INTERGENERATIONAL TRANSMISSION OF CREATIVITY:

INTERRELATIONS OF PARENT CREATIVITY, CHILD CREATIVITY, AND HOME ENVIRONMENT

by

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(Under the Direction of LYNDA HENLEY WALTERS)

ABSTRACT

The heritability of creativity is explored in this study. Not since Galton (1869) has the intergenerational transmission of creativity been examined. The sample included 44 parent/child pairs recruited in the Torrance Center Challenge Summer Program. The Torrance Test of Creative Thinking (TTCT) was used to measure creativity levels in parents and children. Parents completed a parent perception questionnaire, measuring home environment, talent, and mental and behavioral potential for creativity of parents and children. Results suggest that 15% of creativity may be inherited. Results of analysis of parent and child TTCT scores showed no similarity between creativity scores, except in the raw scores for fluency, an important subscale of the TTCT, which seems to be inherited. There was no similarity between the parental report of parent and child creative potential. There was no similarity between the parental report of home environment and child creativity level, suggesting questionable environmental influence.

INDEX WORDS: Creativity, Intergenerational Transmission, Torrance Test of Creative Thinking, TTCT, Fluency, Home Environment

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CHAPTER 1

INTRODUCTION

The origin and nature of creativity has been interesting to scholars and researchers for centuries. Creativity is considered desirable for children and adults to thrive and survive in healthy ways (Aristotle, 310?BC/1988; Csikszentmihalyi, 1990; Kubie, 1958/1988; Maslow, 1968/1988). Recently, Sternberg (2003) has researched the usefulness of creativity in aiding intelligence tests and standardized college entry exams to be more predictive of future behavior. The origin of creativity, therefore, becomes very important, towards fostering this prized construct in our families. This study explores the nature and nurture of creativity in the intergenerational transmission through families. It examines the role of familial predisposition for creativity as well as the role of the environment. This combination of factors will prove to be more complex than originally thought.

Creativity is a mysterious construct that most people want in their lives. Definitions for creativity often attempt to show how creativity works, who is labeled as creative, and where creativity comes from. Simply, creativity is making something unique and useful. There are differing opinions about if creativity is reserved only for the genius or if each of us has some creative potential (Feist, 1999; Gruber & Wallace, 1999; Sternberg & Lubart, 1999). Guilford (1987) helped to expand the definition of creativity to include the every day creativity in everyone, remaining stable across time, in a thought process, identifiable by a combination of personality traits and behaviors that may produce a product. Creativity, once thought to be intelligence, is now considered a separate construct (Guilford, 1987; Sternberg, 2003). Talent is

often claimed as creativity, however, at closer inspection, the two constructs are separate in definition, even if they are often related (Bloom, 1985; Feldman, 1999; Kant, 1923/1988; Maslow, 1968/1988). Creativity is often considered in terms of the person, process, product, and environment. Each of these will be discussed in more detail as to how they relate to the intergenerational transmission of creativity.

Creativity was once thought to be a gift from the gods (Plato, 340?BC/1988). In the 19th Century, theorists began to notice a pattern of creativity running through particular family lines. Galton (1869), working under his own family member Darwin's guidance, researched how genius, or creativity, was passed through families. He found in his early study on intergenerational transmission of genius that creativity, or creative potential, was inherited. Galton's early theories about genetic transmission and the nature of creativity greatly influenced the thoughts on family heritance of traits through to today. He included in his study some theories that now are considered basic in work on intergenerational transmission. Examples of which include: genetic material is unchangeable, both sides of a family, women and men, and extended family play a role in transmission of traits, and the definition of transmitted traits includes not only the physical but also the psychological, emotional, and cognitive. Recently, with advances in work on the genetic code, researchers have begun to question the assumptions of transmission created long ago with Galton.

The study of intergenerational transmission of traits, including creativity, has evolved quickly toward the end of the last century. The literature on intergenerational transmission is complex and dense. However, some basic assumptions, developed by Galton (1869) and Hall (1904), about how traits are inherited have surfaced to be questioned and adapted to recent findings. Debunking these assumptions or myths has allowed the study of intergenerational

transmission to open to new possibilities and to draw closer to a full understanding on how traits are transmitted.

Only within the last century has creativity has been considered mostly a function of the environment. Some believe that there is an ideal environment that can foster creative potential in children (Bloom, 1985; Griffin & McDermott, 1998; Gardner & Moran, 1990; Goble, Moran, & Bomba, 1991; Koestner, Walker & Fichman, 1999; Torrance, 1986, 1993; Torrance & Safter, 1999; Ward, Smith, & Fink, 1999; Wright & Wright, 1986). The environment is shaped by many influences, including familial history, genetics, and personal preference (Bronfrenbrenner, 1986, 1993; Scarr & McCartney, 1983). Much of what we consider to be the environment is at least partially created by the genetic make-up of the individuals (Scarr & McCartney, 1983). It is important to recognize that genetically and environmentally derived influences overlap and intertwine (Reiss & Neiderhiser, 2000; Scarr & McCartney, 1983). Also, due to the complicated procedures associated with gene-mapping, specific genes for every characteristic have not yet been found. Creativity is affected by individual characteristics, the physical and historical make-up of the family, as well interpersonal relationships within the family. Whether the predominant influence is genetic, environment, or both, it is argued here that creativity is transmitted from one generation to the next in the context of the family.

The literature about creativity seems to have evolved from considering creativity a mysterious, special quality, unattainable by average people, to a desirable construct of the environment fostered in every child. Not since Galton (1869) has the question of the combination of biological and environmental factors in the origin of creativity been asked. This study helps to fill the gap in the literature, between nature and nurture, between genetic and environmental influence, to explore the wholeness of the phenomenon of creativity.

Purpose

The purpose in this study is to investigate the intergenerational transmission of creativity. Specifically the relation between creativity in parents and creativity in their children will be examined. Parents and children share some genetic characteristics, and live in an environment that is at least partially shared. There are no studies at this time of the similarities of creativity of parents and their children. In this study, I consider several aspects of creativity of parents and their children. Forty-four parent/child pairs completed a measure of creativity, the Torrance Test of Creative Thinking (TTCT). The parents reported perceptions of both their own creativity and their child's creativity in a Parents Perception Questionnaire, developed by the author. Teachers were asked to report their perceptions of child creativity in order to assess the child's environment outside the home. The TTCT results were used to estimate similarities between parent and child creativity levels. The parental perceptions of books and toys were explored as a measure of the environment. When compared, the results provided interesting discussion on the nature and nurture of creativity.

The following hypotheses were tested.

1. There is no difference in creativity of parent and child.
2. There is no relation between the nature of the home environment and child creativity, when the creativity level of the parent is controlled.
3. There is no relation between the mental and behavioral potential of the child and that of the parent for creativity.
4. There is no relation between the teacher's perception of the child's creativity and the self-reported perception of the parent creativity.

CHAPTER 2

REVIEW OF LITERATURE

In this study, the focus is the intergenerational transmission of creativity. In order to address this issue, it will be useful to discuss the nature of creativity, how it is perceived and how it might be transmitted through the generations. Specifically, the following topics will be explored in greater detail: the history of the study of creativity, the definition of creativity, the role of uniqueness in creativity, how creativity compares with intelligence and talent, the intergenerational transmission of creativity, the assumptions of the study of intergenerational transmission, and the literature on creativity, organized according to the person, process, product, and environment. Theories regarding creativity and its transmission will be presented throughout.

Creativity

Creativity is a concept which many scholars and researchers have debated for centuries. There is disagreement about whether creativity is tangible, testable, and witnessed or if it is some sort of mystery of the universe (Barron, 1969/1988). Due to the fluid nature of creativity, the fact that it is often difficult to create in a specific moment, definitions can vary greatly. Creativity can be thought of as only in the extremely talented, bringing completely new thoughts and products. Or, creativity can be a part of each of us that can be tapped into from time to time and with practice, seen in mundane life situations.

Definitions of Creativity

Aristotle (310?BC/1988) theorized that creativity, especially creative dramatics, was a product of natural, reasoning processes of a healthy individual. Aristotle (310?BC/1988) is known for his statement that nothing is created in a vacuum, meaning that creations are made on the shoulders of previously made creations. A purist's definition of creativity is that which (a) makes something unique, never seen before and (b) is useful (see for example, Feist, 1999; Sternberg & Lubart, 1999). Plato (340?BC/1988), a student of Aristotle, wondered if creativity was a gift from the gods, inspired by the muses, as the process that many artists experience in creating their art seems to hold aspects of timelessness and the mysteriousness of the supernatural. Galton (1869/1988) studied genius, defined as socially recognized excellence, knowledge, and appreciation in a field, including the arts, sciences, business, and sports. Galton theorized that genius, and other non-physical phenotypic characteristics, is passed through the family line through evolutionary processes of natural selection. Later, Freud (1908/1988) observed that creative individuals were closer to a sense of childhood fantasy with strong imaginations, motivated by unsatisfied wishes and unsatisfied realities. Kant (1923/1988), an eighteenth century German philosopher of metaphysics, emphasized the spontaneous creative process, a concept that had never been theorized before. He added that the understanding of and the appreciation for aesthetics were a major part of the creative personality, and an important part of creating a useful product (Kant, 1923/1988). During the same era, Jung (1923/1988), a student of Freud, suggested that the creative process provides a connection to the supernatural through the collective unconscious. Building on Jung's acknowledgement of the collective unconscious and rejecting Freud's psychoanalytical theories, Kubie (1958/1988) advanced the idea of the unconscious processes in creativity. He added that creativity is a necessary sign of

health that was not found in mentally ill people (Kubie, 1958/1988). Definitions of creativity, including the nature of the construct, became complex towards the middle 20th Century.

In 1950, Guilford (1987) gave his presidential speech to the American Psychological Association (APA) on the topic of creativity, citing it as a neglected and important area of research. Guilford expanded the definition of creativity to include everyday creativity, not just genius. He reasoned that everyone has creative potential. "The important consideration here is the concept of continuity. Whatever the nature of creative talent may be, those persons who are recognized as creative merely have more of what all of us have. It is this principle of continuity that makes possible the investigation of creativity in people who are not necessarily distinguished" (Guilford, 1987, p.36).

In regards to creative development, Guilford (1987) mentioned the difficulty in testing children, in that they are under constant pressure to conform to societal ideals. This is important to remember in studying creativity in terms of families. The child may conform to the family's ideals. Therefore, the child's score may be an approximation of family creativity level. Guilford described testing and procedural problems, including that individuals differ in terms of experiences and how they are able to express themselves, how fluency and flexibility would be difficult to derive in a testing situation, and how researchers will disagree on the specifics of what is objectively creative when evaluating individual's answers to any creativity test. These are obvious problems in researching creativity. Guilford's speech brought light to these issues and allowed for many researchers since 1950 to tackle problems when developing creativity measures.

