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Creativity as a Learned Skill: The Role of Deliberate Practice in the Development of Creativity

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CREATIVITY AS A LEARNED SKILL: THE ROLE OF DELIBERATE PRACTICE IN THE DEVELOPMENT OF CREATIVITY

By

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Dedication

This dissertation could not have happened without the tremendous love and support provided me by my amazing family, friends (the family I chose), and mentors. Know that I cannot mention you all here, but am thankful and grateful to you nonetheless.

To my incredible wife Sue. I thank you for tolerating my "mad scientist" nature and for putting up with this longer than anticipated journey! Thank you for always standing by my side, regardless how insane my ideas may have sounded, and most of all thank you for being the inspiration for everything I strive to be.

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Mom, what could I possibly say? You have been there for me for every up and down I have ever had. You provided me with every opportunity that has ever come my way and gave me the confidence to believe I could do it.

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Dad, I miss you every day and cannot express how much I wish you could share this moment with me. You set the bar that I aspire to, have been my hero since day one, and the example I look to every day of my life. I hope today you can look down with a smile…

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This study provides insights into the development of creativity, and specifically into the role that deliberate practice plays in the development of creativity. At the time of this writing, little research had been conducted with regards to methodologies of developing creativity, with the literature tending to focus primarily on measures of creativity. Further, research on the use of deliberate practice has thus far been restricted to those fields that have a focus on motor skills, or routine behaviors. As such, the current study represents the first attempt at applying deliberate practice to a field more nebulous in nature. Given the prime value assigned to creativity in the advertising industry, and indeed in industries across all domains, the value of this study is in the potential for guidance in terms of the education of creative professionals, as well as in increasing creative output.

Interviews were conducted with twenty-nine creative professionals representing a diverse set of domains, from advertising and film to photography, music, and comic books. The results present a thorough examination of the use of deliberate practice by these creative individuals, and provides an overview of how deliberate practice operates in the development of creativity.

The findings suggest that deliberate practice does indeed play a significant role in developing creativity across a wide swatch of domains, and that those incorporating deliberate practice certainly experienced greater strides in development and performance. Further, findings suggested the existence of previously unreported factors utilized by creative in their development. Study limitations, future research, and significant findings are presented in addition to the core findings.

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CHAPTER 1: INTRODUCTION

Creativity. The mere mention of the word brings to mind visions of light bulbs going off in one's head, the "aha moment," and mysterious artists seemingly magically producing works that delight, fascinate, and stimulate the masses. Creativity is a trait that has long been believed to be one luckily bestowed to a select few upon birth, and its successful application has allowed humans to create fire, the wheel, masterpieces of art, comic genius, music that pierces your soul, and advertisements that stay with us long after their run has ended.

The primary purpose of this dissertation is to examine the development of creativity in those who have achieved elite-level status as creative professionals. More specifically, I will be looking into the role of deliberate practice in the development of creativity. While much literature has been devoted to examining how deliberate practice can affect performance in a number of domains, none of this research has been conducted in the context of creativity. Thus far the focus of research surrounding deliberate practice has been on those skills that were primarily mechanical in nature. There has to date been no application of deliberate practice on less physically tangible subjects, such as creativity.

That said, creativity has certainly received much attention from academia over the past century. However, the bulk of the literature has made efforts to examine how creativity functions at a neurobiological level, or how the process of creativity itself unfolds. Very little research exists concerning how an individual actually *becomes* creative. For the most part, the question of how one becomes creative has been cast aside or attributed to external phenomena. Explanations such as creativity being gifts of or

channeled from the Gods have given way to explaining creativity and creative potential being chalked up as an innate talent, destined by birth (Helson 2000).

However what if this is not the case? What if creativity were no different than any other skill, and could be trained? If such a thing were possible, then the value to society would be substantial.

It would also be reasonable to assume that advertising, the author's academic area of study, would find the results to be of significant value. Advertising is an industry that sees firms rise and fall on the merits of their ability to produce consistently a high level of creative work that appropriately meets the client's needs. If the ability to train creativity more effectively were detailed, it would allow the industry to provide its potential employee's far more effective means for delivering the work that is required on a daily basis. Whether or not there is a basis for such a training program is precisely what this study seeks to discover.

Despite humanity's long fascination with the results of creativity, the term itself has undergone a multitude of shifts in meaning, and only relatively recently come to be used in the manner that society today commonly understands. Ancient Greeks, long renowned for being one of mankind's greatest representations of creative achievement, had a rather surprising belief concerning today's view of creativity: that it was actually a bad idea. The ancient Greeks believed that nature was perfection, and that it was man's job to learn the laws of nature and subjugate to them. To do differently would cause man to be in violation of natural law, and thus unable to achieve his optimum state. The responsibility of artists at the time was to discover, not create. (Tatarkiewicz 1980)

In fact, ancient Greece as a whole lacked terms for "creativity," to create," and "creator." Artists were not considered to be the makers of new ideas, but rather imitators of life. Music was a function of rigid adherence to melody, sculptors and painters were judged by their ability to mimic ideal proportions, and poets were, well poets were the exception. Poets were the one group that were seen to go beyond mere imitation and to create new visions. This was the sole group that Socrates claimed to be inspired by the daughters of Zeus and Mnemosyne, more commonly known as the "muses". Poets as a group inspired significant debate in ancient Greece in terms of what they were doing and how. Socrates alternately argued that much poetry should be banned as well as that some works, such as Homer's Iliad, were divine inspiration, with Aristotle claiming that poets lived in a world that was neither true nor untrue. Poets were also the first group to question the rigid adherence to rules by other artists, which would later spark a new vision of creativity in the Roman Empire (Tatarkiewicz 1980).

Rome saw an expanded view of creativity, a view that encompassed not only poets, but painters and sculptors as well. This expanded view was the result of the incorporation of the concept of imagination, which the Greeks had restricted to poets. The Romans saw the similarities in usage of imagination across poetry, painting, and sculpting, and encouraged these artists to dare to push outside the established boundaries that previously chained them.

The concept of creativity again undertook a seismic shift with the ascension of Christianity. As Christianity became the dominant religion, so did the idea that "creation", or any act related to "creation", was the sole domain of God. Men were unable to create,

only make. This also resulted in the term “creation” (specifically meaning creation from nothing) reversing course and no longer applying to the actions of mankind, and solely being reserved for the divine (Tatarkiewicz 1980). Having eliminated the possibility of being creative from the domain of mankind, artists, now including poets, were no longer creators or creative, and were rather designated as craftsmen. This ancient view of art as craft as opposed to creative endeavor enjoyed an even stronger resurgence during the Middle Ages, resulting in perhaps history’s most narrow view of creativity, that of creativity being a trait possessed solely by God.

The modern interpretation of the term “creativity” had its impetus during the Renaissance. This period in the history of mankind is perhaps most responsible for taking creativity out of the hands of God and returning it to humans. Marked by a sense freedom, independence, and yes, creativity, the artists of this era proclaimed their ability to be creative. Led by Leonardo Da Vinci, Michelangelo, and Raphael, these artists asserted that their works came from “nothing”. Of course, supernatural attribution could not be escaped, and many of these artists were believed to be demi-gods, or as having received divine inspiration, or simply having been touched by God. It was near the end of the Renaissance that Maciej Kazimierz Sarbiewski, a Latin poet and theoretician, would be the first to utilize the word “creation“ in reference to the artist as a creator, however Sarbiewski regarded the ability to create as solely within the domain of poets, and he still considered other artists to be imitators of nature (Tatarkiewicz 1980). The resistance to applying the term “creation” to works of art was largely due to the belief that creation came from nothing, and as humans lack the ability to create something from nothing, they cannot be

creators. Sarbiewski based his premise that poets are creative on the notion that what they wrote indeed came from nothing, and poems were "invented" by their creator, whereas all other artists must simply imitate something found in nature (Gabora 2007).

This view sparked a debate that saw both sides further entrench in their views. This debate late in the 17th century also introduced the idea that imagination was a component of creativity, a viewpoint widely espoused by noted philosopher Thomas Hobbes among others. The writings of Hobbes in particular would help push the notion of creativity hand-in-hand with imagination into the 18th century. This Age of Enlightenment saw a strengthening of the idea that creativity is a result of imagination, with Voltaire, Hobbes, and Thomas Addison siding with this belief. The momentum gained by these theories was not without its detractors, many of which vigorously denied the possibility of human creativity, however this resistance gradually faded until the 19th century, where art finally was able to stake its claim as an act of creativity. In fact, the pendulum made a complete swing in the 19th century, with art at this time being regarded as the *only* domain of creativity (Dasgupta 2004).

Until this point in history, creativity had received little discussion as being related to any field outside of the arts, and even less to scientific inquiry. However the latter part of the 19th century and early part of the 20th century saw the arrival of Darwinism and the resulting interest in individual differences in a multitude of characteristics (Dasgupta 2004). Specifically, this led to a belief that creativity was a function of intelligence and even genius, and it was investigated as such. Runco and Albert asserted that this was the true genesis of academic study of creativity, in particular the work of Francis Glaton, who

in the late-1800's investigated whether or not intelligence was inheritable, while specifically mentioning creativity as a division of intelligence (Albert & Runco 1999, Runco 2004). That said, it was the 20th century that truly brought the academic study of creativity to the forefront. While the literature will be reviewed in thorough detail shortly, it is important to note at this point that the view of creativity again shifted dramatically in the 20th century, now encompassing a wide variety of occupations, skills, and activities, and no longer being relegated to those with artistic ambitions. Creativity is now seen in business as a critical resource, a la Steve Jobs innovating Apple into one of the most desirable companies on the planet (Gabora 2007). Creativity can be found in architecture and city planning where individuals work to develop new solutions to old problems on a daily basis. Creativity can also be seen in the heartbeat of commerce, advertising, where people whose job title is often shortened to simply "creative," strive to find the perfect balance of sensory and informative clues to help companies achieve a variety of business objectives. Creativity can be found in the home, where each individual expresses his or her taste in each and every piece chosen and placed in the domicile. Moreover, creativity has been shown to have positive benefits. In addition to enhancing self-expression, creativity has been shown to improve health, increase adaptability, and even facilitate and enhance problem solving. (Runco 2004) In short, creativity is no longer simply for poets, but for a wide variety of endeavors.

The area of creativity that is of most interest to the author is the actual development of creativity. The term "creativity" has had multiple swings in meaning throughout human history, with the two predominant positions either being that "creative" endeavors were

either in fact the result of creative efforts, or the result of craft. Adding to this is the commonly held belief that creativity as a trait is largely the result of "talent". The implication in attributing the degree of one's creativity to talent, of course, being that one is either born with it or without it. However what if creativity is not a talent, but rather is the result of practice, or more specifically, *deliberate* practice?

Deliberate practice is a theory first presented by Dr. K. Anders Ericsson in 1993 as it related to the acquisition of expertise, and has since expanded into a variety of specific fields, ranging from chess, athletic achievement, surgery, to many more. This stream of research has received more attention thanks in part to it being mentioned as the impetus for Malcolm Gladwell's *Outliers* and Geoff Colvin's *Talent is Overrated*. Both authors vastly oversimplified the research, which will be noted in the following literature review. That said, deliberate practice has been examined in a wide variety of contexts, but nearly always in an arena in which measurement is clearly identifiable. It has not yet been examined in an area that is perhaps more nebulous, with less clearly defined methods of measurement (Kaufmann 2003b, Epstein 2008). This is where I believe creativity becomes the perfect candidate for examination when considering what the function of deliberate practice is in its development, if indeed there is any function at all.

The chapters of this dissertation that follow begins with chapter 2, a comprehensive overview of the literature surrounding both creativity and deliberate practice, followed by a chapter 3, which delineates the methodology for determining whether or not there is a potential link between deliberate practice and creativity, chapter 4 will be the findings of the interviews, and concluded with chapter 5, the discussion section.

CHAPTER 2: THEORETICAL BACKGROUND

Prior to investigating any topic of worth, it is first necessary to conduct an overview of the literature related to said topic. As such, this chapter will concern itself with investigating both the historical and current literature as it relates to both creativity and deliberate practice. Theories investigated cover the entirety of creativity, from neurobiological to psychological. Deliberate practice as well will be comprehensively presented, with findings on its application to a wide variety of skills and "talents". As a whole, the literature will then provide a theoretical framework and guidance as to the research questions and direction of this dissertation.

CREATIVITY

The scientific study of creativity is relatively new to academia, with the first studies appearing early in the 20th century, and substantial contributions to the literature not appearing until the 1980's. The efforts of J.P. Guilford are widely regarded as having given the study of creativity both plausibility and credibility (Runco 2004). Since Guilford's "Creativity" speech to the American Psychological Association, the study of creativity has made rapid gains, and has spread across a wide variety of fields.

The subsequent segmentation and fragmentation among various fields and subfields has made it difficult for researchers to keep abreast of all that is current in the study of creativity, with many researchers in one discipline seemingly unaware of the advances of other researchers in different disciplines (Hennessey 2010). A handful of academicians have attempted to reconcile this issue by publishing surveys of the various streams of creativity research, most notable with concern to this are the works of both

Runco and Hennessey (Runco 2004, Hennessey 2010). These surveys combined give an excellent overview of the current state of creativity research. However, despite a tremendous effort, they are still lacking, primarily in the scope of academic disciplines included.

In order to gain a complete picture of the research it is necessary to examine the literature covering as many disciplines as possible. This endeavor naturally lends itself to subdividing the literature into research from the biological/physiological/neurological perspective as well as the psychological. However, first we must arrive and agree upon a definition.

Definition

One obstacle presented in the study of creativity is finding common ground on exactly what creativity is and how it is defined. As has been discussed, the term "creativity" has taken on a variety of meanings over the past few centuries. During this time, it has equally been credited as a human trait and relegated to the realm of the supernatural. Humans either were creative or were spoken to/possessed by Gods or demons, and this could have been in reference to anything from only poetry to any seemingly novel idea.

Griffin and Morrison proposed what is one of the more appropriate definitions of creativity to date in terms of its modern application. They define creativity as: "The generation, development and transformation of ideas that are both novel and useful for solving problems." (Griffin & Morrison 2010, P. 6) While this definition of creativity appears to be largely sufficient, the requirement that creativity solves problems as well as

the restriction of creativity to ideas could be overly narrow for the purposes of this research (Gluck 2002).

Hennessey (2010) noted that while there has been difficulty coming to a consensus on the definition of creativity, nearly all aspects of the literature agree on at least two definitional components, novelty and appropriateness. In fact, within this article, Hennessey makes a statement that includes an excellent definition in and of itself: "…creativity involves the development of a novel product, idea, or problem solution that is of value to the individual and/or the larger social group…" (Hennessey 2010, p. 572)

Both definitions include elements that the literature has proven to be critical in the examination of creativity, and I therefore propose a hybridization of the two. Thus, for the purposes of this research, creativity will be defined as follows:

Creativity – The generation, development, and transformation of ideas, products, or problem solutions that are both novel and of use to the individual and/or larger social group.

Neurobiological Research

The rapid advancement of technological innovation in the 20th and 21st centuries has allowed for the study of the brain at a level of detail that was previously unimaginable. The ability of science now to monitor the brain as it works on tasks allows for researchers to answer questions related to creativity at the biological level. Specifically, fMRI (Functional Magnetic Resonance Imaging) and EEG (electroencephalographic; both topography and frequency), have allowed scientists to

make discoveries about the creative process that were up until recently left to pure speculation (Hennessey 2010).

