Lonergan, Scott, Mumford 2004)
- Analogy, metaphor, paradigm shift, re-conceptualization, structure mapping, relational abstraction, re-representation, structural inversion, structural rarefaction (Veal 2005)

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Serendipity

- Diligent preparation (Koestler 1964)
- Observation (Koestler 1964)
- Ripeness (Koestler 1964)
- Trouvaille (Koestler 1964)
- Self-assessment (Linstrom 2006)
- Open-mindedness (Bleakley 2004)

Spontaneous

- Spark of intuition (Koestler 1964)
- Unconscious guidance (Koestler 1964)
- Leap of imagination (Koestler 1964)
- Spontaneous impulse (Wallas 1920)
- Eureka! effect (Koestler 1949)
- Flash of insight (Koestler 1964)
- Mixed mental states (Wallas 1920)

Synthesis

- Organizing parts into wholes (Guilford & Hoepfner 1971)
- Gestalt completion, Object synthesis, Concept synthesis (Guilford & Hoepfner 1971)
- Associating ideas (Koestler 1964)
- Concept fusion (Lindstrom 2006)
- Idea integration (Lindstrom 2006)
- Left + right brain (Runco 2004)

Thinking out of the box

- *Bisociation* (Koestler 1964)
- Means [Analogy, Paradox, Satire, Irony, Allegory, Deformation, Displacement, Simplification, Exaggeration, Reversal, Association, Symbolization, Formulation, Merging, abstraction, Repetition, Implication] (Koestler 1964)
- Means [Syllogisms, association, visualization, analogy, classification, consequences, expression, common sense] (Peltz 2005)
- Fluency, Flexibility, Originality (Guilford & Hoepfner 1971)
- Divergent thinking (Guilford 1967)
- *Synectics* (Hummell 2006)
- Means [Articulation, Janusian process, homospatial process] (Rothenberg 2006)

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Conclusion

- Exploration
- Incubation
- Methodical
- Recycling
- Redefinition
- Serendipity
- Spontaneous
- Synthesis
- Thinking out of the box

References

- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill Book Company.
- Guilford, J. P., Hoepfner, R. (1971). *The analysis of intelligence*. New York: McGraw-Hill Book Company.
- Koestler, A. (1949). *Insight and outlook*. New York: The Macmillan Company.
- Koestler, A. (1964). *The act of creation*. New York: The Macmillan Company.
- Wallas, G. (1926). *Art of thought*. London: Jonathan Cape.
- Wallas, G. (1920). *Human nature in politics*. London: Constable Books.
- Bleakley, A. (2004). Your creativity or mine?: A typology of creativities in higher education and the value of a pluralistic approach. *Teaching in Higher Education, 9*(4), p. 463-475. Retrieved August 3, 2007, from the Academic Search Premier database.
- Cowdroy, R., Williams, A., (2006). Assessing creativity in the creative arts. *Art, Design & Communication in Higher Education, 5*(2), p97-117. Retrieved August 3, 2007, from the Academic Search Premier database.
- Díaz-Lefebvre, R. (2004). Multiple intelligences, learning for understanding, and creative assessment: Some pieces to the puzzle of learning. *Teachers College Record, 106*(1), p49-57. Retrieved August 3, 2007, from the Academic Search Premier database.
- Erill, S. (2002). What if ...? *Lancet, 360*, p. 420. Retrieved August 3, 2007, from the Academic Search Premier database.
- Fourmentraux, J. (2006). Internet artworks, artists and computer programmers: Sharing the creative process. *Leonardo, 39*(1), p. 44-50. Retrieved August 3, 2007, from the Academic Search Premier database.
- Gionet, D. (2004). Risking ourselves in the creative process. *PSA Journal, 70*(8), p. 20-22. Retrieved August 3, 2007, from the Academic Search Premier database.
-
- Hill, R., Johnson, L. W. (2003). When creativity is a must: Professional applied creative services. *Creativity & Innovation Management, 12*(4), p. 221-229. Retrieved August 3, 2007, from the Business Source Premier database.
- Hummell, L. (2006). Synectics for creative thinking in technology education. *Technology Teacher, 66*(3), p. 22-27. Retrieved August 3, 2007, from the Academic Search Premier database.
- Kohtamäki, M., Kekäle, T., Viitala, R. (2004). Trust and innovation: From spin-off idea to stock exchange. *Creativity & Innovation Management, 13*(2), p. 75-88. Retrieved August 3, 2007, from the Business Source Premier database.
- Lindström, L. (2006). Creativity: What is it? can you assess it? can it be taught? *International Journal of Art & Design Education, 25*(1), p. 53-66. Retrieved August 3, 2007, from the Academic Search Premier database.
- Lonergan, D. C., Scott, G. M., Mumford, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal, 16*(2), p. 231-246. Retrieved August 3, 2007, from the Academic Search Premier database.
- Rank, J., Pace, V. L., Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology: An International Review, 53*(4), p. 518-528. Retrieved August 3, 2007, from the Business Source Premier database.
- Rothenberg, A. (2006). Creativity - the healthy muse. *Lancet, 368*, p. 8-9. Retrieved August 3, 2007, from the Academic Search Premier database.
- Runco, M. A. (2004). Creativity. *Annual Review of Psychology, 55*(1), p. 657-687. Retrieved August 3, 2007, from the Academic Search Premier database.
- Segal, E. (2004). Incubation in insight problem solving. *Creativity Research Journal, 16*(1), p. 141-148. Retrieved August 3, 2007, from the Academic Search Premier database.
- Shaddock, D. (2006). My Terrible Muse: Cohesion and Fragmentation in the Creative Self. *Psychoanalytic Inquiry, 26*(3), p. 421-441. Retrieved August 8, 2007, from the Academic Search Premier database.
- Tamdogan, O. G. (2006). Creativity in education: Clearness in perception, vigorousness in curiosity. *Education for Information, 24*(2), p. 139-151. Retrieved August 3, 2007, from the Academic Search Premier database.
- Veale, T. (2006). Re-representation and creative analogy: A lexico-semantic perspective. *New Generation Computing, 24*(3), p. 223-240. Retrieved August 3, 2007, from the Academic Search Premier database.
- Seibert C. (Website author) (2005). *Growth Process of a Butterfly*. [Photograph] retrieved from http://www.uoregon.edu/~mseibert/butterfly/process_files/image008.jpg on September 24, 2007.

References

Seibert C. (Website author) (2005). *Growth Process of a Butterfly.* [Photograph] retrieved September 24, 2007 from http://www.uoregon.edu/~mseibert/butterfly/process_files/image008.jpg

Trochim, W.M.K. (2001). *The Research Methods Knowledge Base (2nd ed.).* Cincinnati, OH: Atomic Dog Publishing