Recently, Parkhurst (1999) reported that, in the early 1960s, 50 to 60 viable definitions of creativity had been advanced in the literature. Creativity was studied extensively in the 1960s

because of the emphasis in the social culture of the time of "finding oneself" in artistic ways (Moustakas, 1967; Parkhurst, 1999). There was another surge in creativity studies in the 1970's and 80's, lead by University of Georgia theorist and researcher, E. Paul Torrance (Cramond, 1994; Davis, 1999; Torrance, 1988**;** Torrance & Safter, 1999). Torrance extended consideration of creativity beyond the individual and recognized the role of the environment. Now it is common for creativity of the individual to be attributed to the family structure, relationships between family members, and in the environment beyond the home (Cramond, 1994; Davis, 1999; Parkhurst, 1999; Torrance & Safter**,** 1999). Guilford's reference to personality and Torrance's recognition of the importance of environment both imply some sort of transmission of creativity across generations. If Guilford is correct and creativity includes intelligence, and if Galton is correct that extreme intelligence, or genius, is somewhat heritable, then is seems reasonable to suspect that creativity can be transmitted from one generation to another. This is especially the case when we consider the role of family environment; that is, an environment created by persons who share genetic propensities (Goldsmith, Gottesman, & Lemery, 1997; Reiss & Neiderhiser, 2000; Rutter, 1998; Rutter, Dunn, Plomin, Simonoff, Pickles, Maughan, Ormel, Meyer, & Eaves, 1997).

Like IQ, intelligence, knowledge, or personality, creativity is a construct that cannot be observed directly. It is inferred from behavior (Brophy, 1999). A simple definition includes novelty or originality in thought process and action. Creativity can be defined very broadly as bringing something into being, or it can be described as new ways of thinking or behaving, or viewing the world from a novel perspective (Moustakas, 1967; Rothenberg, 1990). Creativity is a human phenomenon, in that people are innately and actively curious, with a strong need to alleviate tensions caused by unanswered questions and incorrect or unsolved problems (Feist,

1999, Torrance & Safter, 1999; Welch, 1975). For research purposes, Torrance offered a broad definition of creativity that included artistic aesthetics and wonder (Parkhurst, 1999, Torrance, 1988; Torrance & Safter, 1999).

Creativity can be judged in terms of the creative process, product, person, and situation (Brown, 1989). Many people think solely of the product when labeling something as creative. In fact, the product defines creativity; a useful product, either physical or psychological, is necessary to define a creative act (Brophy, 1998; Feist, 1999). The product is socially judged and weighed against past and present creations as to how the new product changes, advances, or shocks society. Society influences what is considered creative; a truly novel idea or concept can be accepted as creative and unique or rejected as odd or before its time. As an extreme definition of creativity, Roe (1963/1988) did not consider anything creative unless it resulted in a useful product. In contrast, Rogers (1954/1988) included personality characteristics as products of the creative person. That is, Rogers considered openness to new experience, ability to manipulate objects and concepts, and the freedom, either external or internal, to do so to be products of the creative person (Rogers, 1954/1988). MacKinnon (1965/1988) emphasized socialization as a way that personal behavior is shaped to include creativity. Because most socialization was believed to occur within the family, families were thought to dictate what behaviors are appropriate and when it is acceptable to be creative. In defining creativity, clearly some emphasize the product, some the nature of the person, some the processes through which products are created and some the environment in which creativity happens. Some, for example, Torrance (1988) and Gardner (1988), have concluded that creativity is the combination of many factors, such as mental processes, personality characteristics, and cultural beliefs. To understand the breadth of thinking about creativity, literature focused on each aspect of the definition is

reviewed later. This brief overview serves here to alert us to this complexity in the definition. In addition, it is important to recognize thoughts about the notion of uniqueness.

Is It Creative If It Is Not Unique?

Researchers throughout time have disagreed on the nature of creativity. Many researchers believe that only exceptionally special individuals possess any level of creativity. Often the amicable debate centers on the definition of creativity. The issue is whether creativity is limited to the truly novel, unique act or product or whether creativity can include actions that are new to the individual but have been seen or experienced before by others. Within this issue is the question of whether creativity is the result of a completely novel approach, or is it the result of a variety of ways of thinking. In the creativity literature, researchers distinguish between the "truly novel" and the "every day" new in the way that the word creativity is presented. Creativity, with a capital C, is that which is completely new, novel, or genius. Everyday creativity, with a lower case c, is seen in each of us in our speech, dress, living space, activities. Gruber and Wallace (1999) insisted that Creativity (and all creativity) is unique to specific eminent people, and can not be found in everyone. However, they acknowledged that creativity is multidimensional. That is, creativity can be found in many aspects of life or unconfined to one specific talent, such as playing the violin. Cognitive and social psychologists tend to align with the "lower case" theorists. They consider creativity as a thought process and believe that the power of thought without a tangible product is often what defines the creator as creative (Root-Bernstein & Root-Bernstein, 1999; Sternberg, 1988; Ward et al., 1999). Feist (1999) theorized that creativity is a basic human functioning, just as is personality and curiosity. Sternberg & Lubart (1999) agreed, claiming that like intelligence, each person lies on a creativity continuum of low, average, or high levels; each person has some creativity level. Ward et al.

(1999) stressed that creativity is not solely for the genius. In fact, they maintained that a genius' brain does not function physically differently than a non-genius person's brain (Ward et al., 1999). They suggested that by the fact that creativity lies in the cognitive realm, creative potential is available to all who think (Ward et al., 1999). As Guilford (1987) succinctly summarized: the Creative person just has more creativity than the creative, or average, person.

Is Creativity Included in Intelligence?

Spearman (1904) observed that there are multiple components of intelligence, but they share common variance. He referred to that shared variance as g, the general quality of intelligence, or generalized adaptation to the environment. Congruent with Spearman's theory, Binet and Simon (1916) and Weschler (1939) all developed multiple dimension measures of intelligence, but all of the dimensions measured expected knowledge or analytical processes. The definition of intelligence became synonymous with the score on an intelligence test (Boring, 1923).

Within this tradition of understanding and measuring intelligence, Guilford (1987) reminded us that there is more to intellectual activity than intelligence. He (Guilford, 1987) separated intelligence, creativity, and IQ. He maintained that the three are correlated, but he did not challenge the accepted definition of intelligence.

Sternberg (1988, 2000, 2003) also suggested that intelligence and creativity are correlated, but he did not stop there. Sternberg took a strong position suggesting that intelligence, as it is currently used by professionals, refers only to analytical processes that are most commonly used in academic settings. Creativity and practical experience, important components of adaptability, are not represented in intelligence tests. Although the general public may think more broadly, Sternberg (2000) maintained that professional intelligence scholars still

accept a nontheoretical definition of intelligence: the definition of intelligence is the score on an intelligence test.

Historically, creativity has not been seriously considered as a part of intelligence. Sternberg, however, suggested that it is not just traditional intelligence that should interest us, but it is successful intelligence. Sternberg's (2003) theory of "successful intelligence" includes creativity as one part of a tripartite definition of intelligence. Creativity is considered to be as important as the traditionally accepted analytical processes. Sternberg's (2003) theory of successful intelligence combines the general intelligence g, higher levels of intelligence and aspects of creativity, both general and unique. Successful intelligence, according to Sternberg, includes (a) the ability to achieve success in personal standards, (b) the ability to overcome personal obstacles and enhance personal strengths, (c) the ability to adapt and shape one's environment, selecting environments suitable for personal growth, (d) a balance of "analytical, creative, and practical abilities" (142). This last segment refers to the ability to question and analyze thoughts, make new and unique combinations and adaptations of thoughts, and to be able to sell or persuade those thoughts to others (Sternberg, 2003).

Sternberg is creating and testing a new test of intelligence that includes both the practical intelligences of persuasion, recombination, and creation, as well as the more standard analytical intelligences. He claims that his new test will tap into the unique intelligence needed to thrive in life, supplementing the SAT, GRE, GMAT, and other such standardized tests which claim to predict the success in the first years of college programs. Sternberg claims that his successful intelligence test is a better predictor of college (and life) success than the traditional standardized tests, which are more focused on analytical skills and knowledge (Sternberg, 2003).

Sternberg (1988, 2003) compared intelligence, wisdom, IQ, and creativity in his search for that quality in people that seems so obvious, yet so illusive. To define creativity, he used theories of creativity, including personality combinations of the creative individual and elements of the creative process. Sternberg uses as his definition of creativity the characteristics of problem solving (i.e. finding and defining the problem, and creating a solution strategy), knowledge acquisition (i.e. selective encoding or sifting through massive amounts of information, selective combination or synthesizing unusual information, and selective comparison or relating new information to past information), adaptability styles, including coping, resilience and flexibility, intellectual styles (i.e. motivation to succeed and internal self-control or self-government), and personality characteristics (i.e. intrinsic motivation, tolerance of ambiguity, perseverance, risk-taking, social awareness, and a need for social acceptance without conformity).

Sternberg (1988) acknowledged a variety of "mental self-government" styles, ranging from flexible to intolerant, from driven by specific conflict to by scattered, various conflict, from organized and micromanaging to random and often inexplicable combining of approaches. He supported a type of self-government to be more creative than the others, having the scattering of various inspirational problems, tendency for intolerance, having unclear goals and inexplicable methods, are not self-conscious, and have no use for priorities. This combination of mental management promotes, according to Sternberg, a freedom from societal norms and conformity, ability to mentally disassociate from conceptual rules and existing mental concepts to perceive problems in new ways. These qualities allow for greater amounts of creative activity.

Sternberg recognized that not all people can produce creative products, due to lack of intelligence, lack of will, a tendency towards antisocial endeavors, and/or a history of

unacceptable rebellion with defeating labels and conflict with authority figures. Therefore, someone may have the ideal creative persona and mental ability but not be successful at creative products due to hanging with the wrong crowd or due to a simple lack of the necessary intelligence to develop, maintain, and market that product.

Creativity, according to Sternberg, is in everyone, or everyday creativity, in a general adaptability. He maintains that creativity can manifest in a number of ways and in a variety of fields or domains. Creativity, coming in a variety of forms, can be an attitude, a thought process, a personality, and/or a product, according to Sternberg (1988). Sternberg focuses on the thought processes, not only the product. Finally, creativity, while it overlaps with wisdom, intelligence, and IQ, is its own construct.

Creativity vs. Talent

In the debate regarding whether everyday creativity is really special, or if creativity by definition should be reserved solely for the genius, the difference between creativity and talent arises. It is often difficult to distinguish between the two concepts. Are they interchangeable and/or interrelated? Kant (1923/1988, p.38) differentiated between genius, or Creativity, and talent: (a) genius has an propensity towards originality in a particular field or skill, far beyond a talent or basic aptitude, (b) genius has original models or products that are useable and deemed important by others (and often has unusable nonsense in addition), and (c) a genius can not specifically or scientifically pinpoint the origin of the creativity, but that it just happens naturally. Maslow (1968/1988) differentiated between special talent creativeness, an adept skill at a creative field, and self actualizing creativeness, an openness to experience, freedom to explore human potential, and a challenging attraction to the unknown.