Initial attempts to investigate creativity from a biological perspective were largely secondary to research into other areas of the brain. This is entirely logical given that often ephemeral attributions are given to creativity's origins. Perhaps the most popular research originally applied to creativity was that of Nobel Laureate Roger Wolcott Sperry. Dr. Sperry was a neurobiologist most noted for his work with split hemisphere patients. It was his work that would pioneer the notion of "left-brain" and "right-brain" functionality and ways of thinking. Since the inception of this line of research, creativity has become known as a "right-brain" function, and academic literature has sought to investigate it as such. Perhaps most visibly is the work of Dr. Betty Edwards, who developed a system of teaching people how to draw through a variety of exercises designed to bypass the left hemisphere of the brain (Edwards 1989).

However, the idea of creativity being the sole domain of the right hemisphere of the brain is a flawed notion (Elliot 1986, Hoppe & Kyle 1991), and this flaw was summarized by Runco (2004). Runco states "Perhaps the most significant flaw in the various theories of right-brain creativity is that creativity actually requires the capacities from both hemispheres. Creativity is not always entirely intuitive, for example, nor even radically original. Creativity instead reflects originality and appropriateness, intuition and logic. It requires both hemispheres." (Runco 2004, p. 664). This position is further substantiated by Elliot (1986), Hoppe & Kyle (1991), Tenhouten (1994), Katz (1997),

and Shlain (1999), all of whom found evidence of inter-hemisphere communication that appears to be applicable to creative exercises.

The evolution of the neurobiological study of creativity was furthered in 1978 when Martindale & Hasenfus first suggested that EEG (electroencephalographic) activity would differ throughout the various stages of the creative process. The stages they refer to are Graham Wallas' original four stages of the creative process, which will be examined in more detail later in this review. In testing that examined EEG results in notably creative individuals, they found that alpha waves were more prevalent during the inspiration stage as compared to the elaboration stage, which suggested to them that this was the result of defocused attention which was caused by low cortical arousal. This defocused attention then enabled the creative thinker to form the associations that would turn into a creative thought.

The development of the fMRI (functional Magnetic Resonance Imaging) allowed scientists to more closely look into the activity of the brain, and studies have begun to emerge utilizing this technology that specifically address issues related to creativity. The first of these studies with applicability to creativity came in 2000 (as well as their follow up study in 2004), when Miller, et al. studied patients with dementia. They looked for the development of new skills in these patients and discovered that decline or "loss of brain function in one area may lead to facilitation of artistic or musical skills." (Hennessey 2010, p. 574).

Similar results were reported by Mell (2003) in his investigation of the advancement of frontotemporal dementia, a form of aphasia where the patient initially

loses the ability to comprehend and process language, and gradually loses the ability to think altogether. Mell studied frontotemporal dementia in a talented artist and found that not only was language not a requirement for particular types of visual creativity, but that it could actually *inhibit* these types of creativity.

One pair of researchers in particular has made tremendous headway into this field, Bowden and Jung-Beeman. These researchers have published a number of papers on semantic activation of the right hemisphere of the brain as it relates to solving insight problems. Their findings showed that there is indeed a strong link between the moment of recognition of the solution to an insight problem and activation of the right hemisphere of the brain (Jung-Beeman 2000, Bowden 1998, 2000, 2003).

Most recently, Kounios (2006) examined behavioral priming prior to insight and the resultant effect on various regions of the brain. The experiment results showed increased activity in areas of the brain commonly associated with semantic processing and cognitive control whereas noninsight priming resulted in increased activity in areas of the brain associated with external attention. This study is fascinating in that it is the first to directly illustrate brain activity at the moment of insight, the moment the "light bulb" went off.

In summary, the neurobiological study of the brain as it relates to creativity is very much in its infancy, and while it has provided interesting insights thus far, it quite simply has not reached a level of maturity where it can observe the "creative process as it unfolds in the human brain." (Hennessey 2010) Further, for the purposes of this study, neurobiological study does not directly address developmental issues with regards to

creativity. That said, neurobiological study does suggest that creativity can be developed, specifically from results of the studies of Mell, Miller, Bowden, and Jung-Beeman. Certainly the advancement of technology will continue to allow for examination in greater detail of the creative process, and one day may yield a crystal clear picture as to how the brain progresses through the creative process.

Psychological Aspects of Creativity

The study of creativity from a psychological perspective is not unlike its neurobiological counterpart in that it too is relatively new to academic study, and as such has many gaps that have yet to be investigated.

Creative Process Models

What can be seen as the modern study of creativity largely began with the work of political scientist and sociologist Graham Wallas (Griffin & Morrison 2010). Wallas wrote *The Art of Thought* in 1926, and in it he proposed what was to become the first major model of the creative process. His model contained four stages that an individual goes through when working creatively. They are:

1. Preparation - "Our mind is not likely to give us a clear answer to any particular problem unless we set it a clear question, and we are more likely to notice the significance of any new piece of evidence, or new association of ideas, if we have formed a definite conception of a case to be proved or disproved." (Wallas 1926) In short, the thinker must carefully consider and clearly define the task or problem at hand, as well as perform any necessary research or resource gathering needed to address the task/problem.

2. Incubation – In this stage the thinker internalizes his or her consideration of the task and the previously gathered resources. Wallas asserted that one could work on the preparation phase of one thought while simultaneously working in the incubation phase of another to maximize time efficiency. According to Wallas "…we do not voluntarily or consciously think on a particular problem" and that it "…is the positive fact that a series of unconscious and involuntary mental events take place during that period."
3. Illumination – Now more commonly known as the "aha" moment, the moment when an idea "clicks", or the light bulbs go off. This is the stage where the idea comes to fruition. Wallas also stated that "I find it convenient to use the term 'Intimation' for that moment in the Illumination stage when our fringe-consciousness of an association-train is in the state of rising consciousness which indicates that the fully conscious flash of success is coming."
4. Verification – This stage sees the thinker testing the validity of the idea. If necessary, the idea is expounded upon in order to arrive at the final solution, which is applied if successful in this stage.

The Wallas model when introduced immediately found resistance, and to this day still faces some criticism. Griffin and Morrison mention that the overall simplicity of the model was counterintuitive both at the introduction of the model and remains a criticism to this day. Their response is that "Wallas' four stages represent the more universally experienced facets of process but don't prohibit examination of the phenomenon in

greater depth." (Griffin & Morrison 2010, p. 6). Perhaps being more debatable still was Wallas' assertion that the four stages must be experienced in order, and that the stages cannot be skipped. Wallas does allow that each stage can be returned to when necessary, but that in no case do they actually overlap.

Despite the various debates surrounding Wallas' model, it remains the "most famous and influential proposal for understanding how creative thinking unfolds as a process." (Griffin & Morrison 2010) Additional models have been put forward, often adding a post-, pre-, or both reflective stage, such as Polya (Polya 1945, Polya 1954, Griffin & Morrison 2010) and Dewey (1933), however nearly every major accepted model has at its core the four stages initially proposed by Graham Wallas, and as such has remained the standard for researchers to this date.

More recently, W. Glenn Griffin has proposed The Performance Model of Advertising Students' Creative Process and the Mastery Model of Advertising Students' Creative Process (Griffin 2008). Based upon this research, Griffin suggests that advertising students underwent an evolution of their creative process during the course of their education. In what may appear to be a short time to some, three semesters, Griffin found several changes in the creative process utilized by incoming (1st semester) students and their more advanced (3rd semester) peers. Griffin was able to observe that first and foremost, the more advanced students were less likely to solve the problem as it was presented to them, and rather would reconceptualize the problem and approach it from multiple angles whereas the beginning students would take the problem as it was presented to them. Further, the more advanced students would *mindscribe* their thoughts

more freely, with no filter. Mindscribing is described by Griffin as "the real-time transcription of one's thoughts during the creative process." (Griffin 2008, p. 103) In contrast to the advanced students, the beginners would apply a more stringent filter to their mindscribing practice, thus eliminating ideas before giving them full gestation. Advanced students would mindscribe freely until an interesting stream of thought would appear, which would then proceed to be developed. Finally, Griffin noted that there was substantial difference in the availability of heuristics, or mental "rules of thumb" that the students were able to access. These heuristics allowed the advanced students to more quickly determine the validity of their ideas, as well as improved their ability to further develop their idea by moving from heuristic to heuristic as needed. While the research was specific to advertising creative students, several of Griffin's findings could possibly be applied to other fields. Specifically, it appears as though the revisualization of the problem could be inherent in the evolution of all creative processes. It also appears to be logical that more advanced practitioners of any creative endeavor would have access to a wider array of heuristics, which could thus enable them more quickly to assess and develop their ideas. This is of course speculation without further evidence, however it bears keeping in mind as the study of creativity proceeds.

Structure of Intellect Model

Another model of particular importance to the study of creativity from a psychological perspective is The Structure of Intellect Model (Griffin & Morrison 2010). Described by Griffin and Morrison as appreciating the "interdependent relationship between human intelligence (the sum of a person's knowledge) and intellect (a person's

ability to use knowledge and generate new ideas).” (Griffin & Morrison 2010, p. 8), The Structure of Intellect Model was first proposed by Guilford in 1967, and was organized along three primary dimensions: contents, operations, and products. Further, Guilford broke down each dimension into distinct intellectual abilities as follows:

I. Contents
    a. Figural – Things in the environment. Tangible objects and real-world information.
    b. Symbolic – Information that is seen to stand for something else.
    c. Semantic – Abstract in nature, generally concerned with verbal meaning and ideas.
    d. Behavioral – Perceived as acts of people.

II. Operations
    a. Cognition – Becoming aware of information; discovery, comprehension, and understanding of information.
    b. Memory recording – Encode information.
    c. Memory retention – Recall information.
    d. Divergent production – Creativity. Generate multiple solutions to a problem.
    e. Convergent Production – Rule-following/Problem solving.
    f. Evaluation – Judge accuracy, consistency, and validity of information.

III. Products

a. Units – Single item of knowledge.

b. Classes – Units with common attributes

c. Relations – Units that are associated, sequenced, or analogous.

d. Systems – Structure or networks

e. Transformations – Changes to knowledge.

f. Implications – Predictions of knowledge, including inferences and anticipation of consequences.

Since its introduction, The Structure of Intellect Model has enjoyed widespread acceptance as a theory of human intelligence. Additionally, it has since been raised in prominence by its usage in education. Education primarily relies on The Structure of Intellect Model as a way of testing for a child's aptitude, as well as for detecting learning disabilities. Of importance to discussions surrounding creativity, many school districts use The Structure of Intellect Model testing in order to assess the creative potential in children. This usage in education was primarily advanced by one of Guilford's students, Mary N. Meeker. Meeker published dozens of articles in her career concerning the application of the Structure of Intellect Model to various educational applications and curriculum development. Its utilization in assessing creativity would appear to make sense given that the model includes creativity as one of its intellectual abilities (II. D. – Divergent Production), and that other abilities are crucial in the creative process, such as cognition, relations, and transformations.

Despite its widespread acceptance, Guilford's theories, and specifically his statistical analysis have come under criticism over the past decade and a half. A number of researchers who have revisited Guilford's data sets have found that any random factors could yield the same results as those Guilford proposes in his model based upon his method of statistical analysis (Mumford 2001, Runco 2004). Despite these findings, The Structure of Intellect Model remains influential to this day both as a theory and the foundation for a number of theories that have since followed.

Cognition and cognitive processes that go into creativity have also received much attention from academia. Perhaps the largest area of study within cognition is the study of domain specificity and the relationship of the domain to various cognitive processes (James 2001). Initially, researchers assumed that creative processes were domain specific, but little was said about the number and significance of domains (Runco 2004).

Theory of Multiple Intelligences

One of the first to examine domains was Howard Gardner, who in 1983 began publishing a highly influential stream of research that was also the first to recognize seven domains: musical, mathematical, verbal-symbolic, bodily kinesthetic, spatial, interpersonal, and intrapersonal. This research was largely in response to Spearman's theory of "g", or a "general overriding factor of intelligence" (Gardner 1983 p. 16). According to Daniel Fasko Jr. (2001), Spearman's theory looks primarily at the logical, mathematical, and linguistic aspects of a student's abilities. This notion was rejected by Gardner as being too narrow in scope with regards to intelligence, and posited that only a minority of youth would actually possess potential in these domains.

Gardner countered Spearman's suggestion that there was only one intelligence with his own Theory of Multiple Intelligences in which he identified the aforementioned domains of intelligence. Gardner believed that human differences were to be taken "seriously" (Gardner 1995 p. 7), and that he believed these intelligences to be innate, with their potential determined at birth. Additionally, Gardner did not exclude the possibility of there being more than his seven domains of intelligence, with others possibly awaiting discovery. In proving of his own openness, Gardner later added naturalistic to his list of domains, and still later suggested that moral and existential intelligences also be added for a total of nine (Gardner 1995, Soloman 1999). Gardner was able to identify these intelligences based upon the existence of certain necessary components, which were:

1. Potential isolation of the intelligence by brain damage
2. Existence of idiot savants, prodigies, and other exceptional abilities
3. Identifiable core operation or set of operations
4. Distinctive developmental history
5. Definable set of expert "end-state" performances
6. Evolutionary history of the intelligence and evolutionary plausibility
7. Support from experimental psychological tasks
8. Support from psychometric findings
9. Susceptibility to encoding in a symbol system

Gardner's research prompted an explosion of domain related research, covering the gamut of topics, from subdomain intelligences to cultural differences in domain

intelligences. In terms of subdomain research, Fine artists (Domino 1989), designers (Sawyers & Canestaro 1989), and performing artists (Nemiro 1997) were found to have different cognitive styles and thought patterns, whereas Pritzker (1999) observed that poets, novelists, and situation comedy writers all possessed different attributes in the varying intelligences.

From a cultural perspective, the Theory of Multiple Intelligences has been used as a framework for understanding cultural differences in creativity. Western societies have a tendency to focus more on the verbal and mathematical domains, while other cultures may place values on other domains, such as spatial or existential (James 2001, Runco 2004). One interesting cultural similarity discovered was the existence of a "4^{th} grade slump", that has been observed in children both in the United States and India, with this slump effecting between 45% and 60% of the student body (Torrance 1968, Raina 1984, Runco 2004). Specifically, Torrance observed that in measures of creativity, including those from the Theory of Multiple Intelligences, significantly dipped from the third to the fourth grade.

Kaufman and Baer (2002) examined the Theory of Multiple Intelligences in terms of domain specificity, and largely concurred with the original findings, that the "cognitive mechanisms underlying creative performance are domain specific". That said, they did allow an exception for the possibility of a g (general intelligence) factor.

Miscellaneous Cognitive Research

Outside of domain specificity, one area of psychological research, and specifically within the realm of cognition, that has received a substantial amount of attention by

researchers is the area of attention. Attention has long been speculated to be a component of creativity, and several studies have investigated whether or not this is so.

Wallas again can be largely credited for sparking interest in this arena. As was previously discussed, Wallas' investigation into the stages of creativity led to the founding of his four stages model, which has been the standard for decades. This led to numerous experiments testing the validity of his model, one of which began the study of attention in relation to creativity. Also previously discussed, Martindale & Hasenfus utilized EEG (electroencephalographic) technology to monitor brain activity throughout the four stages of the creative process. Their findings of heightened alpha wave activity during the inspiration stage led them to believe that low cortical arousal caused defocused attention, which then enabled the creative thinker to form the associations that eventually lead to a creative thought. While they were unable to prove this point at the time, it did have the effect of bringing attention into the research arena (Martindale & Hasenfus 1978).

This study has since been elaborated on, with the vast majority of researchers agreeing that attention does indeed have an effect on creativity, although exactly *what* effect remains a topic of debate (Abraham 2007, 2008).

Rawlings was one of the first to take this stream of research further by conducting an experiment which showed that creativity correlated with an increased number of errors in a dichotic listening task. In short, creative people were prone to errors in typical attention related tasks, but on the other hand were more likely to introduce unique or original content into their information processing. This suggests that an "attentional

filter" that may be at work in most people to assist in maintaining focus on relevant tasks, may not work efficiently in creative people. This inefficiency may be harmful in everyday situations, but of great benefit in creative endeavors. (Rawlings 1985) This lack, or reduction, of attentional filter was further examined by Geraldine Shaw (1990, 1992), who studied the differences in creativity between hyperactive and non-hyperactive children. Her findings showed that hyperactive children, who were characterized as having a decreased ability to focus their attention, were typically more creative than their non-hyperactive counterparts.

Breadth of attention span has been investigated as well, primarily by Kasof, who in 1997 found that creativity correlated positively with breadth of attention, although the correlation was not particularly strong. He further showed in the same experiment that noise had a detrimental effect on creativity, and that the effects were stronger as the breadth of attention in the individual increased.

One researcher who has made significant contribution to the literature in this field is Edward Necka. Necka almost accidentally began his study of creativity while investigating the ability of those with differing psychometrically intelligences to ignore irrelevant stimuli appearing in their visual field. His hypothesis was validated, that is that a higher degree of intelligence allowed the subjects to better handle the task however, he supplemented the results with a divergent thinking test, which is used to measure a variety of intelligence attributes, and found that creative people were unable to distinguish between important stimuli and noise and distraction, particularly so as the level of irrelevant stimuli increased (Necka 1999, Groborz & Necka 2003).

These findings led Necka to look into creativity and its relationship in more depth. Over the course of his career, Necka has shown that subjects seen as creative have less resources available in terms of ability to dedicate attention, and that creativity does appear to have a relationship with having a reduced filter of attention, as well as the importance of having cognitive control in the attentional process (Necka 1999, Groborz & Necka 2003).

Flow Theory

For the past several decades, Mihalyi Csikszentmihalyi has researched happiness and optimal experience. This research has developed into a robust stream of literature resulting in and based upon Csikszentmihalyi's Flow Theory. Flow has also become one of the more impactful lines of research with concern to creativity.

What Csikszentmihalyi discovered is that an individual's happiness is independent of outside events, and rather is dependent on an individual's *interpretation* of these outside events (Csikszentmihalyi 1990, Csikszentmihalyi 1996). As stated by Csikszentmihalyi, "People who learn to control inner experience will be able to determine the quality of their lives, which is as close as any of us can come to being happy." (Csikszentmihalyi 1997) Qualities that he attributes to those who have found this happiness are that they: lead vigorous lives, are open to a variety of experiences, continue learning until the point of death, and have built strong ties to both community and other individuals. Perhaps more importantly, they enjoy whatever they may do in spite of difficulty, are rarely bored, and have the ability to take almost anything in stride. Further, Csikszentmihalyi asserts that humans have the capacity to change the contents of their

consciousness, and thus bring about this desired state (Csikszentmihalyi 1990, Csikszentmihalyi 1996).

In researching exactly what makes people happy, as well as how they got to the point of happiness, Csikszentmihalyi discovered what he would later name a state of flow. The state of flow is one that all human beings have experienced at one point or another and can be described as "being completely involved in an activity for its own sake. The ego falls away. Time flies. Every action, movement, and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you're using your skills to the utmost." (Csikszentmihalyi 1997) Athletes have described a similar state as "being in the zone", with the characteristics of the state being described similarly.

In order to determine the characteristics of flow, Csikszentmihalyi observed people who "seemed to be doing things that they enjoyed, but were not rewarded with money or fame." (Csikszentmihalyi 1996, p. 110) This included a variety of people involved in varying activities, such as chess, rock climbing, dancing, and music composition. The first thing Csikszentmihalyi noticed when speaking to these people is that they were all motivated by the quality of the experience itself while doing the activity, and that the feeling was one they could not replicate via relaxation, drugs, alcohol, or "when consuming the expensive privileges of wealth." (Csikszentmihalyi 1996, p. 110) The experience itself was most often described as being "an almost automatic, effortless, yet highly focused state of consciousness." (Csikszentmihalyi 1996, p. 110) This description was remarkably consistent, and did not vary regardless of

activity the respondent derived enjoyment, nor did it vary with any demographic trait, and even remained constant between American and Japanese respondents. Based upon these descriptions. Csikszentmihalyi was able to identify nine elements that he felt were key to this optimal state of flow (Csikszentmihalyi 1990, Csikszentmihalyi 1996):

1. Clarity of goals: You know exactly what needs to be done with no uncertainty.
2. Immediate feedback: Success or failure should be immediately visible.
3. Balance between skills and challenge: Csikszentmihalyi noted that to achieve flow, the task must be challenging enough so as to prevent the onset of boredom while not being so challenging the individual gets frustrated or anxious.
4. Merging of action and awareness: A one-pointedness of mind where concentration is focused on the action.
5. Distractions eliminated: An awareness solely of what is relevant.
6. No fear of failure: An individual is generally too wrapped up in the activity to have regard for failure in the activity. This is a result of having a clear goal coupled with the belief that one's skills are adequate for the task at hand.
7. Lack of self-consciousness: Again, the individual is too involved in the activity to show regard for issues of self-consciousness. However, Csikszentmihalyi did note that individuals tended to produce a stronger self-concept after the experience has ended as the individual is aware that a difficult challenge was successfully overcome.

8. Distortion of time: When entered into a state of flow, individuals report an expansion or contraction of time. Meaning, seconds can feel like minutes or hours can pass by feeling like minutes.
9. Autotelic: The journey is the reward. At some point the individual will do the activity solely for the experience they provide, with no further extrinsic motivation.

While the final six elements describe the state of being in flow, the first three elements describe prerequisites for entering flow. As such they are particularly relevant for this discussion and warrant further investigation.

Having a clear goal is often described by Csikszentmihalyi as being a problem in need of solving, which works well across many domains (sports, science, etc.), but poses a particular problem when discussing entering flow in a creative activity (Csikszentmihalyi 1996). Oftentimes an artist or other such creative is not presented with an explicit problem, and it is often this very ambiguity that attracts the artist to his or her domain (James 2001). Csikszentmihalyi suggests that in such cases "the creative person must develop an unconscious mechanism that tells him or her what to do." (Csikszentmihalyi 1996, p. 114) with no further elaboration. This feels a bit over simplistic, and certainly far too vague of an answer to one very clear requirement of flow. Based on Griffin's research of advertising students discussed earlier, one aspect noted by Griffin was the evolution of the problem by advanced students (Griffin 2008). It is therefore entirely possible that the artist is actually considering some aspect of the ambiguity and transforming it into a problem that suits her needs. It could also be that the

artist considers the ambiguity to be the problem itself. It could even be as basic as the artist wishing to express some sentiment in a unique way, and this becomes the problem or goal. Regardless, this is an area within flow that deserves more academic attention for clarification.

The second prerequisite for flow is the presence of immediate feedback. In most cases this type of feedback can be provided by an expert providing training, be it a professor, mentor, boss, or other such individual with superior knowledge or expertise in the given area. However this is again problematic with regard to the creative as a substantial part of the nature of what they do is to create that which has not come before. How can feedback be immediate in such a scenario? In fact many artists have abandoned their careers out of lacking the ability to wait for museums, critics and the like to finally take notice of their work. Csikszentmihalyi speculates that "The solution seems to be that those individuals who keep doing creative work are those who succeed in internalizing the field's criteria of judgment to the extent that they can give feedback to themselves, without having to wait to hear from experts." (Csikszentmihalyi 1996, p. 116) I would add to this that this internalization appears to be logical, and the knowledge of a field's judgment criterion could also lead an artist to select a course entirely different from the criterion, thus accounting as well for the so-called creative geniuses who were not "discovered" until well after death.

The final prerequisite for entering flow is the balance of skills and the challenge presented by the activity. One of Csikszentmihalyi's most important findings, he noted that when the task was too difficult, the subject tended to become "frustrated and

anxious" and either quit the activity or put forth minimal effort (Csikszentmihalyi 1990, Csikszentmihalyi 1996). If the challenge was too far beneath the individual's skill level, then the subject would become bored, and again fail to produce an optimal experience. Therefore, it is critical to find the point where an individual's skill is well matched to the task being attempted in order to fully enter flow and enjoy an optimal experience, as is shown in Image 1.

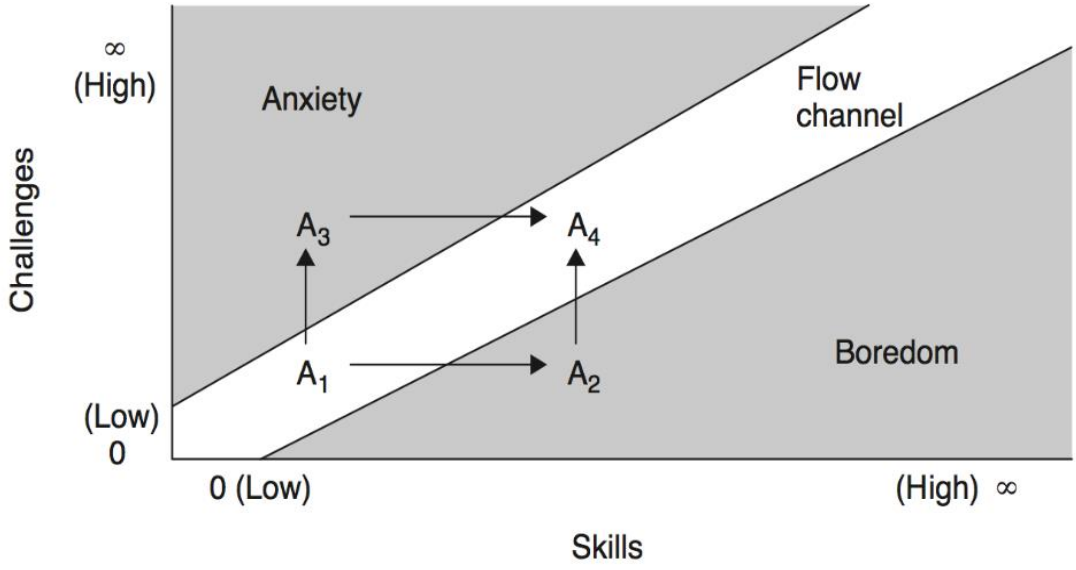

Image 1 (Csikszentmihalyi 1990)

Training and Development

The last area of the creativity literature applicable for review for this study is the area of training and development. The research has yielded mixed results as to the efficacy of training and developing creativity in individuals, despite a number of studies

being conducted both in the United States as well as abroad (Scott 2004). Further, the amount of literature on this topic is to date sparse, although interest in academia is gradually increasing. (Hennessey 2010)

A great number of these studies have focused on the inheritability of creativity, as well as the effects of family background. In these studies, a number of factors were concluded as possibly playing a role in the creative potential of an individual, although none were shown to be conclusively so. These factors include: family size, number of siblings, gender, birth order, and age gap (Zajonc 1975, Albert & Runco 1999, Gaynor & Runco 1992, Sulloway 1996, Ai 1999, Helson 2000, Conti 2001). Of these, Sulloway's findings were the most conclusive in terms of predictive power of creativity, and they concerned birth order. Sulloway found that the middle child had the highest frequency of being creative. The research noted that these children tended to maintain rebellious and nonconformist characteristics, which are often associated with creativity (Zajonc 1975, Sulloway 1996).

The new millennium somewhat altered the course of training and development research more towards actual training and development as opposed to inherited traits or family origins. Svenson, et al. examined the efficacy of creative enhancement drills designed by Edward de Bono. Svenson did so with a pre/post-test design of de Bono's drills, and found that post-training results showed a *lower* level of fluency in the experimental group as compared to the control group. Svenson simultaneously conducted this same experiment on groups and individuals and was able to show that the group

scored higher in terms of fluency, flexibility and originality, but that the individuals resulted in a higher overall total fluency.

Methods designed to improve divergent thinking skills have as well been shown to produce mixed results (McCrae 1987). Basadur et al. were able to replicate findings that showed divergent training methods that improved skills among American and Japanese subjects with South American, Spanish-speaking subjects. (Basadur 2002, Baer 2003) Shortly after, tests were conducted to measure the efficacy of a computer-based divergent training program in terms of increasing both originality and ideational fluency. The authors did find significant gains in the experimental group with regards to specific aspects of ideational fluency, but found no improvement in originality (Benedek, 2006).

Still more mixed results have been reported when investigating domain-specific vs. domain-general problem solving skills. Out of five groups receiving domain specific training, only one, spatial insight, group was able to outperform its counterpart that had received training in a different domain. However, in a comprehensive review of studies concerning training programs for creativity, researchers found that gains typically are resultant from creative training, and that the best programs are those that utilize realistic exercises with a focus on development of heuristics and cognitive skills (Scott 2004, Dow & Mayer 2004).

Csikszentmihalyi as well offers advice on developing an individual's creativity. His suggestions were:

1. Increase amount of available attention for novelty. He argues that many times an individual's attention is wrapped up in everyday activity, survival, or other such tasks, and rarely does one have enough attention left over to consider novel ideas.
2. Develop a healthy level of curiosity and maintain it. Novelty is born out of curiosity and thus should be cultivated. Humans have a tendency to gravitate to the known vs. the unknown, which presents the challenge.
3. Cultivate flow in everyday life. Csikszentmihalyi suggests this can be done by: setting daily goals, increasing the complexity of things you enjoy, and recognizing that the better you do something, the more you enjoy it.
4. Erect barriers to distraction. Distraction eats away at the available attention, and as such should be defended against. Suggestions for this include managing your schedule more effectively, as well as creating a distraction free space to work in.
5. Internalize knowledge of yourself. Knowing your strengths and weaknesses can help facilitate creativity.
6. Apply your creative energy. Find new problems, question everything, and consistently find a way to express yourself.
7. Divergent thinking. Look at problems from as many angles as possible. When coming up with solutions, think of as many solutions as possible, and try to think of as many *different* solutions as possible.

While many of Csikszentmihalyi's suggestions appear to be logical, he does not offer much empirical support for these suggestions. That coupled with the inconsistent findings

of the other researchers leaves the literature with a significant question still to be answered. Namely, how does one develop creativity?

Deliberate Practice

Deliberate practice is a term first coined by Dr. K. Anders Ericsson in 1993, and was the result of his decades-long study of the acquisition of expert level performance and expertise in general. His studies were initially concerned with memory and long-term memory, and specifically with factors that led to exceptional performers in these categories. This gradually led to his study of expertise more in general, with deliberate practice being the result of those efforts.

What is an Expert?

In order to effectively determine what factors lead to the development of expert performance, it is first necessary to understand and have a consistent definition as to what constitutes being an expert. Ericsson maintains there are three specific criteria that must be met to be deemed an expert. They are (Ericsson 1993, Ericsson 2007a):

1. Expertise must lead to performance that is "consistently superior to that of the expert's peers." (Ericsson 2007a)
2. Concrete results must be produced. Expertise in an area would naturally result in successful completion or achievement in a particular domain.
3. Expertise must be replicable and measurable in a lab setting. This criteria is by Ericsson's own admission at times difficult to achieve. That said, he further asserts that creative evaluation can be developed for those domains not lending themselves to such measurement easily. An example provided by Ericsson is to

have artists produce drawings of the same objects and then having them blindly reviewed by art critics.