Creativity includes talent; talent, knowledge of a field, ability with necessary tools, and a certain amount of finesse, acts as a foundation from which creativity springs. Bloom (1985) and Feldman (1999) agreed that creative practice within a field involves recombination of previously gained knowledge. Talent requires practice for maintenance of a skill. Creativity requires practice in much the same way, maintaining a skill of thought and action, intrinsic motivation, and ritual towards creative process. Ward et al. (1999) maintained that creativity requires creative cognition, which includes the generative thought processes as well as the receptive processes. According to Bloom (1985) and Feldman (1999), creativity involves actively accepting the environmental and personal influences; talent does not. The requirements for talent are an aptitude for a skill and the desire to practice. The ability to manipulate or synthesize ideas and skills is not a necessary component of talent. Talent and creativity may each be inherited from previous generations in similar ways. Talent, as in a sport, requires a physical aptitude and emotional desire to succeed in the field. Physical abilities are partially heritable. It is discussed in the next section that emotional and intellectual abilities might be transmitted as well. Creativity, involving complex abilities of thought and a combination of physical and mental propensities, may also be heritable.

Intergenerational Transmission of Creativity

Concern for intergenerational transmission of traits is not new. Debates on the topic range from creationism to evolution and from nature to nurture. It is instructive to notice that the creationism/evolution debate is purposely not discussed here. However, the debate of nature or nurture is very important. Intergenerational transmission deals with both environmental nurturance of family and society and physical nature. These topics are discussed further in later sections. Creativity is a trait that most people appreciate and hope for in themselves and in their

children. Many theorists believe that families want to foster healthy characteristics, like creativity, in their children. To understand the nature of creativity and how it works, it is important to explore how creativity is passed through families.

History of Study

In order to fully understand the study of creativity in families it is important to introduce the history of study of intergenerational transmission of creativity, leading to specific topics surrounding intergenerational transmission of all traits. Very little research has been done specifically on how creativity passes through families, or the intergenerational transmission of creativity. The work of two early genetic researchers and theorists, Galton (1869/1988) and Hall (1904), has become the basis of all intergenerational transmission study. Galton (1869/1988), in particular, has been recognized for research in the transmission of genius, defined as extreme intelligence and creativity in at least one particular arena. It is instructive to consider the studies of Francis Galton (1869/1988) that dealt with the heritability of genius. It is also important to compare Galton's work with the work of Hall (1904). Each theorist paved a different path for two groups of thought in the social sciences.

Francis Galton (1869/1988), cousin to Charles Darwin, pioneered the study of intergenerational transmission of genius in his many life's works with individual differences in both physical and mental traits. Galton (1869/1988) focused on a Darwinian approach of natural selection in explaining how families pass on genius traits. Galton's statistical analysis of a collection of eminent families, mostly of English birth and some foreigners, lead Galton to agree that there is evidence of transmission of human faculties, such as personality, aptitude, strengths and gifts, adding to Darwin's initial theory of physical trait evolutionary transmission through processes of natural selection. Galton observed education level, profession, and reputation of

eminent behavior and attributes of no less than 300 families with 415 great people among them, a large sample for the day. He included in his assumption of greatness, eminence, or genius the reputed characteristics of notable judges, commanders, men of literature, artists, poets and even warriors, oarsmen and wrestlers. In this, Galton implied a consideration of multiple intelligences, honoring attributes of bravery, physical strength, and appreciation for sports, business and the arts. Galton included a number of women in his sample, citing, for example, an aunt of a poet as being greatly appreciative of the theater and a Countess with a gift for math (Galton, 1869/1988, p.44-46). Galton's work suggests that transmission of traits involved both parents and extended family. Interestingly, Galton was extremely interested in racial differences in eminence, stating that future studies of Italians and Jews would no doubt show marked intelligence and those with Americans and Germans would be interesting as well (Galton, 1869/1988, p.44). However, the French, due to their wild use of the guillotine, would be unlikely candidates for generational study, as many generations of possibly notably creative individuals ended in a basket (Galton, 1869/1988, p.44).

The assumption of stability of genetic traits of ability in Galton's theory lead later Hallian theorists and others to conclude that there were desirable genetic traits. Most desirable traits were thought to be found in the white majority, leading to problems, such as racial cleansing in Nazi Germany in World War II and others (Reiss & Neiderhiser, 2000).

Galton's studies, novel for their time, combined many modern theories of intergenerational transmission and of creativity, which he termed genius or eminence. Galton's research on eminent men in families assumed that genetic material was predetermined and unchangeable. He also assumed that both parents and extended family contributed to the traits

through the family values, experiences, and interactions, suggesting an acceptance of creativity in creative families.

In creativity theory, the idea that there are great individual differences in the arenas creativity is seen (e.g., math, science, art, sports, etc.) was new at the time. Galton claimed to find support that the personalities of people, not only physical traits, are linked to their parents and family members. He concluded with "our personalities are not so independent as our self-consciousness leads us to believe. We may look upon each individual as something not wholly detached from its parent source" (Galton, 1869/1988, p.48). He described the passing of cell material, which we now know as genetic material, to the next generation as partially responsible for eminent future generations. Cell material seems to combine from past cells to promote a possible best (most desirable) personality, according to Galton. In these early years of exploring the role of heredity in future generations, little was known about biological and/or environmental impact. Biology and environment were not clearly separated in Galton's work. Psychological and emotional traits were not clearly defined. Therefore, an aunt's fondness for the theater was a particular trait that somehow connected to a nephew's fondness for poetry. There is no mention of home environment or parental value of enhancing particular traits in children.

Hall (1904), on the other hand, viewed humans to be more malleable in their expression of traits. Hall believed that he could take any random child, a blank slate, and make him into any type of human. This assumption lead researchers to theorize that the environment had more influence than previously thought with Galton's work. In fact, studies of prevention and intervention cite Hall's work as reason to manipulate the environment into a perfect state (Reiss & Neiderhiser, 2000). Behaviorism, including learning theories, is also consistent with Hall's assumption that the child is malleable and that the environment is as or more important than what

the child brings to the world (Reiss & Neiderhiser, 2000). The works of both Galton and Hall have been used since the mid 1800s to guide attempts to make the ideal human and the ideal environment in which to foster such a human, in case genetics alone were inadequate (Reiss & Neiderhiser, 2000). Scholars now question the implied static nature of change and find that individual genetic expression, especially in intergenerational transmission, is more complicated than originally thought (Goldsmith et al., 1997; Reiss & Neiderhiser, 2000; Rutter, 1998; Rutter et al., 1997). Expression of genetic traits, alone and in combination with other traits, is influenced by both biological timing and the social environment (Goldsmith et al., 1997; Reiss & Neiderhiser, 2000; Rutter et al., 1997).

Current Perspective on the Role of Genetics

In order to fully understand how creativity is passed through families, it is important to consider the processes of intergenerational transmission. In the last three decades, genetics and genetic influence have become more accepted in explaining individual differences, prompting a movement towards integrating "behavioral genetics" into research on families (Plomin, 2001). A recent, popular theme of behavioral geneticists is "that individual difference in complex psychological traits are due at least as much to environmental influences as they are to genetic influences" (Plomin, 2001, p.229). Plomin (2001) has found that no aspect of psychological traits has zero heritability. Heritability is defined as the proportion of phenotypic differences within a population of individuals that can be credited to genetic differences. Plomin et al. (1994) found that when treating the environment as a phenotype, a trait that can be witnessed such as a physical trait or behavior, significant genetic effects are often found, especially when there is a large sample size. This means that the environment in which the individual lives is in part due to the individual's genes. Individuals also create their environment by selectively

attending, responding, and choosing (Scarr & McCartney, 1983). In surveying the recent literature, Plomin (2001) found that in almost every area of psychology both genetic and environmental influences can be found, which leads to questions regarding the influential relationship between genes and environment.

The historical positions and assumptions made by researchers such as Galton and Hall have lead present research into two main theoretical groups (Reiss & Neiderhiser, 2000). One group, following Galton's influence, maintains that genetic material is fixed or unchangeable, and will be very influential throughout the lifespan. The other group, following Hall, believes that the genetic influence is malleable, that the environment can modify the phenotype (what is seen) and can enhance valuable genetic expression and suppress undesirable expressions. In fact, these two groups, seemingly so unrelated, appear to have influenced current researchers to shy away from research on genetic influence (Plomin, 2001; Reiss & Neiderhiser, 2000). Reiss and Neiderhiser (2000) have suggested that those researchers concentrating on genetic influence are mostly focused on prevention or intervention perspectives, leading to biases for specific environments or interactions that will lead to empirically proven studies that promote child success or prevent the advent of serious psychological and physical difficulties. Plomin (2001) has suggested that separating the genetic influences from the environmental can be tedious as genetics is at least in part responsible for the chosen environment. Gottlieb (1998, 2002) agreed, suggesting a multidirectional influence between genetics and the environment.

Theorists researching intergenerational transmission base their work on a set of assumptions that are recently coming into question. These assumptions were founded by the fathers of the field, including Galton (1869) and Hall (1904). Recently, with the advancement of technology, the study of genetics has become intensely complex. Researchers have challenged

the old beliefs and biases about transmission. The following section will present several assumptions or myths previously accepted as truth in the field of intergenerational transmission and those which need to be considered in order to fully understand the resulting data.

Myth 1: Change Happens Early in Life

One common misconception is that genetic influence happens all at once early in life (Reiss & Neiderhiser, 2000; Rutter, 1998). Many developmental stage theorists have based their ideas on the predictability of gene influence at specific, early life times. Stage theories assume discontinuous development in an often stringent, unchanging form. In contrast, many theorists believe that the expression of genetic influence can happen at a variety of times across the life course (Goldsmith et al., 1997; Plomin, 2000; Reiss & Neiderhiser, 2000; Rutter, 1998; Rutter et al., 1997). In fact, in regards to specific traits, expression or suppression can adjust at different developmental stages (Reiss & Neiderhiser, 2000; Rutter et al., 1997). For instance, personality traits, such as antisocial behavior and some psychological disorders can appear in adolescence or at menopause, but disappear throughout other stages of life (Goldsmith et al., 1997; Reiss & Neiderhiser, 2000; Rutter, 1998; Rutter et al., 1997). Rutter (1998) clarified that discontinuity in development is more dominant than continuity, especially in intergenerational transmission. A major cause of such discontinuous influence on development is societal change (Rutter, 1998). Many characteristics do appear and disappear throughout life, according to life stage and genetic timing. It is possible to assume that with fluid characteristics such as creativity, the genetic influence of characteristic onset can happen later in childhood or even into early adulthood.

Myth 2: The Environment Plays No Role in Genetic Expression

Another misconception in transmission research deals with the role of the environment in genetic interaction. The assumption is that the environment plays no role in the timing or expression of genetic traits; genetic influences are not considered in the measures of parent-child interactions, and interventions with parent-child interactions are not expected to have an influence on genetic material (Reiss & Neiderhiser, 2000). However, there have been recent findings suggesting that the environment has an effect on genetic expression. Both positive and negative home environments, school environments and stressful life events have been found to influence the extent and timing of expression of genetic traits (Csikszentmihalyi, 1990; Gardner & Moran, 1990; Guilford, 1987; MacKinnon, 1962; Reiss & Neiderhiser, 2000; Sternberg, 1988; Wright & Wright, 1986).

Research dealing with shared environment experienced by siblings, twins and non-twins, has shown repeatedly that children growing up in the same household neither perceive their environment the same nor do they have exactly the same experiences (Plomin, 2000, 2001; Reiss & Neiderhiser, 2000; Scarr & McCartney, 1983). Therefore, the non-shared environment is extremely important for understanding any differences. Differentiating between shared and non-shared environments is accomplished by separating variance associated with genotype, shared, and non-shared environments into its component parts. The variance explained by environmental influence is the variance not explained by genetics (Plomin, 2001). For example, family resemblance not explained by genetics is thought to be due to the shared environment variance (Plomin, 2001). Non-shared environment is the remaining variance after specific shared environmental characteristics are considered. The environment that is not shared by members of a family is the result of individual characteristics that influence perception (Plomin,

2001). In the Nonshared Environment of Adolescent Development (NEAD) project, siblings were shown to have only 50% genetic similarity in psychological and physical traits (Plomin, 2000, 2001). This dramatic finding shows a great need to rethink the research on family environment in terms of individual differences and genetic influence.

One inference that can be made from such results is that people create their own environments at least in part due to their genotypes (Plomin, 2001). This is known as the nature of nurture, or more precisely as the genotype-environment correlation, or experiences correlated with genetic influence (Plomin, 2000, 2001). Genetics influence the psychological traits in an individual, which then aids in that person choosing activities, interactions, and environments (Plomin, 2001). Indeed, individuals actively shape their environments. A passive genotype-environment correlation is the amount of parenting behavior (and the ability to acknowledge and change behavior) that overlaps with child adjustment (Reiss & Neiderhiser, 2000). That is, the abilities of parents to reflect on and adjust their parenting behaviors are related to their child's ability to adjust. Evocative genotype-environment correlation suggests that the child reaction may elicit particular parental responses (Reiss & Neiderhiser, 2000). Passive and evocative genotype-environment correlations are also known as parent effect and child effect, respectively. Genetic influence, importantly, comes from both parental and child sources (Neiderhiser, Reiss, Hetherington, & Plomin, 1999; Plomin, 2001; Plomin et al., 1994). The combination of genes from both parents in the child's genotype creates a unique genetic influence. Genetic influence from each individual, regardless of age or experience, is powerful in the family. Genotype-environment correlations can be useful in developing theories and models of acquisition of specific psychological traits in family studies.

Gottlieb (1998, 2002) concurs with these assumptions. He has studied the reciprocal functions of genetic materials, including DNA, RNA, and proteins, and has found that there is a paradigm that has directed genetic research and all research dealing with intergenerational transmission. What Gottlieb (2002) has termed "the Central Dogma" is the assumption that genetic material is unidirectionally influential; genetic information is thought to pass from DNA, the genetic code, down to the structural basics of proteins, but not vice versa. It is this paradigm or belief system that has limited the study of genetics (Gottlieb, 2002). Gottlieb suggested instead, from surveying current literature, that environmental influences, both internal and external, can affect genetic trait initiation through genetic potential. This means that the genetic code is more vast than we usually consider, including potential for adaptation to new environments in unexpected ways, and that the environment has more influential power, especially when considering the levels of environment. Gottlieb (1998, 2002) suggested a vision of environmental levels (similar to Bronfrenbrenner's (1986, 1993) levels) to incorporate the chemical levels in the body (which social scientists ignore), and social factors, such as propinquity and similar personality characteristics in mate selection, a type of evolutionary natural selection which biologists and geneticists ignore. According to Gottlieb, proteins are affected by chemicals naturally occurring in the body system, due to stress, sleep, nutritional change, and environmental change. When provided with a completely new life situation, the body reacts in the production of various levels of chemicals, which communicate to the body structure through proteins. Proteins will in turn affect the higher level genetic materials, including DNA, through complex reactions. Gottlieb does not suggest that the DNA is changed, per se, but that the potential for dealing with change is included in the genetic code; the potential is activated and the phenotype is changed. The chemical environment is different, enabling or

disabling combinations of genes and their influences, thus affecting the phenotype. This is a modification to the previously accepted central dogma of genetic influence (Gottlieb, 1998, 2002). In terms of intergenerational transmission of traits, Gottlieb (2002) suggested that natural selection through mate selection is both a genetic and an environmental function; in order to choose a suitable mate, numerous environmental issues must be coordinated, including closeness to suitable mates or propinquity, the similarity of personality traits, values, and life experience, each of which are in some way motivated by the genetic code, passed on to future generations. Geneticists and biologists often exclude this sort of influence or choice when dealing solely with the chemical functions of genetics (Gottlieb, 2002). Gottlieb suggested further questioning of the old paradigm of genetics to fully adapt to the new information about genetic influence.

The environment produced in a family influences the phenotypic characteristics of the family. In fact, the values and norms of the family can affect what genetic traits are seen in each individual, even if other genetic traits are available or would be seen in other environments (Goldsmith et al., 1997; Gottlieb, 1998, 2002; Plomin, 2000; Reiss & Neiderhiser, 2000; Rutter, 1998; Rutter et al., 1997). Personality characteristics, such as openness to experience, adaptability and agreeableness, appear to be inherited in children through their families (Bloom et al., 1998; Rutter et al., 1997; Reiss & Neiderhiser, 2000). It seems possible that creativity would be passed through families as well.

Myth 3: Genetic Material is Stable and Not Malleable

The previous myths lead to another assumption of the malleability of genetic influence (Reiss & Neiderhiser, 2000). The environment has been found to cause expression and suppression of traits. Negative home environment and/or parental response seems to lead to more expression of negative genetic traits, while positive home environments, with warmth and

parental support, seem to protect individuals from negative genetic expression and enhance positive expression (Gottlieb, 1998; Neiderhiser, Reiss, Hetherington, & Plomin, 1999). Evidence supports the important relationship between life events and timing of genetic expression. The receptivity to genetic influence varies according to age and experience (Reiss & Neiderhiser, 2000). Acceptance of phenotypic change is more likely when the individual is receptive and able to adapt. Body chemicals, such as hormones and stress chemicals, have a multidirectional affect on the genetic potential, according to Gottlieb (1998, 2002). It seems that genes impact almost every aspect in our lives, from decisions to reactions, in ways that we had not considered previously. Therefore, realization that genetic influence varies across time and can be controlled by the environment is important. It has been found that genetic material, even though major theorists have thought it as stable, is actually quite malleable in the environment, society and family. It is important to understand that genetic influence is distributed and manipulated from all sides of a family, through interactions with, for example, mothers and fathers and divorces and remarriages (Rutter, 1998). Intergenerational continuity depends on the interaction patterns within family groups (Rutter, 1998). Discontinuities between family members are more likely to happen than continuities, simply because of the lapse of time between growths (Reiss & Neiderhiser, 2000; Rutter, 1998). Likewise, continuities between related individuals can appear to happen through redefining of the variables through time (Rutter, 1998). It is important to understand that genetic researchers are at the beginning of understanding genetic influence. Thus, conclusions made are estimations at most, especially when studying continuities between small groups of traits (Rutter, 1998). By combining the social and biological influences, assuming that they are intertwined, research will become more complicated but also more accurate in describing the nature of intergenerational transmission.

Genetic research has found that we are made up of 100,000 genes, each working alone and in combination to produce the individuals of society (Reiss & Neiderhiser, 2000). Each individual, with genetic material inherited from a family, grows and is socialized within a family. In discussing this, however, there are points that need to be considered in terms of the acquisition of genetic material, the impact of the environment, and misconceptions that the early theorists in genetic research, such as Galton, assumed to be true but recently have been questioned. Timing and developmental growth are factors to be considered in studying genetic material. Clearly, the one stable factor in biology is change. As research and theory regarding intergenerational transmission grows and changes, so shall the study of every social pattern, including creativity.

Person, Process, Product and Environment

Having considered intergenerational transmission of traits, including creativity, it is instructional to explore how creativity functions in terms of the person, process, product and environment. The next sections will further clarify the concept of creativity.

The Creative Individual

Creative people have been found to behave differently than less creative people. Gruber and Wallace (1999) suggested that the creative individual is unique in thought processes that evolve in multidirectional change. This suggests that the creative person is labeled as different or unusual possibly in a vast number of areas of life and that they can change or evolve. Maslow (1968/1988) added that often the goal of creative people is to become self-actualized, a characteristic of self-understanding, evolving people. Rogers (1954/1988) and Feist (1999) both have suggested characteristics that are unique to the creative individual. These characteristics, such as high openness to experience, internal locus of evaluation, ability to manipulate ideas or objects, discipline, impulsivity, introversion, neuroticism, psychological safety and freedom, are

easily compared to personality measures, such as the Big Five Personality traits (see Costa & McCrae, 1992; Feist, 1999). Personality traits from the Big Five, including Openness to experience, Introversion/Extroversion, Agreeableness, Neuroticism, and Conscientiousness are thought to be configured similarly among creative people (Feist, 1999; Rogers, 1954/1988). For instance, a creative person would be more open to new experience and more adaptable (Gardner & Moran, 1990; Torrance & Safter, 1989) and more neurotic (Kubie, 1958/1988; Ludwig, 1989; Piechowski, 1979) and/or physically or psychologically sensitive (for example, having synaesthesia, the blending of senses, see Cytowic, 1996/1997), and even higher levels of ESP Krippner & Murphy, 1973/1988) than a less creative person. Sternberg (1988) added that creative individuals are not conventional or conforming to societal rules, they have high aesthetic appreciation, they have high drive or motivation, and they have a willingness to take a stand or perspicacity. Maslow (1968/1988) and Rogers (1954/1988) agree that creative persons have lower levels of fear of perceptions of others and more freedom to express themselves. Csikszentmihalyi (1990) studied the influence on "flow" or the stream of consciousness zone of the creative process, which often seeps into the everyday lives of creative individuals, especially while working on a creative concern, causing them to seem out of touch with the present moment. Creative individuals, including the unique, strange, absent-minded, and even weird, certainly have traits that are easily recognizable and labeled as creative.