Ericsson also asserts that a great number of people assumed to have expertise are wrongly so assumed. On multiple occasions he cites the 1976 Judgment of Paris, in which French wine "experts" conducted a blind wine tasting (Ericsson 1993, Ericsson 2007a). The results were shocking as the experts not only judged California wines superior, but they often mistook the California wines for French and vice-versa. This experiment has been replicated a number of times since, which has simultaneously proven the doubters of California wines wrong while also seriously calling into question what a wine expert is.

The Existence of Talent

Having identified what an expert is, Ericsson then sought out factors that would lead to the development of expertise in an individual. This naturally lends itself to the nature vs. nurture discussion, one which Ericsson clearly sides with nurture on. In searching for the existence of natural born talent, Ericsson was at a loss to find evidence of any, with the exception of height, which is also a common response by people who are told talent does not exist (Ericsson 1993). While height may indeed be genetically predisposed, it is not a talent. Height in and of itself does not make you talented nor particularly skilled at anything. Even in basketball, where height can be a great advantage, talent is independent of height. If height were the dictator of talent in basketball, then the world would be looking to Manute Bol or Gheorghe Muresan (The tallest players in NBA history) as the greatest players of all time and not Michael Jordan.

A similar discussion is then often raised surrounding so-called prodigies. If there were no such thing as talent, then certainly prodigies could not exist. Two of the most common thought of prodigies are Tiger Woods and Wolfgang Amadeus Mozart. However neither of these cases holds up as a prodigy when placed under scrutiny. Tiger Woods was introduced to the world at a very young age, hitting balls on television shows when most kids were getting their first taste of elementary school. However, this "talent" was less born and more created. Tiger's father Earl decided at an early age that Tiger would learn golf, and learn at a "ridiculously young age" (Woods 1997). He went about achieving this by first setting up a high chair for Tiger in the garage so that Tiger could watch his father hit golf balls hour after hour, thus fixating a golf swing in his mind. By the time Tiger reached age two, Earl had given him his first metal club and was innovating new ways to teach the grip to his young son. By the time Tiger began to achieve widespread success as an amateur (age 19 was his first U.S. Amateur Championship), he had already been practicing at an intense, high level for more than 17 years (Woods 1997, Londino 2006).

Mozart as well is held up as one of history's most influential prodigies. Influential yes, but his claim to prodigy is less convincing. Mozart was born the son of Leopold Mozart, who was an eminent teacher of music theory and composition. Further, he had a keen interest in the teaching of music to children, and at the age of three he placed his young son into a rigorous program of study of both music theory and composition. Therefore, from a very early age, Mozart was receiving intense instruction from a highly qualified teacher. This intense training continued throughout his childhood and teenage

years, with his father overseeing each of his works, correcting them when needed. The first work by the younger Mozart to be deemed a "masterpiece", Piano Concerto No. 9, was composed at the age of 21. By this time Mozart had received over 18 years of intense instruction that the majority of the world not only could not access, but could not afford if they could (Weisberg 1993, Weisberg 1999).

In terms of the "nature" vs. "nurture" debate, Ericsson and his colleagues have thus far been unable to find ample evidence of a natural born talent that could also not be attributed to other factors. Those cases mentioned above illustrated the possibility that talent does not exist, and rather is simply an attribution to some other unknown in the process of developing excellence. It was this unknown that Ericsson sought out, ultimately resulting in what he would call "deliberate practice"

What is Deliberate Practice, and What is it Not?

Deliberate practice is, in Ericsson's mind, the key differentiator between elite-level performers and their moderate or poor performing counterparts in nearly any activity a human can undertake. The concept of deliberate practice has received widespread recognition since the publication of *Outliers*, by Malcolm Gladwell. In *Outliers*, Gladwell claims that the key to success in any field is generally the result of 10,000 hours of practice, or 20 hours a day for approximately 10 years. Gladwell cites Robert Oppenheimer, Bill Gates, The Beatles, and numerous other examples of Ericsson's theory in action (Gladwell 2008). The only trouble being that Gladwell cites 10,000 hours of practice, and not *deliberate* practice, as the key to success, which has subsequently led to much debate and misunderstanding.

Ericsson does agree that substantial time invested in practice will make someone better at most anything, in fact the 10,000 hours is also something Ericsson said and would agree with. What he would not agree with is the term practice. Ericsson's theory states that the acquisition of expert performance is the result of approximately 10,000 hours of *deliberate* practice, which he deems to be different from just practice (Ericsson 1993).

What exactly differentiates deliberate practice from typical practice? Ericsson identified five key elements of deliberate practice (Ericsson 1993):

1. Deliberate practice is "a highly structured activity, the explicit goal of which is to improve performance." These activities should target weaknesses, and are often designed with the aid of an instructor.
2. The activity should be one that is repeated over and over and over again. It should be specific, and often monotonous in nature.
3. The individual should be able to have constant access to feedback on his or her results. This can be provided by an instructor or other whose knowledge is superior to the practitioner.
4. Provides no immediate monetary rewards and will often generate costs, most often for instruction or access to instruction, equipment, etc.
5. Deliberate practice isn't much fun. Individuals should be intrinsically motivated to perform deliberate practice as it is often boring and a long-term perspective of the results of deliberate practice are required. The individual should be focused on

the reward that practice will bring, such as improvement, as opposed to the enjoyment, or lack thereof, involved in the practice itself.

The first element requires that the activity be highly structured, with a focus being on improving performance. It is critical that the individual and her instructor identify very specific elements of her performance that require improvement, and design the activity to address that weakness. Ericsson found that the most dramatic gains in performance were made when the subjects isolated very specific activities that were areas of weakness and worked on those areas repeatedly (Ericsson 1993). This is in contrast to a typical practice session, where an individual may work on various aspects of their performance with less focus (Ericsson 1993, Ericsson 1996, Ericsson 2000). One study of high level figure skaters found that the highest performers tended to focus on jumps that they were unable to perform, but were jumps that would later win medals, as opposed to lesser figure skaters, who practiced jumps they were already capable of.

Another differentiator between practice and deliberate practice is the amount of repetition involved. General practice may repeat a specific skill, move, process, one or a handful of times, whereas in deliberate practice entire practice sessions could be devoted to this one area, often times spanning weeks of practice, until the skill itself was mastered (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a). This high degree of repetition can be monotonous and boring, which requires substantial mental effort and focus, and can be mentally exhausting. For this reason it is rare that a session of deliberate practice can exceed five hours in a day (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a).

Further compounding the mental requirement is the assertion that deliberate practice is not fun. The reasoning behind this is the tremendous repetition, coupled with the fact that the individual is deliberately choosing to work on *mistakes* and how to correct them, via activities designed specifically for that purpose as stated in the first requirement. Most individuals do not enjoy repeated failure, thus requiring focus and mental foresight to see the benefit and sustain high attention (Ericsson 1993).

It was this ability to engage in deliberate practice for a sustained period of time, approximately 10,000 by Ericsson's estimates, that Ericsson believed was the key to breaking free of average or mediocre performance levels and up to elite-level performance. The ability to break a skill down into focused, practicable elements, repeat the practice over and over, have instant access to feedback, have no assurance of monetary reward for said practice, and maintain the ability to see the long-term reward clearly enough to "power" through the practice itself were traits Ericsson found absent in below elite-level performers, and thus constituted his offering as to the unknown factor that dictated enhanced performance.

Constraints

Ericsson identified a number of constraints and obstacles that can typically impede the implementation of deliberate practice, specifically resource constraints, effort constraints, and motivation constraints.

Peak performers in most any domain will receive their first exposure to their future domain of excellence somewhere between the age of 3 and 8 (Ericsson 1993, Ericsson 1996, Ericsson 2000). At this point it is for the parents to determine if the

interest is to be pursued and to what degree. Should the domain be discovered later in life, the individual may be in a position to make the decision on his or her own, but the decision remains to be made. This decision is complex, and involves available free time of the parents, transportation availability, and financial ability (Ericsson 1993). These are all necessary as the child will need to secure instruction, necessary resources and equipment, as well as appropriate instruction. (Bloom 1985a & 1985b) Parental motivations for this decision are often the result of perceived talent by the parents, as Bloom discovered that in most cases there was no early evidence of talent in a child, only the existence of the parents' *belief* that they were talented.

As deliberate practice requires full attention for extended periods of time, it requires substantial effort on the part of the practitioner. In researching optimal practice times, several studies have revealed that there is little to no benefit for sustaining practice for periods over 4 hours, and actually find reduced benefit for periods lasting longer than 2 hours (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a). This is likely due to exhaustion of the necessary physical and cognitive resources to pay focused attention to the task at hand, and the need for rest and recovery afterwards (Ericsson 1993, Ericsson 1996). Research also indicated that the majority of high performers started their training with a limited practice schedule, with a duration of less than an hour and a half, and gradually built their practice time up until reaching an elite status and practicing in short (2-3 hour) durations multiple times daily (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a)..

Motivation is the final constraint mentioned, and is perhaps the most critical. The achievement of expert performance is an endeavor that requires a great commitment in terms of time, effort, and finance, often with the need to sacrifice social and other obligations, often with little or no financial reward (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a). In order to maintain this, the individual must possess a high degree of intrinsic motivation to sustain such an effort (Isen 2005). Ericsson found that in youth, it was often the parents who would initiate the deliberate practice after seeing their child's "talent", and would then gradually teach them the value of such practice and promise of results later (Ericsson 1993, Ericsson 1996). Achievers of expert level performance were able to internalize this and maintain the long-term perspective provided by their parents.

One constraint not mentioned by Ericsson formally, but addressed, is that of age. Ericsson found no evidence that age in and of itself is a constraint to the acquisition of expert-level performance, but did note that advanced age presents different problems to such acquisition (Ericsson 1993, Ericsson 1996, Ericsson 2000). Primarily is by starting later in life, older individuals are always years behind their younger counterparts, with insufficient time to catch up. Secondly is that as people advance in age they are saddled with more responsibilities that prevent them from putting forth the necessary time, attention, and effort required to reach expert status. All of this said, there is nothing that would prevent an older individual from attaining expert status should the other constraints not prove too obtrusive (Ericsson 1993, Ericsson 1996, Ericsson 2000, Ericsson 2003a).

Deliberate Practice Studies

In his initial study, Ericsson predicted two things in general regarding an individual's performance (Ericsson 1993).

1. The amount of deliberate practice performed in the past would be directly related to the subject's current level of performance and;
2. Expert performance would not be reached prior to 10 years of deliberate practice.

Ericsson selected music as the first domain to investigate, and specifically chose the Music Academy in West Berlin for its renown in training elite violinists. In order to test the initial predictions, subjects were asked to provide retrospective accounts of their past practice behaviors (Ericsson 1993).

In addition to his two general predictions, the author also predicted that those showing the highest levels of performance, as well as those showing the highest level of improvement, would be associated with the highest levels of deliberate practice, and further that their practice sessions would have rest periods in between and be maintained for a relatively short duration. In order to assess this, Ericsson asked the violin students to maintain a diary of their activities, and to record their entire day's activities at the end of the day to help prevent the students from focusing on or showing bias towards one task (Ericsson 1993).

The subjects were separated into three groups based upon instructor evaluation: elite (those with promise for an international solo career), "good" violinists (those judged to possibly perform, but unlikely as soloists), and "music teachers" those whose skill was unlikely to yield a performance career. In each category, subjects were matched on both

sex and age. It is important to note that at the time of entry to the academy, nearly all students were judged as having similar potential, with the separation in their performance levels coming later in their education (Ericsson 1993).

The subjects were then interviewed on three occasions. The first was to obtain biographical information and to explain how the diary system was to be coded. For their diaries, subjects were asked to record the duration of their activities as well as how relevant they perceived it to be towards the development of their music. The second session focused on discussions with the subjects as to practice and concentration, with the final interview allowing for the subjects to ask any questions they may have, be debriefed, as were asked about their future goals and aspirations (Ericsson 1993).

The results of the study confirmed both of Ericsson's initial predictions, as none of the subjects had managed to achieve expert status prior to ten years of deliberate practice, and the amount of deliberate practice was a predictor of the subject's level of performance. There was a notable difference between the top two groups in terms of deliberate practice, however a tremendous difference between the top two groups and the music teacher group. Further, the diary assessments of the student's activities and opinions of those activities confirmed the elements deemed by Ericsson to comprise deliberate practice (Ericsson 1993).

Shortly after the initial study, Ericsson conducted a similar study among professional and elderly amateur pianists in an effort to confirm his initial findings. Similar to the initial study of violinists, Ericsson's theories were confirmed and very large differences

in deliberate practice were discovered between the two groups (Ericsson 1993, Ericsson 1996).

Since the original presentation of deliberate practice, the theory has been tested and applied to a number of domains. Ericsson originally speculated that deliberate practice would be of particular value in domains such as: chess, sports, mathematics, and sciences (Ericsson 1993). He has personally investigated a number of these domains and their relationship to deliberate practice. Domains in which he found significant evidence of deliberate practice being a predictor of elite level of expertise include: problem-solving, dart throwing, rhythmic gymnastics, golf, education, nursing, medical expertise, interpreting, and golf (Ericsson 1993, Ericsson 2000a, Ericsson 2000b, Ericsson 2007a, Ericsson 2007b, Ericsson 2007c, Ericsson 2008a, Ericsson2008b).

Additionally, other academicians have taken this theory and successfully applied it to other domains as well. Most recently, deliberate practice was found to be an effective tool for enhancing microsurgical skills in surgeons (El Tecle 2013) as well as hysteroscopy skills in obstetrics and gynecology residents (Rackow 2012). Outside of medicine, deliberate practice has been shown to be significant in accelerating a wide variety of other skills, including: knowledge development (Pachman 2013), critical thinking skills (Cahill 2012), team sports (Helson 1998), chess (Charness 2005), and advanced writing skills (Kellogg 2009) among others.

In summary, the role of deliberate practice has been firmly established in the development of expert level performance in a wide variety of domains. Where there has yet to be any experimentation that can be found in the literature is with regards to areas

with less defined boundaries. Specifically, there has thus far been no investigation into the role of deliberate practice in the development of creativity. It is this hole in the literature that will be the basis of investigation for this research paper.

CHAPTER 3: METHODS

This dissertation seeks trends among high achievers in creativity, but more importantly also seeks to understand the perceptions, values, and norms of the creative individual with regards to their development, and specifically the role of deliberate practice in that development, into an elite performer. As such, questions of particular interest to the author are:

1. What approach to practicing creative endeavors was undertaken?
2. How often was such practice, and how was it structured?
3. At what point did the subject attain an elite level of performance?
4. What types of activities are performed in order to maintain the elite level of performance?
5. Are there differences between the deliberate practice habits of those who have achieved an expert-level of performance and those who have had moderate achievement?