Maslow (1968/1988), who's theory of flow was called B-cognition, focused on the creative person's goal of self-actualization and he theorized that self-actualization is a large part of what makes a creative personality, in addition to a healthy, happy person. Self-actualization, as he defined it, contains many of the qualities listed above. He (1968/1988) believed that these qualities are in everyone at birth and that it is the environment that fosters or suppresses these

characteristics. An aspect of personality that Maslow (1968/1988) and Rogers (1954/1988) thought was particularly important to creativity is a lack of fear. Fearlessness is represented within the neuroticism dimension of the Big Five (Costa & McCrae, 1992). The lack of fear, in general and specifically, social, personal, and psychological fears, is what seem to make it possible for creative people to take risks associated with creating something new or proposing a new idea, drawing them closer to self-actualization.

Creative people seem different from the outside, leading to the question of physical and functional differences. Some researchers have looked at creativity and brain functioning and have come to some interesting conclusions. Restak (1993) and Martindale (1999) studied the physiology to both eminent and average people. Both found that there is a distinct pattern of brain function associated with creativity, just as there is with language and math skills. The right side of the brain is concerned with visual, performing arts, natural and nonverbal sounds, depth perception, emotion due to the arts, perceiving and expressing emotion (Restak, 1993). Martindale (1999) added that the right side is also responsible for primary processes, parallel, holistic, and creative responses. The left side of the brain is concerned with math, logic, verbal, sequential and analytical processes (Martindale, 1999; Restak, 1993). Restak and Martindale differ in terms of their stance on levels of cortical arousal, but they agree that simultaneous brain functioning levels in both lobes is needed to result in creative activities. As creativity lies across academic, scientific, and artistic domains, which are advanced only by creative actions, there is no one area of the brain responsible for creative thinking. Brain functioning and the high levels of communication between brain halves seem to have great importance for fostering creativity (Martindale, 1999; Restak, 1993). Stronger connections in the corpus callosum, the connective tissue between the brain lobes, and within the brain lobes result in better brain functioning and

higher levels of brain activity, thought, and creativity (Martindale, 1999; Restak, 1993). Stronger connections are due to stronger axons and neurotransmitters, and greater myelinization of the neurons (Martindale, 1999; Restak, 1993). It seems obvious that better physical connections would promote better functioning. However, Restak (1993) also found that brain injury and even brain degeneration can increase creativity levels. Working with brain injury victims, mentally disabled individuals and Alzheimer's victims, Restak found that creativity levels can be enhanced as the brain adapts to lost connections, creating new connections. This is reflected in the numerous studies dealing with mental illness and disability (Ludwig, 1989) and drug use/abuse (Martindale, 1999; Restak, 1993). Martindale (1999) pointed out that these instances, injury, drug use, disability, can also squelch creativity in some individuals, as it depends on the person and extent of injury or use. Martindale (1999) mentioned the cortical functioning and the amount of cortisol created by the brain, affected by many drugs, may be a factor to creativity. Thus, it appears that brain function is relevant to creativity, but we lack knowledge of specific brain function(s) that are important for creativity. It may be that creative people have high levels of specific brain functioning even if they do not have generally high levels of brain function. Stronger connections and higher functioning within the brain allow for fluency of thought, which aids in idea creation and recombination, critical in creative thinking.

Creative people are especially adept at skills and thoughts about a particular area of life. This area, also called the domain, arena, specialization, medium, or field, is the creative individual's special area of interest, what she/he is particularly good at. Some people are termed "Creative" as they seem extraordinarily well versed in a particular field, or at many fields, as in the "Renaissance Man," someone like Da Vinci, who practiced creative thought successfully in a wide range of areas. The Creative person makes unique combinations of thoughts and products,

creating something completely new and useful. Some people are only creative in a particular arena, such as a specific sport or scientific task. Others are deemed "creative" in that they seem to possess the unique qualities of creative personality or show talent in an arena or seem to make connections between unlike things easily in every day life, but do not seem genius- level. Both Creative and creative people have chosen, through a variety of ways, a domain of interest in which to be creative. Roe (1963/1988) stated that all that a person experiences is due to personal choice; a creative person is drawn to creative endeavors and people. Scarr and McCarthy (1983) suggested a process of niche picking, in which the individual enjoys a particular activity, gets rewarded for being good at it, and continues to be interested in it, learning how to manipulate the definitions, tools, and rules within the domain. The domain becomes the individual's medium in which she/he can be creative. With familiarity of the domain, the individual has freedom to explore creative possibilities. Maslow (1968/1988) and Rogers (1954/1988) appeared to agree; the creative individual moves from talent at manipulating objects or thoughts into freedom for creating something new.

Gruber and Wallace (1999) suggested that individuals evolve through the life span, adding knowledge and experience of a number of fields to the creative repertoire. This suggests that if the ability to be creative exists in an individual, that individual has the potential to be creative at a number of domains. Likewise, the individual's knowledge, experience, and creative expertise are enhanced throughout the life span. The domain itself is unimportant; it is a field in which the creative person finds an expressive voice, in order to be creative. The domain can be an art, science, sport, language, internal body understanding, or interpersonal relationship awareness.

Gardner (1982, 1988) opened the world to learning styles, including visual, audio, kinesthetic, intrapersonal and interpersonal styles, in his cognitive theory. He theorized that creative individuals combine a number of learning styles in their creativity. Likewise, he showed that creativity can specialize in one of the variety of learning styles. For instance, someone can be visually creative, experiencing the world primarily through their visual sense, expressing themselves visually in a medium like photography. In this way, the photographer has picked a visual niche for her creativity. Gardner (1982) and Galton (1869/1988) showed the multitude of possible areas of life in which creativity can happen, in both the Creative and creative.

The Creative Process

It is interesting to consider how creativity happens. Some theorists believe that the product at the end of the creative activity is of utmost importance. Throughout history, the creative product has been what socially determines what is creative. When defining creativity, Roe (1963/1988) used the product as the model for creativity. The product is tangible and witnessed. Products, such as paintings, new mathematical functions, or novel social reform, are defined by many in society as "creativity." The creative thoughts and actions resulting in the product are often ignored by theorists and the general public, due to their intangibility. However, many modern theorists have insisted that creativity is more than the end product (Feist, 1999; Guilford, 1987; Restak, 1993; Rogers, 1954/1988; Ward et al., 1999). Many believe that the process, itself, is a product. The searching out and being sensitive to problems, attempting to answer questions, testing and retesting the answers and modifying the results are all parts of the creative process (Cramond, 1994; Torrance, 1990). Each of these parts is considered by some to be experiences or products of the creative process. In creating a "client-centered" therapy, Rogers (1954/1988) theorized that the personality factors of a creative individual were, in fact,

products of the creative process. By using the traits that are labeled creative, the individual experiences the creative process, gaining materials to be used in the future, and therefore, the resulting product lies in advancement of novel action (Rogers, 1954/1988). Rogers believed that creativity is not "good" or "bad;" the process is the usage and acquisition of skills, and the movement toward a novel end product. Each creative act is an advancement of the total creative experience of the individual, cumulating into a product of a life long of creativity. Ward et al. (1999) said that it is the cumulative process that leads to and includes the product. For many people, the act of producing is more creative or useful than the resulting product. Maslow (1968/1988) believed that the healthy individual was one who explored his/her own creative potential throughout life. Feist (1999) theorized that the creative process is a lifelong process, staying constant in its intensity. Torrance (1988) theorized that creative thought levels stay consistent across the life span. A researcher on brain functioning, Restak (1993) agreed that creative thought processes stay constantly useful across the life span in normally functioning brains, especially when considering the non-verbal, experiential qualities of creative thinking. The domain of interest might change, but the motivation and thought processes are present across the lifetime (Feist, 1999).

Intrinsic Motivation

The creative process is believed to begin with intrinsic motivation (Collins & Amabile, 1999; Csikszentmihalyi, 1990; Ward et al., 1999). This motivation or drive, a characteristic of creative people, is an inner feeling of need to solve a problem, answer a question, or to make something different. A creative individual might be able to solve all of the world's problems, but without drive, these answers will never be planned, directed, or even thought out. Of course, thinking is an important part of this process, as it is a conscious effort towards a goal.

Intrinsic motivation is opposite of extrinsic motivation, which comes from outside the individual, and can be harmful to the creative process. An example of suppressing the creative impulse is seen in meeting a deadline (Collins & Amabile, 1999). Often the pressures and stresses of extrinsic motivation interfere with the creative process, not allowing the words, feelings, and answers to come to the surface of the mind, becoming that mental block, termed "writer's block," or "artist's block" (Root-Bernstein & Root-Bernstein, 1999). Root-Bernstein & Root-Bernstein (1999) suggested that to overcome such a block, it is useful to go back to the basics of training, brainstorming, elaboration, etc. Practicing the basics helps to reorganize thoughts, relax the creative mind back into a productive flow. Creativity, importantly, includes the intrinsic need to overcome obstacles and to answer the problems, both within and outside the creator.

Creative Development

Gruber and Wallace (1999) said that the creative person is constantly changing and evolving, suggesting that creativity is not static, and can be enhanced or suppressed. This supports the notion that creativity is a stable, continuous factor in quantity and yet discontinuous in quality, that it is constantly worked on by the individual, without specific stages. Continuity implies some level of permanence. When Torrance (1988) explored the idea of permanence in creativity across the life course, it was found that tests of prior performance predicted some future behavior. Prediction was best when prior performance was combined with a congruent future self-image (Torrance, 1988). In fact, Torrance found that testing for continuity or permanence needs more work, as was evident in his observation of creative slumps in 4th graders and again in 7th-8th graders (Torrance, 1988), suggesting developmental inappropriateness of creativity at that time, due in part to physiology, cultural socialization, and environment.

Maslow (1968/1988) believed that creative qualities are in everyone at birth and that it is the environment that fosters or suppresses these characteristics throughout time.

Stages of Creative Process

The creative process is believed to be different for every individual (Csikszentmihalyi, 1990; Martindale, 1999). Individuals differ in their need for rituals, environmental conditions and time requirements in order to be creative (Csikszentmihalyi, 1990). Many people have reported that they experience specific stages while participating in their own creative acts. Wallas (1954/1988) described the stages of the creative process. These stages are (a) preparation, (b) incubation, (c) illumination and (d) verification. Preparation is the gathering of knowledge and materials. It is controlled, calculated and necessary. Preparation can be gathering materials for a painting, reading the literature on a subject or finding information about our world. Incubation is the unconscious mental process that goes on during relaxation. Incubation is uncontrolled and may occur while some other issues are consciously dealt with in the illumination or verification stages. Illumination is that "Eureka" response, as the answer becomes clear. It is the flash of understanding. It rarely occurs completely independent of training. Wallas (1954/1988) stressed that practice and training facilitate illumination. Illumination leads to further questioning and research. Verification is the future research or response to illumination. It is the process of considering whether the product works, if it is socially accepted and where to go from there. The incubation process seems to be the most intriguing to many who study creativity, as it provides an answer to that need to put down a task to ponder it in a relaxed state. It also helps to explain how mysteriously answers seem to come in the middle of the night during a dream or in the shower in the morning: Aha! That's it!

Incubation also points to the complexity of the mind and consciousness of thought, both of which are interesting in theory, but frustrating to research, like creativity.

Researchers have questioned the stages of the creative process because the mysterious stages of incubation and illumination can not be witnessed. Barron (1969/1988), a believer in the supernatural, mysterious qualities of creativity, acknowledged that these stages are extremely difficult to prove. He maintained, also, that creative people manipulate current environmental issues, beliefs, and materials, so they are influenced by the environment. The behaviorist psychologist B. F. Skinner (1972/1988) did not believe that such stages could exist without proof, but then, Skinner thought that the environment inflicted creativity on the individual. Weisberg (1999) was another prominent doubter of incubation, due to the lack of proof.

The Concept of Flow

Another intriguing concept of the creative process is that of the "mode" or "zone" that a creative person can find him/herself in while creating. Plato (340?BC/1988) was the first theorist to note this feeling of unexplained heightened experience. Plato was interested in the creative experience, as if it was a way to tap into the supernatural. Jung (1923/1988) theorized that the creative process bridges into the collective unconscious, explaining the sense of the supernatural, of wholeness and the ease at which answers appear. Csikszentmihalyi (1990) calls it "Flow." Maslow (1968/1988) referred to the same aspect or process as "B-Cognition." Maslow's research on creative thought included the study of brain (Beta) waves and their appearance in heightened levels during creative experiences. Basically, all of these theorists were referring to the sense of timelessness, lack of self-consciousness, heightened self-awareness, attentiveness to the process, and sense of control that accompanies any prolonged creative experience. It is here when answers seem so easy. The creative problem solving, in

whatever form, "flows" easily and smoothly, seemingly to stop time for a while. Often, when not in Flow, the creative individual can feel uninspired, pressured, stressed, and as if the answers must be forced. Many artists say their best, most creative, understandable and logical works come under Flow… likewise, their worst creations are made outside of the Flow experience. Dabrowski, in his theories of giftedness, mentioned the societal misconception of this creative process phenomenon (Piechowski, 1979). The heightened senses associated with Flow, and with the creative individual inside and outside of the flow process, are often mistaken for hyperactivity and other antisocial behaviors (Piechowski, 1979).

Most people have experienced flow in some way or form, but witnessing it in others is often confusing. The poet, composing as he walks the streets, talking to himself, seems crazy, not an artistic genius. It is important to understand that much of the mystery of creativity is novelty, and can easily be socially misunderstood.

The Creative Product

Creativity does not require a product. Society does. Most people find it difficult to believe what they can not hold and handle. Roe (1963/1988) discussed how the product of the creative process must be socially useful. MacKinnon (1965/1988) believed that a collective social response determines what creativity is and decides if the product is important. Skinner (1972/1988), as a behaviorist, was only interested in an observable product that was derived from external influences onto the blank slate of the individual. However, he considered the creative product to become a literal part of the creator, much like a slice of the soul, created actively and with a labor of love (Skinner, 1972/1988). The product is relevant, the specific process by which it was produced may never be known (Skinner, 1972/1988).

Nickerson (1999) suggested that there may be a hierarchy of creative products, that one product is more socially acceptable than others. This may be true, in that society appreciates order. Criteria are developed, in a specific historical time from past criterion, by which products are judged and can be categorized. If one product serves a major purpose, comes at an important, groundbreaking time, or is seen as generally acceptable or useful, then it might be considered more desirable. Likewise, the lack of social support will deem the product as unacceptable, crazy or before its time, and the product will be discarded as unimportant. Rogers (1954/1988) believed that history or time plays a part in social acceptance. Plato (340?BC/1988) thought that creative products were built on previously influential products, pointing to the influential power of the novel product that is before its time. An unacceptable product will be disregarded by society. Later, that same historically disregarded product may be considered before its time. Plato suggests that the fact that the product existed in some form had influential power on present day production.

The Creative Environment

In the nature/nurture debate, all aspects of human functioning become questioned. Creativity has not gone without being viewed through the nature/nurture lens. Studies, such as those by Restak (1993) and Martindale (1999) have been monumental in illuminating how the brain processes information. Biology may, in fact, play a part in creativity. The environment can also play a part. The environment is made up of both the physical environment (the home, the objects provided to the child, etc.) and the psychological environment (the relationships between family members, the social control and love for the child, etc.). Theorists studying the physical environment seem to agree that a safe (physically and psychologically) environment with rich stimulation will provide ample opportunity for creative expression to happen (Bloom,

1985; Csikszentmihalyi , 1990; Nickerson, 1999; Torrance & Safter, 1999). Safety in the home or school allows for freedom for expression (Bloom, 1985; Torrance & Safter, 1999). The availability of various items, including a variety of toys, books, and other media, provides for the budding creative person the tools for exploration (Bloom, 1985; Torrance & Safter, 1999).

The psychological environment that best supports creativity proves to be more complicated. Maslow (1968/1988) theorized that even if the creative motivation and thought processes are found in an individual, society or the environment can hinder them. Skinner (1972/1988) said that the environment actually acts on the individual, not that the individual acts on the environment. The nature/nurture debate is being tackled in the human development research, but that work is not well represented in the creativity research. For example the transactional influence of person on environment and environment on person is an important step toward resolving the nature/nurture question. Scarr and McCartney (1983) suggested that through a variety of ways, including individual choice and societal pressure and influence, niche picking, and even physical comfort, likes, etc., we structure our own lives. One influence that, until recently has been overlooked, is that of genetic predisposition towards a particular environmental choice (Scarr & McCartney, 1983). It is possible, according to Scarr and McCartney, that genetics play a major part in an individual's environment, due to the family setting up the initial environmental comfort zone. We can see a little of this thinking in the creativity literature.

Csikszentmihalyi (1990), MacKinnon (1965/1988), Roe (1963/1988) and other researchers in family studies, including Bronfrenbrenner (1986, 1993), took an ecological theoretical view when discussing the spheres of experience in terms of how the individual is embedded in society. The individual experiences the world in his/her own way, with his/her own

resources of biology, cognition, and personality. Most individuals live within a family system. Each family member brings in new ideas and perspectives to the family system. The multiple perspectives within a family influence each individual in the family. The family sphere is inside community and, ultimately, society spheres. New issues and ideas come from society, through the family, to the individual. As mentioned before, time is an important part of the environment (Bronfrenbrenner, 1986, 1993; Rogers, 1954/1988). Creative acts are new and unusual. When they are produced before society is ready for them they are considered unacceptable. This was seen in the lack of acceptance of the ideas of Galileo and of the art of Van Gogh. Both were rejected by society at the time. Now, they are revered as geniuses. Societal norms exist in the context of history. Multiple factors determine the acceptability of a creative product at any point in time. Some of those factors include natural phenomena, such as extreme weather, economic conditions, and political issues both within and between countries. In other words, there is an interaction between the acceptability of a creative product and the environment in which it is presented. If every person tailored the creative process to fit the perceived environment, many exemplary creative products would have not been produced. An important implication of the interaction between environment and acceptability is the importance of intrinsic motivation for creativity. Especially in American society, the motivation to be successful comes dually from the social family (with the need to impress them) and from the need to fulfill inner desires. The process of creativity may be influenced by the environment, but it must also be characterized by a substantial proportion of individual, intrinsic drive.

The Family Environment

The family, a micro-society, plays a large part in the creative individual. Family, as a definition, is the most proximal society for a child. Its impact can be much more important on

the individual, due to emotional investment. Often, due either to genetics or family environment, creativity runs in families. Galton (1865/1988) theorized that genius runs in families. Likewise, Bloom (1985) and Feldman (1999) demonstrated that talent is passed down through families, as many families claim members with unusual talent. Ward et al. (1999) suggested that the family creates an environment that supports creativity, and that this family pattern is learned and taught to future generations. However, the family, as Bronfrenbrenner (1986, 1993), Torrance (1988) and Bloom (1985) theorized, is not the limit to the child's environment. The school setting for children can be highly instrumental in fostering or destroying creativity in a child. An interesting environment or classroom setting, or a play room at home, can inspire the needed experimentation and exploration in children (Bloom, 1985). Child play is often practice for adult life (Freud, 1908/1988). If the classroom inspires problem solving skills, fantasy and imagination, and safety to practice play, children will grow with added skills into positive adulthood. By enhancing the environment, and providing variety, allowing for exploration, creativity can be enhanced (Bloom, 1985; Torrance, 1988; Torrance & Safter, 1999). If there is a predisposition for creativity, brought by genetics, the environment can help draw it out. Likewise, a poor, harmful environment can suppress naturally occurring creative impulses, according to Bloom (1985).

Some researchers find that a warm, nurturing environment fosters the freedom of expression necessary for creativity in children. Wright and Wright (1986) conceptualized a framework through which future research should view creativity in the family, focusing on the factors in the family and household, in both parenting to enhance a child's creative potential and for researching the construct of family creativity. Factors such as positive communication styles, authoritative parenting, positive parent perception of child creativity, respect and encouragement,

will provide a model household for enhancing child creativity (Wright & Wright, 1986). Caregiver, or parent, characteristics, suggested by Wright and Wright (1986), include flexibility, androgyny, independence, a value of creativity and flexible roles for each family member. These characteristics are defined previously as being creative characteristics. Wright and Wright (1986) concluded that through a supportive, open family environment, children can be creative. Torrance (1986, 1993) theorized that the best environment for fostering creativity is one with a great amount of positive parent interaction, support and structure. Goble, Moran, and Bomba (1991) agreed, finding that maternal aid in child problem solving provides a safe environment for exploration while not stifling the child. However, too much maternal aid does not allow for much child creativity, but teaches the child to conform to the maternal thoughts and values. Guilford (1987) suggested that the child may conform to the family's ideals, evident in lack of unacceptable behavior. Gardner and Moran (1990) found that families showing high degrees of adaptability and cohesion between members also have greater degrees of creativity. Carson, Bittner, Cameron, Brown and Meyer (1994), using the Torrance Test of Creative Thinking (TTCT) and measures of Coping and Stress, found that the higher the scores on the TTCT the greater the amount of positive coping to higher stress, in both mothers and their children, suggesting an environment supporting such problem solving or a natural predisposition for positive coping skills. These studies suggest that there is a best environment for creativity to thrive, and it is the positive family environment.

In contrast, Koestner, Walker, and Fichman (1999) found that parental conflict within the home positively correlated with later adult creativity in the child of those parents and that parental warmth and nonrestrictivenss were not associated with creativity. In their longitudinal study of creative personality and family dynamics, it was found that a certain amount of conflict

within the family of origin aided in future issues in adult life that needed to be problem solved creatively (Koestner, et al., 1999). Perhaps, children in conflicted homes use a variety of coping mechanisms in order to make sense of their family dynamics, in effect practicing their creative skills.