As such, this study is suited more towards a qualitative approach than a quantitative approach in order to examine explicitly these motivations (Murdock 2003, Busch and Strauss 2005). While a survey based approach may measure the number of hours engaged in a particular form of practice, it will do a poor job of explaining *why* the practice is entered into, as well as what the experience of such practice is. In order to examine any further aspect the role of deliberate practice in developing creativity, it is first and foremost important to understand the perceptions of the value of such practice to creative practitioners as well as evaluate their experiences for evidence of deliberate practice. As the intent is to understand the why behind these habits, as well as to understand the

meanings being given to these actions by the individuals involved, qualitative methods are the most appropriate choice (Braybrooke 1965, Drumwright 2004). This is especially useful when attempting to generate theory in areas new to theoretical research (Strauss 1990). Finally, a comprehensive examination of creative research and examination of creative behaviors and motivations found that qualitative methods were particularly appropriate for these purposes (Murdock 2003).

As the goal is to ascertain the effects of deliberate practice in the development of elite level performance, the most sensible methodological approach would be to utilize "elite interviews," a term coined by Dexter (1970) to describe interviews with "decision makers as opposed to consumers, an electorate, or a mass population" (Dexter 1970, Drumwright 2004). For the purposes of this study it is reasonable to assume that elite performers in creative arenas differ substantially from the "mass population." Further, elite interviews are designed to investigate "the decision makers' understanding" of a behavior (Drumwright 2004). The ability of this type of interview to enable to respondent to somewhat shape the course of the account, and to select what he or she believes to be relevant, offers the best possible path to understand the arc of the creative subject's development, as well as what characteristics were deemed to be important. (Dexter 1970, King 1994, McCracken 1988, Schwartzman 1993, Drumwright 2004), which can then be compared to existing theory to see what degree of alignment, if any, exists.

Interview Subjects

The subjects selected for elite interviews should be individuals with a proven track record of creative achievement. The field in which the creative achievement has

been attained has not been restricted to one particular field so that a broad view of the development of creativity can be ascertained, and the possibility of any domain-specificity effects can be avoided. While the fields themselves were not restricted, those whose creative profession crossed into the world of commerce were preferred as the applicability to advertising is greater under such circumstances. A total of 20 subjects were selected to be interviewed as part of the primary data set. The 20 subjects selected consisted of individuals from a variety of creative fields, including six advertising creatives, four photographers, three musicians, one film director, two comic book artists, one fine artist, one author, and two user experience designers. While user experience design is a broad field in scope, both of the subjects in this dissertation were in the technology sector, and focused on app and software design. All subjects have achieved recognition within their field and were and are easily identified by luminaries in their respective fields. In terms of award recognitions, in those areas where awards are prevalent, the subject pool was restricted to those who had won multiple of the top awards in their fields. In advertising this required more than one win in one or more of the following competitions: The ADDYs, The Cannes Lions, The One Show, The D&AD, Communications Arts Annuals, and the CLIO Awards. Photographers needed multiple wins in: Pulitzer Prize, POYi, World Press Photo, PDN Annual, Communications Arts Annual, Fellow of the Royal Photographic Society, Guggenheim Fellowship, World Wildlife Photographer, or Nikon World Understanding Award. Musicians were required to have at least one top-ten album and two top ten singles or a Grammy award win. The lone film director has multiple Emmy and Peabody awards

wins. Both comic book artists had multiple Eisner Awards and multiple top ten books in terms of sales. The author has had two *New York Times* Best-Sellers, while both the fine artist and user experience designers were selected based upon referrals from within their field due to a lack of awards specifically for their medium. That said, the fine artist was the featured artist at the Whitney Biennial, one of the art world's leading contemporary art shows, and is in high demand in galleries around the globe. Geographically speaking, our subjects represented a global presence, with respondents from the United States, Japan, Italy, United Kingdom, Thailand, Mexico, and Canada. Within the United States, a diverse group of cities were represented as well, including: San Francisco, Los Angeles, New York, Chicago, Nashville, Austin, and Atlanta.

Several subjects were identified via the awards competition results, with referrals from within the field by other similarly recognized individuals or industry experts contributing to the sample as well. All subjects were then discussed with leading industry professionals to ensure consensus as to their elite-level status. The level of experience for the elite-level performer group ranged from 15 to 30 years in their respective fields.

Finally, several subjects were recruited via "snowballing" of the original sample (Moriarty 1983). This technique involves asking respondents to identify other individuals which the research may be applicable to. In this case, respondents were asked for individuals whom they respected as an elite performer in their field. Those referred were then looked at in terms of the above award and recognition measures. Those names found to have had notable achievement in the field were then brought up to other industry

professionals, and those with significant name recognition on top of their industry recognition were then approached for an interview.

In order to assess the difference between deliberate practice habits between elite-level performers and moderate-level performers, it was also necessary to recruit moderate-level performers. A total of 10 subjects were recruited to fulfill this part of the study. The subjects came from similar fields as the elite-level group, specifically: three from advertising, two photographers, two musicians, one comic book artist, and one filmmaker. These subjects were recruited primarily via referral and snowballing. The criteria for the moderate-level group was set at 15-30 years of experience in their respective fields in order to match the elite-level group. Further, the potential subjects should have won no awards, should not be recognizable within the industry by luminaries in the field, and should produce work that in general would be deemed acceptable but not outstanding by their peers. All subjects were provided the same rights and assurances as the elite-level group.

In total, 29 subjects were interviewed and used. One of the potential moderate-level group withdrew just before their interview and a suitable replacement was not readily available. Those subjects that participated were offered and assured of complete confidentiality in order to ensure full disclosure on the part of the subject. Further, informed consent was given to all subjects prior to interview, and the ability to terminate the interview at any time remained with the subjects at all times. Finally, respondents could also selectively choose not to respond to questions, for any reason they chose.

Data Collection

Interviews were conducted in person whenever possible, resulting in 17 in-person interviews. However given the global presence of my of the subjects, there were occasions when alternate arrangements had to be made. In such situations, Skype was the preferred first alternative, accounting for seven interviews, with a phone interview being conducted only if the subject could not be met either in person or via Skype, which occurred on five occasions. One interview was conducted via Skype and with the assistance of a translator chosen by the subject. Follow up questions were typically asked via telephone and/or email. The interviews ranged in duration from 45 minutes to three hours and twelve minutes. The average interview lasted just over an hour at one hour and two minutes. In all cases, conversations were audio recorded, transcribed, and summarized. Following accepted practice of elite interviewing, questions asked of the respondents were open-ended, broad, and designed with the intent of enabling the respondent to define the situation (Drumwright 2004). The full instrument can be found in appendix I, however the general areas of questioning were:

1. What were early exposures to creative activities?
2. What role if any did the parent have in facilitating creative endeavors?
3. What approach to practicing creative endeavors was undertaken?
4. How often was such practice, and how was it structured?
5. At what point did the subject attain an elite level of performance?
6. What types of activities are performed in order to maintain the elite level of performance?

7. Are there differences between the deliberate practice habits of those who have achieved an expert-level of performance and those who have had moderate achievement?

The interviews were reflected upon prior to conducting the next interview in order to keep the nature of the questioning fluid and on target. This allowed for topics or ideas introduced by prior respondents to be investigated fully and completely. Further, in those situations where questions arose as to something that was said, or when something another respondent said conflicted with a prior interview, the respondents were re-contacted for the purpose of clarification.

Analysis was then conducted by the author in a review of all interviews. The process was to initially categorize exposure to creativity across the respondents, followed by categorization of their practice habits both prior to attainment of elite performance and since. In the case of moderate-level performers, their practice habits were simply categorized prior to and after the securing of employment. Relevant themes and discoveries will be reported accordingly, with all subjects being assigned a pseudonym to assure confidentiality. Finally, upon completion of all analysis and auditing, random respondents were contacted and a member check performed, focusing on a discussion of the results, accuracy, and clarity of the analysis. This allowed for a final verification of the accuracy and reliability of the findings.

Limitations

All studies have limitations, and this dissertation is no exception. Primarily there is the potential for disagreement over subject selection and sample size. With regards to

subject selection, there may be those that will disagree with the inclusion of some subjects and questions may arise as to their achievements. To this end, the author has made all efforts to ensure that all subjects interviewed are well regarded in their fields, and have a substantial body of work behind them. Or, as in the case of the moderate performers, that they did not successfully meet this criteria. In both cases, the decisions made by the author were verified by experts in each individual field of study so as to ensure elite-level, or moderate-level, status.

As for sample size, 29 total subjects were felt to be sufficient. Given the specialization of the topic and qualitative nature of the dissertation it would have be unnecessary, if not outright impossible, to achieve a sample size commonly associated with samples in quantitative studies. That said, the sample was chosen largely for its diversity of fields and breadth of expertise. This was deemed the best way to ensure rich, accurate findings that could be seen as applicable to a wide variety of creative exercises.

In terms of measurement, the question must be asked as to whether or not we are witnessing the impact of deliberate practice on the development of creativity, or on the development of skill sets. The author firmly believes that the two are inextricably linked, and as such the answer to the above question is yes. Yes, we are witnessing the impact of deliberate practice on the development of creativity and on skill sets. The fact remains that in every case, the subject was strongly associated with one particular field, and that they were not known for being particularly creative in other realms. The two subjects that had achieved some success outside of their initial domain utilized deliberate practice

methods in the development of the second domain as well, further reinforcing the value of such practice methods.

Further, the limitations of any study utilizing a qualitative approach have been widely discussed and debated in academia. Some, such as reliability, have been accounted for in accepted fashion, whereas others cannot. Most notably is the notion that the results will lack in generalizability. This is deemed acceptable in this case as the intent was to develop a foundation for theory to grow from and as such the depth of response is valued over the number of responses. Even with a smaller sample such as this, the results give a clear view of more broad, overarching themes. Finally, the methodology relies on the responses of individuals. This requires a certain faith in the honesty of the respondent and accuracy of their memory. Oftentimes this results in inaccurate recollections, either due to memory loss or deception. This study has taken this into account and attempts to balance it by not relying on a small handful of interviews and the assurance of confidentiality. The number of interviews conducted should have been sufficient to allow for discrepancies for any reason to have become clear.

Chapter 4: Findings

Given the number of elements involved in deliberate practice, it is worthwhile to first summarize the findings of each element prior to moving on to a discussion of those findings. It is worth noting that it is remarkable how robust the findings were across the various domains included in this dissertation. Several aspects of deliberate practice were confirmed, with a number of findings that surprised the author in their distinct differences from what was to be expected in terms of deliberate practice.

Key Element #1: Highly Structured Activity Targeting Weaknesses

Elite-Level Performers

Of the 20 elite-level subjects interviewed for this study, there were zero exceptions to this element of deliberate practice, that practice be highly structured and target weaknesses. However, there was one caveat. While all subjects reported engaging in practice activities that could be considered highly structured, and certainly targeted weaknesses, not all did so under the guidance of an expert, which is suggested by the theory of deliberate practice.

The notion of highly structured activity is one that was taken to heart by Dennis, one of the most in-demand commercial photographers in the world right now:

"I went about developing myself as a photographer purely, purely, technically. Like if you are learning dancing, I would learn exactly the right posing and exactly the right steps. In photography I needed to understand how a camera worked, how film worked, I need to understand everything from the foundation. I asked 'why' a lot as a kid and so I couldn't just understand something and move on, I had to understand it 200% and then move on.

Back then I had a much lower knowledge base about stuff and I had no style whatsoever. So I was very experimental, I wanted to do cross-processing, I wanted to make my own green light, I wanted to learn lighting. Actually, even from a very early point I felt like a picture that was lit with a strobe looked better than one that wasn't lit. So I was always very focused on actually adding artificial light. At first just being able to kind of like master artificial light and then eventually figure out how to mix artificial light with ambient light to make a more, I don't know what you call, pleasing image, more emotional image."

The idea of breaking the skill down into smaller segments, or "chunking," that was then focused on is one that was illustrated by User Experience (UX) Designer Katy:

"And I would participate in these online graphics battles where you made logos that are like, there would be like this theme, and then like a size restriction, like it had to be 500 x 500 pixels, and then you would create a logo based on this theme. And people would vote on whose was better, and I think that's also where I learned a lot of my skill set because I would always try to challenge myself by looking at, like, 'Oh I like what this person did. How do I, like, reproduce it?' And at that point it wasn't like you could just copy and paste it. You had to actually learn the technique. And I was able to learn it because they would explain how they did it, and a lot of times they would say like, 'Oh I used this 3-D program,' and I would be like, 'What the heck?!?!' And I would go download the program and then I would learn. Well, I would go look at a lot of tutorials so I could learn how to use the program and try to reproduce what they did. By doing that I was able to learn the technique and use it for other things."

This approach was supported by many of the subjects interviewed for this dissertation. For example, Trey, a Grammy winning classical musician, stated:

"You can't learn a piece of music by just playing the thing over and over right? I mean you can, but it wouldn't really work right? What you have to do is break it up into something more manageable. You find the passages, well, you want to separate the piece based on where the passages are ok? Then you identify those passages that are going to be more difficult, like maybe there is some phrasing there that is particularly tricky or whatever. By focusing on just that section, and playing just that section over and over, you can, you can really get a handle on it. Once you've got the passage nailed then you go back and play the entire piece."

Even those that did not report initially breaking down their weaknesses into smaller components eventually did report doing so later in their development. This is perhaps largely due to the caveat mentioned earlier. The caveat to this element of deliberate practice is that quite often, in fact in a majority of those interviewed for this study, the elite did not utilize the help of an expert in designing their practice habits for large portions of their development, and oftentimes at the more critical junctions of their learning, i.e. – either early in their development or at the moment they decided to make a career of their chosen creative endeavor. In fact, the elite-level performers oftentimes became their own expert, creating a base of internal knowledge that they could then reference in order to assess where they were, or could turn to for feedback on their performance.

This is perhaps embodied best by Miles, a top selling comic book artist and Eisner Award winner:

"Knowing the kind of art that I liked and the kind of art that I wanted to do, I knew that if I wanted to improve I knew I had to try to figure out how do I do what they were doing. Because I had taught so much I had somewhat formalized the way I approached, the way I viewed learning was a fairly formalized process. At least in terms of how it applied to art, it's reverse engineer what they were doing. And so, in order to reverse engineer what they were doing it's not a matter of just looking at the lines they used, but trying to figure out why they used this line as opposed to another kind of line. What is the benefit of doing it this way as opposed to some other way? And there was a lot of literature as well on comic book art in terms of how to build anatomy. So these are the various systems you can use in terms of blocking out rough shapes, and then tightening up and refining as you go along. Using bubbles to your visual sense of where the muscle groups are and then refine. There are different techniques for penciling versus for inking, there are techniques for composition… And so there is a lot of material out there for me to use as a resource, a lot of very intelligent, very accomplished artists who I try to learn as much as I could from [by observing or studying] *and it was just a matter of applying and refining. This is more specific kind of related to I remember being a tutor, whenever I would train a student to do well in a standardized test a big part of it was, this is a learnable system so when you make mistakes assess what your decision-making process, what was your answer? What was the right answer? Why was your answer wrong? Why was that answer right? And then try again until you refine your step-by-step process to one that pumps out the right answers more often than wrong answers. And so similarly that's the approach to art. Every single page that I finish I then tear apart, not literally, but just in terms of what*

did I do wrong? And with a lot of high achieving artists this is a very common neurosis almost, where you have a look at a finished page and all you can see are the mistakes. You know, they are always striving for something better."

In such cases it was common, so common in fact that there is no exception in the subject pool here, for the subject to self-educate herself to an expert or near-expert level in terms of their knowledge base. So while they had a substantial gap between their actual skill and their desired skill, they were able to possess a cognitive understanding as to what the gap was and what needed to happen to close the gap. This was done via mass consumption of materials specific to their field, which were then often deconstructed in order to determine why the materials in question were either successful or unsuccessful. They were then able to internalize this reference point and measure their progress against it.