Griffin and McDermott (1998), in their study of rebelliousness, found that both positive and negative environments were capable of fostering what society considers negative creativity, or rebellion, which adds a level of stress to the household. Griffin and McDermott (1998) explored the links between creativity, rebelliousness and the home environment, and found that it is the combination of child and adult personality and needs and wants for social control and discipline within the family that helps foster or destroy creativity. Rebellion, according to Griffin and McDermott, is creativity of response to the social environment that may not be a good fit to that individual's personality. Rebellion is seen in all types of families, supportive and nurturing to abusive or neglectful. Rebellion in the family is a creative way of expressing a lack of met needs (Griffin & McDermott, 1998). Social rebellion, challenging social thought and norms, is similar to what happens in the family, only on a greater scale. It is this type of rebellion, shocking the system that changes social structure (Griffin & McDermott, 1998). The environment, poor or enriched, supportive, harmful, or neglectful, does seem to play a part.

Summary

Creativity is an interesting, desirable construct, one that families wish for their children. An accepted definition for creativity is making something unique. In studying definitions for creativity, the creative process and the home environmental effects on creativity, researchers have overlooked the place of intergenerational transmission and its numerous effects. Creativity, as seen in the work of Galton in 1869, is seen through family lines, but by what mechanisms

does this work? Traits are passed to children through biological means and through influences in how the environment is set up and what experiences the child is exposed to. Each of these methods is an example of intergenerational transmission. Genetic influence happens not at once but throughout the life span. The environment plays an important part in what traits are expressed and when. Genetic material is neither as stable nor unmalleable, as previously thought. In terms of creativity, the person, the product, the thought process, and the creative process or creative act can be creative or not, inherited or not. The creative individual has distinguishing characteristics of openness to experience, freedom of self-expression, intrinsic motivation, movement towards self-actualization, and a claim of a natural "flow" of creativity. The creative process has common themes for most creative individuals, including ritualism, "flow," stages of productivity, incubation, and verification, and an overall internal motivation to achieve answers to driving questions. Creativity often results in a product, either tangible or not. Creativity can be expressed in many different arenas, including the arts, sciences, interpersonal relationships, kinesthetic activity and business. Creative people are drawn to creative things, activities, people, and environments. Their genotype is partially responsible for creative people's choices. All people live in a family environment, which is responsible for developing or discouraging genetic trait influence. This study is an attempt to fill a gap not visited since 1869, addressing the extent to which creativity is transmitted through generations.

CHAPTER 3

METHODS

Sample

Forty mothers and their children were recruited from the Challenge Program of the Torrance Center for Creativity and Talent Development, University of Georgia, during the two weeks of June 18-29, 2001. The Challenge Program offered summer sessions for children aged 4-13 years (Pre-K to 8th grade). Families chose to send children to the program for one (first or second) or both sessions. Although scholarships were available through the Torrance Center, most parents paid $90/half day/one week or $160/full day/one week. This means that the sample of parents was middle to upper class in economic status. Often, parents who registered their children were associated with or have worked with the Torrance Center prior to the summer program, were familiar with the beliefs of the Center, and subscribed to them. Parent involvement in the Center indicates that creativity was valued in the families that participate. Teachers, who were in contact with the children during the program, were recruited to complete a Teacher questionnaire for each child.

Parents responded to demographic information in the Parent Perceptions Questionnaire created by the author. Thirty three (33) parents and their 44 children were included in the sample. There were 30 mothers and 3 fathers. Parents' age ranged from 30-58, with one guardian grandmother at 74. Most of the parents (39) were white. The majority of parents had completed college and/or grad school. There was no correlation between parent response and parental education, $r = -.065$, n.s. Forty four (44) children participated. A more detailed

description of the sample of children can be seen in Table 1. The children ranged in age from 5-12, with an average age of 7.4. All but one of the children was biologically related to the participating parents. Many siblings were included. Both genders were well represented in the children. There was no difference in parental responses according to age or gender of the children. About a third of the parents believed that their children had previously taken the TTCT. There was no difference in parent responses between children who had previous exposure to the TTCT and those who had not.

Measures

Torrance Test of Creative Thinking: Figural TTCT, Form A

Parents and children completed the Torrance Test for Creative Thinking (TTCT) to determine their creativity levels. The TTCT was chosen because it is so well known. It is a popular test of creativity used in schools all over the state of Georgia and across the country. Georgia uses the TTCT as one of four criteria for the gifted and talented programs. The TTCT was developed at the University of Georgia by E. Paul Torrance, and is maintained through the Torrance Center for Creativity and Talent Development in the College of Education. The test was administered in the Challenge Program of the Torrance Center, a creativity summer camp program offered for the Athens community. The Torrance Center graciously provided the TTCT booklets and scoring forms, which helped guarantee the success of this project.

The TTCT is an unusual test where participants draw on and/or around provided figures or lines. Each participant receives his/her own test booklet. The TTCT uses three exercises with pictures to assess five characteristics: fluency, originality, elaboration, abstractness of titles, and resistance to premature closure (Torrance, Ball, & Safter, 1992). Fluency is the count of the relevant ideas created. The directions for each section of the TTCT direct the participant towards

creating as many ideas as possible and then to go back to add details to support the stories (Torrance et al., 1992). Originality is the novelty or usual quality found in the ideas. The directions for each of the three sections in the TTCT include statements that promote original creative thinking, such as "try to think of a picture that no one else will think of" (Torrance et al., 1992, p.2). Elaboration, an attention to detail added to further the idea, is supported in directions such as "keep adding new ideas to your first idea to make it tell as interesting a story as you can" (Torrance et al., 1992, p.2). Abstractness of title refers to the creativity of titles, explaining the idea in words. Titles for each picture are requested. Titles are a way for people who are not as confident in drawing to succeed. Participants are directed to "make your title as clever and unusual as possible. Use it to tell your story" (Torrance et al., 1992, p.2). Resistance to premature closure is the ability to not close off a shape, to not take the easy route of completing an idea or provided figure in an obvious way. Directions support thinking of something that no one has thought of and putting as much detail to further the story for each idea; these support resistance to premature closure.

Fluency, generating as many ideas as possible, is seen and scored in sections two and three (Torrance et al., 1992). Fluency is an essential part of creativity, according to Torrance. Fluency is considered to be a powerful motivator of the TTCT; without fluency, the other subscales are not well represented and can not be observed as clearly in amount, power, and scope in their own defined properties, and therefore, each subscale score is lower, lowering the total score (Torrance et al., 1992). Fluency is scored first and other subscales follow (Torrance et al., 1992); a person who does not score well in fluency will automatically score lower in the other sections, even if they are filled with elaborate detail and original ideas.

There are two forms or versions of the TTCT, form A and B. Figural Form A was used for all participants in this study. Form A differs from Form B in the shape types provided; differing forms of the TTCT can be used for pre- and post-tests (Torrance et al., 1992). On the first section of the TTCT, one figure, a large, black, kidney bean shape, is provided. The directions say to draw around the shape to make an unusual picture and add a title. The second section is a set of incomplete lined figures, provided for the participant to draw around and title each. An example of a lined figure is a spiral line floating in the middle of a box. The third section has many sets of two short, vertical, parallel lines for the participant to use to express as many ideas as possible, titling each.

The author of the TTCT created the test with the knowledge that creativity is difficult to define succinctly (Torrance et al., 1992). Creativity is known to overlap with constructs such as divergent thinking, productivity, invention, imagination, intelligence, a variety of personality variables, and problem solving techniques (Torrance et al., 1992). The author maintained that this type of test, although unconventional, will provide the best measure of the components of creative behavior and therefore creativity. The Torrance Test is used with people from kindergarten age through adult ages. This measure has been found to be both reliable and valid for adults (Torrance et al., 1992; Clapham, 1998; Glover, 1976). In fact, the scores obtained during high school years correlate about .51 with adult scores, seen in a longitudinal study of twelve years (Torrance et al., 1992). Some adults may not be involved in creative professions or activities in their adult lives; therefore, the results of the adult TTCT may be more random due to unfamiliarity and discomfort with the TTCT format (Torrance et al., 1992). The raw data of adult parents, older than high school age, were standardized according to national norms as age

18, due to the stability of creativity through time. As with any study of young children, this measure has not been found to be as reliable for children as for adults (Torrance et al., 1992).

Scoring of the Figural TTCT is a streamlined procedure producing standardized scores for characteristics (Torrance et al., 1992). Scoring must be done by trained, certified persons, promoting interrater reliability. Each of the five subscales is scored individually, starting with fluency, and then creative strengths are considered. Creative strengths include storytelling skills, expression of emotion, synthesis of lines or circles and incomplete figures, novel thought, extension of boundaries, imagination, fantasy, and humor. Subscale scores and final scores are standardized according to the national average by age of the participant. National averages are found in a scoring manual, kept by trained scorers of the TTCT. For this study, a scorer, who scores many tests for Athens-Clarke County schools, was hired to score the TTCT tests. The reliabilities for the TTCT range from .89 to .93 for people aged 5 years old and above.

Parental Perception Questionnaire

The Parental Perception questionnaire was developed by the author (see Appendix B). Parents with multiple participating children were given one questionnaire per child. Parents were asked to think of and to identify one particular child when answering each questionnaire. Categories of questions were used to address the parent perceptions of creativity of their child, themselves and their home. The categories are as follows: creativity in the home environment, the parent's perception of child talent, the parent's perception of the child's mental and behavioral potential for creativity, the parent's perception of own talent, the parent's perception of own mental and behavioral potential for creativity, the parent's perception of rules and child obedience, and parent demographics.

Home Environment

The section on home environment contained questions of what parents think about when buying toys and books for their child. Parents were asked if they thought of properties of creativity (such as visual stimulation, beauty, and problem solving skills), constructs related to creativity (such as intelligence, school improvement and what is appropriate for girls or boys-androgyny), and creativity in general when they purchase toys and books. This section was designed to learn whether parents thought about creativity while maintaining their home environment. It has been suggested by researchers that environments rich with stimulation enhance creativity (Bloom, 1985; Torrance, 1988; Torrance & Safter, 1999; Wright & Wright, 1986). Books and toys, in this study, act as measures of enrichment of the child's physical environment. In addition, this section was designed to see if parents promote creativity in the child's environment. Parents who value creativity may produce a creative environment. Each question included responses ranging from 1 (never) to 4 (almost always). Parents were asked to report whether they thought their children were provided with variety of toys and books and if they read to each child. These questions were responded to with a check mark if the parents agreed.

The Parent Perceptions Questionnaire was factor analyzed to learn which items were most effective for measuring each of these constructs. Factor analysis for this measure can be seen in Appendix B. Because different response metrics were used for different sets of questions, all items were standardized before any analyses were conducted. Cronbach's alphas were used to estimate reliability of these subscales. For all subscales the higher the score, the greater the property being measured. Home environment subscales, created through factor analysis, that were used in this study included: toys in the home and books in the home (see

Table B1). The toys in the home subscale included questions regarding toys that pertained to social experiences, problem solving, visual stimulation, and creativity (see Table B2). The books in the home subscale pertained to questions about books bought by parents to encourage problem solving skills, visual stimulation, and beauty (see Table B3). Reliability for books in the home was .7609 and for toys in the home was .7186.