Using oneself as the expert in designing deliberate practice is never addressed in the literature, and should be considered in future research. Given the modernization of many instructional and learning materials, it is far more likely that those attempting to develop skills will not seek out a traditional expert, but rather will simply surf the internet for the knowledge they seek. That said, the value of an expert helping to identify your weaknesses could be invaluable in accelerating the learning curve. The need for an expert is pointed out by Miles when he discussed the idea of the *"nascent learning stage"* where you often don't know what you don't know, and it's difficult to do anything other than approach the problem from a macro point of view.

"One of the frustrations with trying to improve when you're in that kind of nascent, amateur stage is so much of what you're doing is wrong that it's very difficult to isolate distinct elements that need improvement, so for example, I know I'm drawing a hand wrong but I don't know why I'm drawing a hand wrong. And that's where the constant refinement and starting broad and narrowing down. I think the issues I had with just drawing a hand ten, five years ago, it was in a macro and micro sense. I didn't understand how a hand looked, so when I was making refinements back then they were much more macro refinements, silhouettes, broad proportions of fingers to the rest of the hand. Now it's much more like I'm trying to have a hand gesture, or gesticulation to give an impression of emotion."

Moderate-level Performers

Those identified as performing at an average or moderate level, on the other hand, were far less likely to approach practice in a structured manner. While they did still practice whatever their chosen field was, practice was either less structured, or structured practice was discontinued after a certain level of achievement had been attained. Whereas elite performers reported continuing a structured approach to improving their performance, or refining their skills, throughout their careers, the moderate performers traded in practice for what could be described as doing enough to maintain their level. Stephanie, an Art Director of 20 years currently with a small advertising agency doing local and regional work, describes her current practice:

"Well, I don't really put much time into getting better at this point. I mean, well, who really has time? Once I leave work, I have the kids, and my husband, and, you know,

we enjoy going out and doing things, so I wouldn't really be able to spend extra time on work. Besides, you know at this point I've pretty much got the process down. Like, well I mean I know how this job works now and it's not like I need to practice."

In terms of structure, those performing at a moderate level all reported approaching practice strictly from a broad, general point-of-view, or if working with a more detailed approach, avoiding those areas which were particularly difficult for them. This is clearly illustrated by Chad, another guitarist who finds steady employment as a studio musician, but who has yet to be featured in any way. His practice clearly differs from Grammy winner Trey:

"So, when I get a new piece of music the first thing I do is just, you know, sit down and play it right? I mean the point of music is to play it and so you just have to play it. And like that's what I do, I just play it over and over until it sounds right.

The difficult parts? Man they're difficult! Haha, but seriously, I can't stand when I hit a stretch that I can't get my hands around. But eventually if I play the piece enough the difficult spots get better. It really, you know for me, you know if I focus on the parts I enjoy, that I'm really shredding, that keeps me going. If I had to just play the difficult parts I'd probably punch a wall."

This aversion to focusing on weaknesses and abandonment of a practice strategy were reported in all eight of the respondents who were identified as being moderate performers. While it makes sense that one would want to focus on the parts one enjoys, it is also is somewhat intuitive that if one wishes to reach elite-level standards of performers

to improve she must address those areas in which she doesn't excel, even if she happens to be performing well enough to collect a paycheck.

Key Element #2: Activity Should Be Repeated To a High Degree

Elite-Level Performers

As with key element number 1, there are zero exceptions to this criterion of deliberate practice. None of the subjects interviewed described having what could be considered a minimal level of deliberate practice, and if anything, they all showed a degree of pride in having exhibited obsessive tendencies towards their practice.

One such example is Gordon, now an award-winning Creative Director with multiple firms who described his approach to learning his craft after enrolling at the Portfolio Center:

"For me it was mostly instinctive, but I did have a strategy, which was just pursuing it relentlessly. I just kept trying and putting in extra effort to try to make things just a little bit better. You know it was sort of conscious and unconscious.

I think my dad was an artistic person who grew up in a time when, you know, World War II, and the depression, and you know environments that didn't encourage that, but I think he was very artistic and I inherited that. And he was also a bit of a perfectionist, you know, he was in industrial construction and stuff he did might've helped build a nuclear power plant. And his work was really good, it was really beautiful, he didn't leave loose edges on the turbine or whatever. And so for me things had to be a certain way, they had to have a certain life to it, and a certain integrity. It couldn't just be slopped together. Even

though some of my initial work wasn't great relative to my skills it was nicely done. Some of that was great and some of it was just being anal."

More so,

"I just put in a lot of effort. Part of it was I was really shy, I mean I'm not a shy person but I was then. I had friends but I didn't have a big gang, so just sitting home and drawing just felt right. And I just had this ethic and to this day it's like things have to be a certain way you know? I mean even an email. It's like you can write a quick sloppy email or you can really phrase exactly what you want and what you're thinking. You know we just redesigned a label for a client and presented dozens of ideas. And it had to be right, it wasn't enough to have a label that we could put on the shelf. The lady that owns the company is part of the brand and it had to have her spirit you know? It's kind of what we do. And so there's always been this 'okay it's got to be right and if it's not right we just keep working'."

Michelle, an acclaimed copywriter, learned this skill of repetition early in life while studying dance and was later able to translate this practice habit to her passion for copywriting:

"On my own, always, was always practicing. It [practice] *was literally my best friend and I, and we would put in songs and just do them over and over and over until our parents wanted to shoot the stereo. And I don't know, I would just do that like after practice for three or four hours a night, which is crazy. But it was one of those things that you know you just love it and you're not really thinking about how much you hate it."*

Further, we have Joe, a best-selling rock musician (guitar), describing his relationship with his neighbors:

"I'm always practicing, always. Like even if I'm not at the studio, I'm practicing at home. Seriously man, my neighbors fucking hate me. I try to be cool and not play outside of business hours, but they still hear the guitar and just give me the evil eye every time we pass by. And when I lived in an apartment? Forget about it, I'm just happy they didn't key my car! Kind of sucks, but what am I supposed to do?"

And this theme is further reinforced by Hiro, a Japanese fine art photographer (Via translator):

"The most common question asked of me is 'How do I become a great photographer?' This question is easy to answer at its core. The answer is to go out and shoot, then shoot some more, then finally continue shooting. Then you must again go out and repeat the process.

Most young people do not want to hear this. They do not want to hear that they have to work. I shoot only with film, and I tell students to become great they must shoot a minimum of 40 rolls per month, if not more. Of course this troubles them because before walking up to me they think that 5 rolls in a month is a great deal. For those shooting digital, it must be even more because you are less considered with your frame."

This element of deliberate practice is where Ericsson states that in order to obtain expert-level performance, one must invest 10,000 hours of deliberate practice. While it is outside the scope of this project to attempt to measure the amount of deliberate practice invested by our subjects, it is reasonable to assume that all of the subjects involved had

acquired at least that many hours given their tenure and self-described practice habits. That said, the above quotes illustrated a near Obsessive Compulsive Disorder quality to their approach, and that may very well be a factor. Several subjects indicated sacrificing social lives, academic progress, etc., in an effort to gain a sliver of knowledge into their field.

Interestingly enough, a number of subjects mentioned the "10,000 hour rule" described by Gladwell, and all did so in a manner suggesting they agreed with the premise. Most fascinating to the author was that nearly all of the subject interviewed, and 100% of those at the absolute peak of their respective industries, dismissed the idea of talent either partially or entirely. Comic book artist Miles described his misgivings with the concept of talent as such:

"I don't really believe in talent, I take issue with it as a concept, I think hard work is much more important. The whole 10,000 hours thing is something I wholeheartedly subscribe to. But, I definitely had a motivation to pursue it from early on."

Which was backed up by Charles, a fine artist:

"I really hate the notion of talent. I mean, I find it borderline offensive when someone tells me how talented I am. Like, what do you mean talented? I struggled and busted my ass for ten years before anyone thought anything about any of my work. You know? I mean, how talented could I be if no one cared about my work for more than a decade? Also, it seems so dismissive of the work that actually goes into this stuff. Nothing I ever did just appeared out of nowhere, it appeared out of sweat."

Moderate-Level Performers

This key element is an area in which the majority of moderate-level performers actually largely align with the elite-level performers, at least initially. Our moderate performers would often report investing significant levels of practice early in their development, however they would also report discontinuing the practice later, as was demonstrated earlier by Art Director Stephanie and her family and other needs taking precedence.

One characteristic that is missing from the moderate performers descriptions of their practice is the obsessive trait that the elite performers often described. As opposed to being obsessed about their need to consume, refine, and work at their field, the moderate performers more often than not described practice as something that had to be done, but that would be done at the minimum level required. Comments such as those from Mike, a copywriter, were common:

"I mean, besides my homework, I wasn't going to work on that stuff. It's not that I didn't enjoy writing, or didn't enjoy advertising, but I enjoyed beer and girls more, you know what I mean? I mean, let's be honest. It was college, and I wasn't going to miss a good night out to stare at the same tag lines I had been fighting with in class any way. Besides, like, I would be in class in two days anyway and would be working on it then, right?"

In contrast to the elite performers, it is also interesting to note that the moderate achievers were far more likely to credit any success they had achieved to their innate talent as opposed to a work ethic. They also had a tendency to overstate their accomplishments. This is summed up nicely by Stanley, a photographer who repeatedly and strongly

described himself as one of the best in the world despite an absence of confirmation of this from peers, awards, or those that hire him:

"I don't really believe you can even teach photography to be honest. I mean you have to have something in you, this ability to see something that others can't, that I just don't think you can teach someone. Like, people ask me all the time how to get better at photography, and I feel bad you know, because you're either talented or not. I usually just tell them good luck."

This is clearly opposed to elite photographer Dennis, who had already described being surprised that things like composition could be successfully taught and now discusses his advice to aspiring photographers:

"When I do portfolio reviews now, honestly, I'm not as nice as I used to be. I mean I used to tell people like 'Yeah this is nice' and 'Keep trying' and all that. But now, I guess you know I'm just sick of seeing people with a few nice images walk in and just want to be doing assignment work, and not shoot anything for personal work. I mean, its bullshit to be honest, you just can't do that. Anyone can be good at this, so what makes you special? So now, you know, I tell people in front of me 'Man you might need a different job. I mean, seriously, because you have to want it more than everyone else. You have to want to shoot all the time, and want to shoot for your own stuff. You have to want to work twice as hard as anyone else, because there's a million people that want to do this and the only thing that's going to separate you from them is busting your ass.'"

Key Element #3: Constant Access to External Feedback From Experts

Elite-Level Performers

Feedback was a somewhat polarizing aspect of deliberate practice in terms of the respondents' attitudes towards and utilization of feedback. A solid majority, 14 out of 20, reported having had feedback during their developmental stages or early careers. Nearly all of those who had feedback present in their development felt feedback was important to the development of creative activities, with a few even deeming it "critical." That said, it is worth noting that the more directly "commercial", i.e.- an advertising creative as opposed to a photographer or fine artist, the individual was, the more crucial she felt feedback was in the development of her creativity. This is possibly due to the more team oriented nature present in an advertising setting, or even due to how the creative process is being taught to advertising professionals. Whatever the reason, the tendency is evident and worthy of further exploration.

For commercial creatives, there is often a particularly formative recollection of their first encounter with feedback as described by Creative Director Gordon and Copywriter Laura:

Gordon, *"I remember one time I did this campaign, my first campaign in an ad agency. It was just awful because I didn't know how to do a campaign, I knew how to draw. So I drew pictures and the way this agency worked was sort of Mad Men style. You know, the writer came up with the idea and the art director drew it up, and I drew up some crap. And you know there weren't a bunch of meetings like a real agency. And so I mounted everything and the account guy took everything to the client and was in the elevator and*

he was looking through it and he just it hit the stop button on the elevator and called the client, and made up some excuse about car trouble. And so my creative director, you know he had to stay and we had to redo everything. And he was a funny guy, is really good guy, and he did this Foghorn Leghorn voice where he said 'Well I say, I say boy, we're going to show you how to do this right.'"

Further, he described how his approach to feedback has had to change now that he is the Creative Director and the one responsible for providing it:

"Feedback, you know it's really critical. It's really important and so, how do you challenge someone and say, you know, 'Well this is great, but you can do better' or, you know, 'Well I'm glad you got that shit out of your system.' How do you do that without crushing someone's spirit?

One of my mentor's phrases was 'Don't fuck it up,' which was his way of saying 'I know you're on it and you can handle it.' He could be leaving the office the night before some huge deadline, and so we obviously will be staying all night, and you know he just sticks his head in and asks what we're doing. And so we respond with an update on the campaign and he would just look at us and say 'Don't fuck it up' and walk out the door. I sort of miss that era."

As for Laura's first experience, *"There's one assignment where at the very beginning of that first class in the creative sequence where you have to bring 100 thumbnails to class, for one product. And so it was that day, and this shows you how long ago it was. My product was Sony Walkman, with the tape cassette. And so I come to class, and we were sitting like four to a pod with, with a student from portfolio three as a critique.*

And so I went first and I put my stuff up, and my friend says that I was just so defensive. And I know I was defensive because this guy wasn't getting certain things in my thumbnails, and so I was explaining it because I thought it was brilliant! And he was making probably good points about certain things that I was not really open to. I was very guarded. I'd never been in a situation where I had to put my work up like that. And so my friend says after that I kind of packed up and left. Of course he makes it sound like I stormed out. But looking back, I really wasn't open to constructive feedback. I didn't know. I had never been exposed to that process and so that was really good for me to just kind of put my work up in and be bare, be open, and I've actually evolved in my ability to take criticism, evolved quite well. I actually look forward to it now!"

Both Gordon and Laura now describe feedback as *"critical"* to any advertising creative's development, and both attribute much of their success to the feedback they were given along the way, as did award-winning Art Director Michelle:

"You know, all creatives need feedback, it's like critical. And in school you got it all the time and then you know, as long as you trust the person, I love feedback. If it comes from someone who I trust and I like them and they have more experience than me, then I think it's, it's always made my work 1000% better. It's helped me get past that initial thought and really work on it to make it clear and concise and simple, you know? And as long as it's, you know, critical and I like it, and it's not absolutely retarded, then I'm going to take it, but when it's not then I do not take it very well. And at my agency there was, there just wasn't structure and there wasn't feedback it was just kind of everybody did their own thing and so everything just ended up being crap. So I left."

Additionally, negative feedback appears to be especially motivating to our subjects. Multiple subjects reported having had significantly negative feedback at some point in their development that served as motivation to push even harder. In addition to Laura's earlier experience with feedback, comic book artist Miles once again illustrates this point:

"We also went to a larger comic convention up in Chicago, we were both 21, I remember because there was a lot of drinking on that trip, but, um, that was my first exposure to showing my art portfolio to publishers and stuff and getting my ass just torn apart. Again, besides feeling pretty shitty for a day or two, it kind of put a little fire under my ass to prove them wrong, to show them that I could do this properly."

User Experience (UX) Designer Katy similarly derived motivation from negative feedback, as well as a strong ability to rebound from harsh criticism:

"Mostly people who participated in, like, these online graphics battles, would comment on each other and, like, those comments would hurt! If somebody was like 'Man your stuff is bad', I mean, yeah the feedback that I got really hurt sometimes. It became more about the feedback when I got into photography because on those forums those people will really comment and really give you feedback. I remember when I first started, in photography at least, like, I used to post pictures on this one forum and there was this one guy who was really good but he was a real jerk. Like he wouldn't give constructive criticism he would just give criticism and it was to, like, everybody and, like, if he said something to me I really took it to heart and I just really wanted to impress him."

Another strong tendency among the subjects of this study is the tendency to rely on an internal gauge in order to provide "self-feedback." These internal gauges were largely created by massive consumption of their particular field, and great attention paid to the daily happenings in the field. They would then utilize this internal expert to measure up against the work they were producing. Gary, a Creative Director with multiple awards with multiple agencies, describes this:

"Now you know what good work is and it's just a matter of you keep doing it until you're there. You know, because you can look at your stuff and say 'That's what's wrong, I have to redo that.', or you just know that it's good."

This "self-feedback" was present regardless of whether or not the subject also had access to other expert feedback, in such cases offering up another voice. It should be mentioned, as well, that this "self-feedback" was often far more critical than that provided by others. As Miles points out:

"Every single page that I finish I then tear apart, not literally, but just in terms of what did I do wrong? And with a lot of high achieving artists, this is a very common neurosis almost where you have a look at a finished page and all you can see are the mistakes. You know, they are always striving for something better."

Which was reiterated by Dylan, widely regarded as one of the top two portrait photographers in the world:

"My favorite photograph? You mean that I've taken? I don't know man, I don't really think I've ever been happy with one of my images, or at least not completely. There's always something that just isn't quite right…I don't know, it's pretty frustrating actually."

What is less clear, however, is exactly how successful the subjects are in creating an "internal expert". While their beliefs may be that they were successful, this belief could be fueled by ego, misinformation, or a fundamental lack of understanding of elite level performance in their field. Regardless, it is interesting that a strong majority of elite-level respondents reported having this sort of internal expert that they utilized.

There was one notable elite-level creative not utilizing external feedback in any capacity. Most that did not make use of feedback did so due to a lack of access to experts, or due simply to their obsession causing them to hyper-focus on the task at hand. However one artist intentionally avoided feedback. Danny, a comic book artist and film director, actively sought to avoid having the presence of an expert in his development.

"I always had this fundamental distrust of the opinions of others. I mean, even if they were doing something at a really high level right, that doesn't mean they were doing it the way I should be doing it. I mean I'm not really being creative if I'm just following someone else's path. So no, I didn't have any mentors, and actually tried to avoid them if I could!"

Otherwise, all subjects reported having made use of feedback, even if only from their internal expert, with those having had feedback from experts proclaiming its value to be requisite for success.

Moderate-Level Performers

The moderate level performers largely had a similar attitude towards feedback, with an even split amongst those who reported having received consistent feedback and those who did not. All of those who reported having had feedback also reported finding it helpful

to their development, although none deemed it "critical" as had some of the elite performers. This is summed up by Art Director Edward:

"Feedback is just part of the process, you know? It's something the boss is going to subject you to, the client is going to demand, and at the end of the day you just have to tolerate it. Sometimes you get some good ideas to throw in there, but also a lot of times, you wonder why you would listen to that person you know?"

Where there was a significant difference was in the absence of a "self-expert" that the elite performers reported utilizing. Not one of the moderate performers reported having developed a level of internal expertise that was later used as a reference point for his development. All involved were simply content to produce the work required for their assignment and turn it in to a professor, superior, etc. This absence is likely explained by key element number two and the lack of willingness to put in hours beyond the scope of the basic acquisition of their required skills. All of the elite performers who described using this internal barometer also described putting in tremendous hours outside of what was required of them in order to achieve that level of knowledge. This tremendous number of hours was not once self-reported by the moderate performers.

Key Element #4: No Immediate Monetary Rewards/Generates Costs

Elite-Level Performers

Key element #4 was another element that had zero exceptions, and as well had no caveats. In all cases, those interviewed engaged in their chosen creative endeavor for reasons other than immediate compensation outside of simply being able to improve. This

element, in conjunction with key element #5, which states that deliberate practice is not much fun, is considered to be a measure of intrinsic motivation. In the case of this key element, the subjects all agreed that there was no immediate monetary reward involved, and in many cases, even the *potential* for monetary reward was in doubt. Therefore, monetary rewards, at least in the short term, can be disregarded as potential motivators for the subjects in this study.

Further, oftentimes our subjects actually had negative connotations associated with creative careers, such as commercial photographer Dennis:

"My mother was not really a creative person, but she was incredibly analytical. I think she always liked the creative side of me. She just never understood how creativity could lead to a career. Actually, I don't think I ever heard the term 'artist' without also hearing 'starving'!"

Or Creative Director Gary:

"If anything, they [his parents] *discouraged creative activities as being sort of frivolous."*

And guitarist Joe:

"My parents thought music was a joke man. Well, maybe not a joke, but shit, they REALLY didn't want me pursuing it as a career! They thought for sure I would, like, end up broke or homeless or something."

In addition to the lack of monetary reward, either in the immediate present or even, in many cases, the perceived future, all of the subjects interviewed incurred substantial costs in pursuing their creative outlets. Whether it be the cost of education, outside

instruction, gear, or supplies, each of the subjects reported investing heavily in their creativity.

Moderate-Level Performers

Key element #4 is an element that sees the moderate-level performers in complete agreement with the elite-level performers. None of the moderate performers felt that immediate compensation for their efforts was likely, or even possible, and they invested in their careers similarly to the elite performers, be it education costs, equipment costs, or other associated expenses.

Key Element #5: Deliberate Practice Isn't Much Fun/Intrinsic Motivation

Elite-Level Performers

This element is by far the one with the least supporting evidence in its favor with respect to the responses provided by our subject pool. Interestingly enough, every single subject met half of the criteria, the presence of intrinsic motivation, while missing on the other half, that deliberate practice should not be much fun.

The closest any subject came to expressing a lack of fun in her practice was Michelle when she stated:

"And I don't know, I would just do that like after practice for three or four hours a night, which is crazy. But it was one of those things that you know you just love it and you're not really thinking about how much you hate it."

However, this was stated with regards to her dance, and not her career as an advertising art director. Outside of this comment, there were no comments that directly indicated any dissatisfaction with the practice required of them to succeed. There were a number of comments expressing frustration with aspects of the careers themselves, such as politics, procedures, etc., but these again were not related to the practice aspect of their careers, and rather pointed to other issues, such as those raised by Ken, an award-winning Art Director currently struggling with the value of his career:

"I hate advertising. No really, I hate it. I often question how much impact we have even. Like with say a Walgreens. If I design this super amazing banner for Walgreens, is that going to cause more people to come in? Somehow I don't think so. I just doubt it. So I don't even know if what I'm doing is worth anything and I work 80-100 hours a week to do it and this industry just sucks you dry and then comes back wanting more. No seriously, that's how it works."

Or issues raised by Gordon, our Creative Director from earlier, who believes the gender imbalance in advertising is ultimately harming it:

"I'm very aware of the social aspects of advertising, and particularly when it comes to the question of how do we get more of those overlooked segments into the business? I mean, we have the 3% conference, but what else are we doing? The 3% conference is based on the fact only 3% of all Creative Directors are women, which by any criteria is screwed. When I hear that number I always remember what my dad said, which was 'The world will be a much better place when women are running things.' And he was a Navy man. An engineer."

While all legitimate concerns, none show a dissatisfaction with the work required of them to achieve elite-level performance, which is the focal point of this key element as well as the focal point of this study. In fact, when directly asked if they could recall a time when they were either bored or simply not having fun doing the practice, there was not one elite-level performer that responded in the affirmative.

However with regards to intrinsic motivation, it is telling that *"love"* was repeatedly used by those elite-level performers, such as photographer Dennis:

"I was so passionate about trying out even though I had no idea what I was doing. The photo editor saw how passionate I was though and gave me a chance. From that point on, I was just living photography, like I always had photos in my head. I didn't even know what I didn't know, but I was just in love with it and I basically dropped out of classes and civilization and did just enough to pass."

Comic artist Miles,

"It was clear if I could I would love to be a comic book artist…but even up through my senior year of college I didn't think of it as a viable option. I think my parents had pretty well ingrained that art was a hobby. So if I'm not going to go to grad school right away I need to have a failsafe."

New York Times best-selling author Scott:

"I show up for work every day at 8 AM, you know pour myself some iced tea and some water, and I sit down and I work. And I work for 11 hours a day, seven days a week when I'm doing stuff like this. And it's very, very rigorous and I am very dedicated, and

I'm happy to sit down every morning and work. I love my job, but I work long hours, and I do it in a very methodical way."

And finally by Dylan, commercial photographer:

To me, it was incredible this idea that you could actually make a living doing this. Going from a lab tech job to this shooting job and then it developed from that to like, where can I go from this? And so I thought about what do I love to do? I love to do portraits. That's what I really love to do, and I love to light. I loved assignments where I had used lighting, so I go shoot these jobs as if I was working for a magazine. I would look at the magazines, and I would try to shoot that way. And I just loved the idea of making a portrait. That really became a love of mine."

Moderate-Level Performers

Moderate-level performers, as opposed to their elite-level counterparts, did in fact report that deliberate practice could lack enjoyment, and most, in fact, avoided those areas that they considered to not be fun. Chad illustrated this for us earlier when describing how he would rather practice those areas he excelled and avoid those areas that gave him trouble. Further, comic book artist Adam reinforced this viewpoint in his discussion about overcoming obstacles.

"I think what you're trying to do, you know, is, well if you're really struggling to draw something, is to just get it good enough, right? I mean with a monthly deadline on your shoulders at pretty much every moment, sometimes you just have to make passable

shit. Not every frame can be a Picasso, so if you can't draw eyes, or can't draw a face or whatever, I mean, just make it decent and move on. Get it done."

Which was echoed by photographer Stanley:

"I was never really very good at lighting things, and so I kind of just avoid it to be honest. I mean, for what I do, I can just put a flash on the hot shoe and make it look alright, but I pretty much always try to just use natural light. Like, it's just more intuitive for me.

You know, I'm sure lighting is something I could get good at, really good, I just never had the interest in trying out four thousand lighting setups and shooting it over and over again. I'd rather just use natural light. Of course, sometimes I get assignments that kind of require lighting and then, well, then I'm kind of screwed to be honest!"

In terms of motivation, the moderate performers did seem to possess a degree of intrinsic motivation, but it was perhaps to a lesser degree, and also illustrated a subtle, yet significant difference. For the elite-level performers, the process of learning their art was the point, or a process-oriented goal. For those who were identified as moderate-level performers, the goal was the job, an outcome-oriented goal. Once the goal was achieved, i.e., they got hired, their desire to improve waned significantly. It was at this point, the point of settling into a job, that their interests would shift, be it to family, hobbies, or other interests, and their practice habits would drop off dramatically. Art Director Bryan talked about the effect of achieving his goal had on his work habits:

"For me you know, the target was to be an art director, I mean, I wanted that pretty bad. So getting my first agency job was pretty kick ass, and I was so excited, you know, wanted to tear it up and all that. That kind of wore off quick though. I mean, man,

advertising is hard. People treat you like a dog half the time, and the hours are almost medieval in what you're expected to put in, and shit, I mean, I got to have a life too, right? I just don't have that carrot to chase, that one that really excites me at least, you know, in advertising for sure. I do chase that carrot outside of work though. I definitely have goals I want to achieve, just most of them, like, you know, aren't about my work."

This is in direct opposition to those elite-level performers who more often than not found the challenge of overcoming obstacles to be the exciting part of what they did. As such, the majority of elite-level performers were able to sustain their motivation, to consistently find new "carrots to chase" within their field and thus continue growing as their goals centered on the journey and not the destination.

Key Elements: Summary

In every key element of deliberate practice as presented in the literature exists a consensus, or near consensus of those elite-level performers interviewed as to whether or not the element was utilized at some point in the development of the subjects' creative development. At the same time, while some aspects of deliberate practice are evident in the moderate-level performers, there are far more absences, which indicates that those achieving elite-level status are deriving benefit from efforts around deliberate practice.

In looking at our elite-level performer group, key element 1 shows a unanimous presence of structured activities targeting improved performance, although not all subjects utilized an expert in determining how to address the deficient area. Key element 2 was unanimously affirmed, as was key element 4. Key element 3, having constant access to feedback was present in the majority of cases, but not all, unless one takes into account the

self-developed expert that the remaining subjects referred to, with one subject even rejecting the notion of feedback wholesale. Finally, key element number 5 was partially accepted uniformly while simultaneously being uniformly rejected as the subjects all enjoyed the practices that went into their development.

For the moderate performers, key element 1 was largely absent as the subjects rarely took a structured approach towards improving, and rather preferred to approach their skills from a broad, general, or macro-perspective. Similarly, key element 2 is one that the moderate performers initially seem to align with the elite-performers, up until a point. There eventually comes a point where their efforts fall off, almost always due to their motivation waning, or being replaced with other interests or priorities. Key element 3, feedback showed similar results to the elite performers as well, with the one very notable absence of the "self-expert" that was developed via significant effort surrounding amassing as much knowledge about the subject as was possible. Key element 4 was identical across both groups while key element number 5 revealed a noticeable difference in motivations, one of process vs. outcome.

Deliberate practice in all studies to date has been uniformly confirmed, with no contradictory results. In the present study however, we have ample evidence that deliberate practice does indeed play a strong role in the development of creativity, however with certain aspects of deliberate practice either being absent, playing a reduced role, or perhaps playing a different role than initially expected.

CHAPTER 5: DISCUSSION

The subjects interviewed for this study represent a cross-section of elite-level performers in the creative arena, as well as their moderate-level counterparts. All were fully forthcoming in their responses, and the insights they provided were both fascinating and revealing.

Given the notable differences between the two groups, it is clear that there is evidence of deliberate practice and its effects on performance among those interviewed for this dissertation. Those considered to be at an elite-level in their respective creative fields consistently approached their practice in a more structured manner, continued practicing longer into their careers, focused more on their areas of weakness, and possessed a greater level of intrinsic motivation when compared to their moderate peers.

While the presence of deliberate practice as a function in the development of creativity seems clear, and this satisfies the original intent of this study, it is perhaps the unexpected findings that are as, or even more, interesting than said original intent. These unexpected findings are those that actually somewhat contradict the theory of deliberate practice, but rather than disprove the theory, perhaps glean insights into how developing creativity might differ from other, more mechanical skills.

Internal Expert as Reference

To begin with is the development of an internal expert. Deliberate practice calls for the availability and consistent application of immediate feedback from an expert, and also asserts that practice sessions designed with the aid of an instructor will be more fruitful than those undertaken with no guidance. This was strongly contradicted by the subjects in this dissertation as many lacked any expert guidance until later in their careers, if ever. The

elite-level performers in this study often took it upon themselves to design the structured practice sessions that they utilized to develop their skills. While these sessions were often designed with the help of the internet, books, or some other intermediary, quite often the sessions were developed based upon the subjects' knowledge of the subject and subsequent identification that their work was not up to standard. This subject knowledge was obtained through obsessive tendencies to consume examples of excellence in their field, coupled with a strong tendency either to break down the successful works into smaller, repeatable components, or reverse engineer the process in order to understand how it was executed both at a technical and theoretical level.

This development of an internal expert is not referenced in other literature that examines deliberate practice, with most of the literature operating under the assumption that practice was designed by an instructor, mentor, or other type of supervisor. Further, the subjects in this study took their internal expertise a step further and often would utilize it as an internal expert that would then provide feedback as to what areas needed improvement. By comparing their work to their internal expert they would then be in a better position to assess the strengths and weaknesses of what they had done. This is certainly not evident in the existing literature, as the theory clearly dictates that feedback should be external, and come from a recognized source that is superior to the individual attempting to improve. While this type of behavior could be expected after years of study, and a level of expertise naturally acquired, the fact that elite-performers sought initially to gain a level of knowledge that could then serve as a reference point for one's own development is significant.

The efficacy of such a practice is certainly in question as there is no standardization across individuals in terms of the level of knowledge acquired, the accuracy of said knowledge, and whether or not the individuals' egos played a factor in the evaluation of their expertise. That said, many of the elite performers in this study reported having had no other assistance in developing their practice methods, nor the presence of any feedback early in their development. Oftentimes, these elite performers would not have access to expert feedback until they were either on the cusp of turning professional, or in fact were already professional. Therefore it is reasonable to assume that these subjects were successful in creating a self-directed curriculum based upon this internalized expertise. Further, it bears noting that the vast majority of elite-level performers in this study tended to be far more harsh critics of their own performance than the experts who provide feedback would be.

This finding is of particular import for those in education, or those responsible for educating individuals in creative fields. Given the apparent significance of developing one's own internal reference point, educators should strongly encourage students to do so, and should provide guidance as to how to do so. While research on precisely how to develop this expert has as of yet not been conducted, those in this study consistently consumed material from a variety of sources in order to gain the most complete perspective on their chosen field. Books, blogs, curated websites, and museums were the most common sources of this information. This information was then approached in one of two similar ways by the subjects. They would either immediately begin comparing their work to that of the material they were consuming in order to see where their work was deficient, or they

would take the expert works and reverse engineer them in order to discover the methodology behind the better work. In this sample, there appeared to be no difference in efficacy between the two approaches. However, more research is needed before coming to any definitive conclusions.

Lack of Enjoyment

The fact that not one respondent in the elite-level performers considered practice to lack fun or enjoyment directly contradicts one of the key tenants of deliberate practice. This tenant exists in that an elite-level performer should possess a high degree of intrinsic motivation in order to continue to work through aspects of their performance that are deficient, and that working on areas one consistently experiences failure in is, in general, not a pleasant experience. This does in fact help explain why our moderate-level performers remained moderate, as even those that possessed a degree of intrinsic motivation generally attached such motivation to outcome-oriented goals that, once achieved, allowed for the motivation to wane, along with their commitment to the development of their skills.

Despite this absence of a distaste for some of the tasks, our elite-level performers did in fact possess a high degree of intrinsic motivation, and it certainly drove their desire to improve. Where they differed from the moderate-level performers was in the attachment of their intrinsic motivation to process-oriented goals. The elite-level performers were primarily concerned with simply getting better, with the belief that such development would deliver them to the desired level of performance, whereas the moderate-performers were more concerned with earning a title, or achieving some fixed objective. This does

explain our experts' attitudes towards their practice, and explains why they enjoyed it. While deliberate practice theory does state that a subject will have this long-term focus, it also states that the subject will find these activities to not be enjoyable. On the contrary, those interviewed for this dissertation *did* enjoy this type of practice. Quite possibly because of the nature of creativity, these subjects enjoyed these difficult parts as they enjoyed *figuring out how something worked,* which by necessity means they enjoyed struggling through the difficult parts as the difficult parts were what they were largely interested in. Put simply, the expert found the challenge of developing, growing, and improving, to be the prime source from which to derive enjoyment, whereas the moderate performers sought their enjoyment from having achieved a particular position. Put another way, elite-level performers are the tortoise enjoying the journey, while our moderate-level performers are the hare, more concerned with landing at a particular destination.

This idea of enjoying the activity for what it is rather than focusing on some end point is not unheard of in the literature. In fact, it is quite familiar in that it comes from Csikszentmihalyi's theory of flow that explicitly states that a condition of flow is that the activity is autotelic, or that the journey is the reward. Further, this idea is compatible with the theory of deliberate practice as in key element four it states that subjects are not immediately compensated, and in key element five where subjects at an elite level should possess intrinsic motivation. Where this study has found difference is in nuance. Both elite and moderate performers were largely intrinsically motivated, just to different degrees and geared towards different outcomes, which could be more significant when discussing developing creativity as opposed to fine motor skills.

Again this presents important implications for those teaching creative endeavors. The idea of making things as easy as possible is an idea gaining substantial popularity in Western culture today. As is evidenced by the popularity of books and blogs on "hacking" nearly every activity imaginable, people today want to get as good as possible as quickly as possible with as little effort as possible. This is fine and well for those who find a moderate-level of ability to be sufficient. However, for those who aspire to greatness, it appears inevitable that one cannot escape, nor should even attempt to escape, the inherent struggles posed by any creative activity undertaken. In fact, it seems clear that it is these struggles that lead to elite-levels of performance should be approached with an attitude of curiosity as well as with the mindset that learning to master the difficult aspect of the activity will be reward in and of itself. Teach students to lean into the difficult parts of their field, and they are more likely to be rewarded will levels of skill previously thought unobtainable.

Grit and Goal Setting

It appears, based upon the subjects in this sample, as though one of the most important factors in achieving an elite-level of performance in creativity is the ability of the individual to continue to create meaningful goals long after the initial fascination has worn off. After all, regardless of elite or moderate in performance level, all of the subjects at one point or another were passionate about their chosen creative outlet. So what was it that distinguished those who were able to continue to find motivation to learn and improve when as opposed to those who would achieve a moderate goal and then consider their job done? The answer to this question appears to lie in a combination of setting process-

oriented goals as opposed to outcome-oriented goals and of just plain old grit and determination for lack of a better term. Given the scope of this project, it is not possible to know whether or not this capacity for "grit and determination" was inherited, or came from their upbringing or learned in some other way. Regardless of how it was developed, it is clear that those who have attained elite-level performance have a far greater capacity to put in extra hours towards their development, whether for reading, practicing, or any other activity associated with improving their skills. Further, it is this same capacity that seems to drive them towards that which is weak in their skill set. Those who were moderate in performance had a greater tendency to avoid those areas of their performance that they were deficient in. Some expressed fear of failure, others just a distaste for having to struggle through something, but regardless, those who excelled were willing to attack these difficult areas.

Once again, the findings indicate an area of guidance for creative educators. In an educational environment where much is made of directly measurable outcomes, it is important to do almost the exact opposite in teaching creativity. There is no test score to be had, and so creative goals tend to get attached to other measurable outcomes: a job title, an exhibition, a client approval, etc. In developing creativity, the goals should avoid such outcome-oriented results and rather should focus on being process-oriented. The primary benefit of such an approach is that motivation is sustained long-term. Setting an outcome-oriented goal sets a hard target for the student and all too often the achievement of this target has the side-effect of extinguishing motivation. Setting goals that have the ability to

evolve and grow over time allows for the motivation to grow and evolve as well, thus remaining strong decades into a career.

Future Research

The results of this study are conclusive in that deliberate practice is clearly shown to have had an effect on the development of creativity in the sample interviewed for this dissertation. As happy as the author is at this conclusion, he is perhaps even more excited by the questions this dissertation has raised as opposed to those it has answered as it is those discoveries that have opened new paths of research.

The question of to what degree deliberate practice impacts the development of creativity could only be answered via a longitudinal study in which potential creatives were examined over a long period of time. This could perhaps be a study of incoming students to an advertising creative program. They would need to be assessed initially for their level of creativity, and then followed over a period of years, while simultaneously asking them to journal or record their practice habits over this period of time. The time component is significant as it is not only one's ability to engage in deliberate practice that is considered important, but one's ability to do so over approximately 10,000 hours of practice time that is considered to be equally important. The study itself could be conducted on any creative profession. However, the author's academic association is with the field of advertising and as such makes for a solid foundation for this type of study.

More immediately, research should be conducted on the so-called internal expert. Potential studies include analyzing the amount of time necessary to achieve sufficient

knowledge for an internal expert to be effective, as well as what methods of study are most effective in doing so, what level of effectiveness such an internal expert actually possesses, and finally, what degree of elite-level performers make use of such an internal expert and to what degree is it effective. Each of these areas is ripe with possibility, particularly given the apparent significance to the development of a creative.

Of particular interest to the author would be to examine what combination of established expert and internal expert yields the best results in developing creativity. While many subjects interviewed for this dissertation had little to no access to a traditional expert early in their development, this does not mean that they could not have developed their skills more rapidly had a traditional expert been involved in their education. Contrarily, it could be that the forced internalization of an expert degree of knowledge could have been the very factor that propelled these subjects to their level of achievement. Certainly this question, now raised, could yield substantial insights given further investigation by academia.

Further, given the higher acceptance of feedback by commercial creatives, it is worth further investigating the impact of feedback on creativity, specifically in the more commercial realms. It is apparent based upon the current sample that creativity being taught for more commercial purposes is done so in such a way that feedback is heavily encouraged, and even positioned as a requirement. It would be fascinating to the author to see what effect is had by reducing the level of external feedback in commercial settings, or possibly increasing it in non-commercial settings. It is again possible that given the nature

of the desired outcome of these types of works that the presence or absence of external feedback is indeed critical.

The final suggestion for future research would be to investigate the determination, or "grit", associated with those who achieve elite-level performance. Academia has already begun to investigate this trait of grit, primarily led by Dr. Angela Lee Duckworth out of the University of Pennsylvania (Duckworth, 2007). The cross-section of deliberate practice, grit, and creativity is certainly a topic worth exploring in detail. One specific topic the author would suggest as being particularly worthy of more investigation in terms of grit would be how does one develop this trait of grit, if possible to do so at all?

On a similar note, the ability of elite-level performers to set process-oriented goals vs. outcome-oriented goals clearly has a strong influence on their long-term development. Academia should direct efforts into examining both why this phenomenon is so, and further, how an individual can be trained to modify their goals in such a way as to be more process-oriented. This alone could provide individuals with a higher degree of both skill and enjoyment in their chosen creative field. The commercial aspect of creativity offers additional potential areas of research here as well. Most importantly would be to examine the interplay between the necessary process-oriented goals discovered here with the necessary outcome goals of commerce. In other words, how an art director manages to maintain process-oriented goals while constantly being given outcome-oriented goals would be worthy of investigation.

Finally, field specific research could be conducted with regards to both the efficacy and implementation of deliberate practice into one's development. As an example, in

advertising, research could be conducted into incorporating particular theories into the education of creative. The Elaboration Likelihood Model (ELM) is one of the most widely recognized theories in advertising. However, it as of yet has not found an effective way of being integrated into the actual development of advertising campaigns. As such, research could examine whether or not when "chunking" the process into manageable pieces could include consideration of whether the ad will be best processed either centrally or peripherally, and whether or not such training improved the overall effectiveness of the ad. Similar studies could as well be conducted in any creative field, integrating theories specific to that domain with deliberate practice. Such possibilities are quite literally endless.

Conclusion

This dissertation has made critical strides towards filling a void in the extant literature. Research abounds on creativity in general and has explored any great number of topics. Where the literature has significant weakness is in the area of training and development (Scott 2004). What little research exists offers conflicting results, and even when evidence of training effects exists, the literature is often at a loss to describe how they occurred.

This absence of research into creativity development is exactly what this dissertation sought to investigate, and the results indicate that creative talent is not an inborn trait, and can indeed be developed and refined utilizing deliberate practice as a framework for training. Differences were clearly visible between those who had achieved

elite-levels of performance in their creative domain and those who were moderate, or average, performers. Further, there were few, if any, differences between the elite-level performers, despite coming from a varied set of domains, again suggesting that deliberate practice's effects were not restricted to a particular type, or domain, of creative activity.

In addition to illustrating the potential positive association between deliberate practice and creative development, this study illuminated a concept not yet discussed in the literature, namely that of an inner-expert that can be used both in delineating practice tasks and as a reference for self-feedback during the improvement process. This is certainly an intriguing discovery, and one that the author looks forward to investigating further.

Lastly, in terms of contributions, this study did uncover a disconnect between the theory of deliberate practice and its actual application in terms of creative development. Specifically, two factors were not in set alignment with the theory. The first of which, that an expert help in designing the practice drills and providing feedback, was disputed by many of the creative interviewed. Several claimed to have either never had access to expert input, or rarely had access, or only had access after their primary development had been completed and they were entering the workforce. It is certainly possible that this key element is being downplayed by the participants, or that history may have eroded memories in terms of the influence others had on them in the past, but it seems unlikely that this would have occurred in the number of subjects that it did. The importance of the inner-expert becomes even more important in these cases as this became the primary source of feedback.

As it stands now, the current study suggests that those embarking on a career in, or even exploration of, a creative arena should strongly consider incorporating at least the basic structure of deliberate practice into their plan of action. This suggestion can be taken and applied by those in education, those in industry, or even those simply trying to maximize their abilities in a creative endeavor. Certainly educators should take note of these results and make efforts to incorporate them into their curriculum as the habits instilled by deliberate practice possess their greatest potential for impact earlier in the learning cycle.

In conclusion, deliberate practice is a proven theory with regards to the attainment of elite-level performance in a variety of fields. Having never been subjected to a more nebulous concept, such as creativity, the applicability of this theory was an unknown prior to now. That said, the author believes that this dissertation clearly illustrates that deliberate practice is indeed a function in the development of creativity, and that further research will only yield greater insights into exactly how this works, and how the principles of deliberate practice can be better incorporated into the education of future creative professionals.

It is quite certainly possible that for hundreds of years creativity was reserved solely for those who were blessed by the Gods, or those who were in tune with the muses. Possible indeed, however, in 2014 creativity is freely available to the masses, and is within the reach of anyone willing to put in the effort and practice required to achieve their goals. Well, it is within reach of anyone willing to put in the effort and *deliberate* practice required to achieve their goals!

Appendix

Appendix I

I. Introduction to the project
   a. This interview is part of a research study investigating the process surrounding the development and maintenance of creativity. The interview should take no more than an hour, and the entirety of the interview will remain confidential. You have been provided with an informed consent form which fully details your rights and confidentiality, and you may opt out of the study at any time without any penalty.
      i. Go over informed consent form.

II. Tell me about your earliest exposure to creative endeavors that you can recall?
   a. How would you describe your level of interest in creative activities at that time?

III. Please describe your childhood environment in terms of creative activities.
   a. For home, please describe parental or guardian attitudes towards creative activity. What level of support and encouragement do you remember receiving?
   b. Same for school.

IV. Tell me about practice sessions at this time for your creative activities.
   a. How long and how often?
   b. What type of structure, if any, was applied to these sessions?

V. Tell me about how you came to your decision to pursue your chosen creative area?

VI. Describe for me in as much detail your approach to practice *after* choosing a creative area?
   a. Duration and frequency of the sessions?
   b. Describe the structure of the sessions.

VII. How did you handle or approach areas that were weaker than others?

VIII. Tell me about how you were able to measure your progress.
   a. If feedback was provided, how often was it provided?

IX. Please describe in as much detail as possible your current approach to practice in terms of duration, frequency, structure, and general approach.

a. Current approach to obstacles?

b. Current approach to feedback?

c. How do you feel your approach to practice has changed from your early years until now?

X. Conclusion

a. What questions have I not asked that you feel might be important? Is there anything you would like to add? Anything you feel you were unable to express, but would like to?

b. Can you think of other individuals that you believe have achieved a high degree of achievement in creative fields that you feel might provide insights into this process that would be important to speak to? Would you be willing to refer me to them?

c. Thank you!

    i. Follow up information as far as sending manuscript, etc.

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