Talent

The author agrees with the theorists who maintain that talent and creativity are related but different constructs (Aristotle, 310?BC/1988; Bloom, 1985; Maslow, 1968/1988). Creativity refers to the way the person thinks, manipulating gathered material and knowledge to recombine to something new. Talent is the ability or skill to perform at a specific domain or field of expertise. Talent and creativity overlap in that often to be creative at a domain a certain amount of talent is necessary. It is helpful to be adept at the tools of the domain, or to be talented in that domain, in order to create within the field. However, to be talented in a domain, creativity is not necessary. An example of this is when someone is very talented at playing the piano, but is unable to improvise or to create his own music. Talent was assessed with questions for the parents about their children and themselves. In the section designated for parent perceptions of child talent, parents were asked if their child was talented at a number of activities, including art, music, sports, dance, science, theater and building things. These questions were designed to see if a child was talented in specific domains of creativity, including the visual, motor/physical, expressive, and intellectual arenas. Responses to these were made on a scale of 1 (not at all) to 3 (very). Factor analyses for parent reports of child and parent talent were illogical, and so were not used.

Mental and Behavioral Potential

Mental and Behavioral Potential refers, in this study, to the everyday creativity, or potential for creativity in everyone. The TTCT has been critiqued as leaning towards visual creativity; Torrance et al., (1992) responded that participants were encouraged to title their drawings, so as to add the verbal component. The parent perceptions questionnaire was designed to survey other components of creative thought and activity. In this way, a well-rounded view of creativity could be gained.

The section of questions on parent's perceptions of child mental and behavioral potential for creativity contained questions that targeted thought patterns, actions, and general ways of behaving creatively or with the potential for creativity. These questions pertain to constructs that have been found to be related in differing ways to those people who are creative, in their personal expression, thoughts, and relationships with others, themselves, and outside stimuli. Parents were asked about their perceptions of the child's emotionality, friendliness, introversion, adaptability, multitasking and openness to new experience in order to assess some personality characteristics associated with creative people (Feist, 1999; Gardner & Moran, 1990; Rogers, 1954/1988; Torrance & Safter, 1989) Gardner (1982, 1988) stated that there are a variety of domains in which creativity can thrive, including those based in multiple intelligences, such as intrapersonal skills of feeling within the body and emotional states, interpersonal relationships with others people, as well as the visual and audio arenas. To assess the multitude of creative arenas mentioned by Gardner, questions were included about the parent's perception of the child's introspection (self reflection) or personal emotional awareness, emotional expression, sensitivity to physical stimuli, which are all related to creativity (Cytowic, 1996/1997; Kubie, 1958/1988; Piechowski, 1979). A short section included questions about family outings, such as

trips to movies, the theater, and libraries, to ascertain the family's and child's support for new, stimulating experiences. Parents were asked directly if their child was creative and how important was it for that child to be creative. These questions were paired to obtain a parental value of creativity. All questions in this section included responses of 1 (not at all) to 3 (very).

Factor analysis was used to find out which items were most useful for measuring child potential for creativity (see Table B5). Subscales created for child potential include: synergy, experiential learning, personal, active/social, openness, and introversion (see Table B1). The questions in synergy asked if the child likes problem solving, puzzles, and if he/she asks questions. Questions in experiential learning were about the child's likes for art, music, and/or theater, museums and zoos, trying new things, and if the child likes to learn. Questions in the personal subscale were about the child's awareness of his/her own feelings, the feelings of others, and if he/she expresses empathy. The active/social subscale was regarding activity and social ability, asking if the child does many different things at once, make friends easily (reversed in scoring), and thinks deeply a lot. The openness subscale was about openness to experience through liking to experience new things and trying new foods. The introversion subscale contained questions about tendencies for social withdrawal, including: if things get stressful, the child looks for family (reversed); this child does not like to be touched; and when this child is scared or worried, he/she wants to be alone. Each of these subscales, created through factor analysis, were targeting personality characteristics related, or not, to creativity. Reliabilities for the subscales are as follows: synergy was .6534; experiential learning was .5834; personal was .6987; active/social was -.7140; openness was .5722; and introversion was .4780.

Sections of the questionnaire designed for parental perceptions of their own mental and behavioral potential were repetitive of the sections on their perceptions of their child. All

questions were repeated in terms of the parents themselves to insure easy comparability of information. The similarity of question topic and wording provided familiarity and ease for parents answering the questions and were designed to be similar to questions about the child. All questions included responses similar to those in the child potential section.

Subscales for parent potential of creativity were found by using factor analysis (see Table B4). Parent subscales included openness and curiosity (see Table B1). Openness for the parents included questions regarding the parent's personal abilities (to express empathy, understand others points of view, and to be aware of their own feelings), and if parents ask questions and like to learn. Curiosity was made up of questions about trying new things, finding answers to problems, doing lots of different things at once, and making new friends easily. Reliability for openness was .8259 and for curiosity was .8200.

A short section on the parent's perception of rules and the importance of child obedience followed. This section was designed to see how rules in the family were made and how activities for the child were chosen: by the parents only, by the child only, or by mutual agreement. This section was to show the freedom allowed for each child to gain independence and for the boundaries set by the adults. The idea for this section came from thoughts on strict, controlling verses free families, open families and the levels of creativity of the children in each type. Families vary in levels of love and control; all family types result in creative children (for example, some escape harsh environments, others have more freedom to explore) (Bloom, 1985; Griffin and McDermott, 1998). Questions about rules and responsibility were designed to assess the mutual communication, understanding of support and control and the parental values of rules. Factor analysis on this section was illogical so this data was not used.

The last section of the parent perception questionnaire contained vital parent demographic questions. Questions of age, ethnicity, gender, and level of highest education attained were asked to see the variety in participating parents. Questions about the particular child's gender and relation to the parent, such as biological relation, adoption, or other, such as in step-families, were included. The biological relation between parent and child is important in this type of study in the case of intergenerational transmission. The last question of the questionnaire asked if the child had taken the TTCT before, as the Challenge program targeted gifted students who may have been exposed to the test previously.

Teacher Perception

Teachers were asked to answer a short questionnaire about the children they observed in their classes in the Torrance Center's Challenge Program. These questions are similar to those in the parent questionnaire, but are limited to teacher perceptions of talent and mental and behavioral potential for creativity. Again, these items were be submitted to factor analysis to learn which items were most effective (see Appendix C). Factor analysis of the Teacher Perception questionnaire can be seen in Table C1. Items were standardized before analysis. However, there were no logical results found in factor analysis of the Teacher questionnaires. This was probably due to the short duration of time and short exposure to each child. The Challenge Program is a short summer program of only a few weeks, and most children only attended for half time or one session. Due to this, teacher data were not used and hypothesis four was disregarded.

Procedure

Fliers informing parents of this study were sent to the families prior to the beginning of the Challenge Program. During first few days of the program, parents were recruited during

drop-off and pick-up times. Due to the half-day program available, parents were recruited in the morning, at noon and in the afternoon. Parents were asked to participate in a study that would help the Challenge Program advance family communication. Parents and children were tested in large groups with the timed Torrance Test of Creative Thinking during a scheduled break for lunch. Families were recruited and brought together into a classroom. Pencils were provided. Each family received an envelope with parent consent forms, child assent forms (for each child), a parent questionnaire (for each participating parent), and a TTCT booklet for each person over 5 years of age. The consent and assent forms can be seen in Appendix A.

It was explained to the group that the following activities were to help the Torrance Center and the Challenge Program and was for my thesis project, that it would take about a half hour to 45 minutes, and that it would be fun; if anyone wanted to stop or not to do any part, that would be fine, and that they will still get lunch and a poster for their help. Parents were asked to sign the parent consent form (to participate themselves). Parents were asked to sign a parental consent form for each child to participate. Each child was asked if he/she wanted to participate. Participating children were asked to sign the child assent form. Children who were not participating, due either to not wanting to participate or to being too young, were given crayons and paper for coloring and/or played with volunteer aides. Older children who did not want to participate were allowed to go have lunch in the cafeteria with their friends or to go back to class, according to the time and parent's wishes.

Each participant received his/her own test TTCT booklet. Directions for each section were read either to groups of families or to single families. The TTCT is a timed test; each section takes 10 minutes (Torrance et al., 1992). A timer was used. After the TTCT, parents were then asked to complete the Parental Perception Questionnaire while their children ate a

provided pizza lunch. Parents were encouraged to stay in the classroom while filling out the questionnaire, but if parents needed to leave, they were given a brown envelope with a label on it to be returned to Amanda Knapp as soon as possible. Most questionnaires were returned the next day. Parents also received lunch. Completed TTCT booklets and questionnaires were placed in envelopes that were sealed and collected by the volunteers. Parents and children were compensated for their time and efforts with pizza lunch and a poster of E. Paul Torrance's suggestions for enhancing creativity in children.

Teachers were asked to complete the Teacher Perception Questionnaire for each participating child with whom teachers were familiar. Teachers were recruited during each session of the program. Many children attended both sessions of the Challenge Program. The teachers of these children were given questionnaires at the end of the program, to take advantage of the greater amount of exposure to those children. Questionnaires, with each child's name, were passed out to appropriate teachers during the last days of each session to ensure the greatest time and familiarity with the children. Teachers were encouraged to complete the questionnaires while in the building, but they were allowed to take questionnaires home to complete if needed for adequate time. Teacher questionnaires were collected by the researcher at the end of the last week of the program. Teachers were also compensated with a provided pizza lunch and a Torrance poster.

Data Analysis

Data were analyzed to confirm acceptable variability of items to be used in the analyses. The Parent and Teacher Perception questionnaires were factor analyzed separately to determine whether the expected subscales could be found. Principle axis factor analysis was used with

varimax rotation. Use of these measures was determined by the results of the factor analyses and estimates of reliability.

Hypothesis one was tested with a paired sample t-test. Hypothesis two was tested by regressing the child's creativity score on the home environment score controlling for parent's creativity score. Hypothesis three was tested by correlating the mental and behavioral potential for parents and children.

CHAPTER 4

RESULTS

The purpose of this study was to explore the question of heritability of creativity by comparing parent creativity scores to their children's scores on the same measure. A measure of the home environment, parent report of their own creativity, and parent perceptions of their children's creativity were added to get a fuller picture of the relationship of parent and child creativity.

The relation between home environment and child's creativity, when the creativity of the parent was controlled, was examined in order to determine if the home environment provided by the parents was associated with the child's creativity. The self-reported creativity level of the parents was compared to the parent's report of their child's creativity. Finally, the teacher report of child creativity was compared to the self-reported parent creativity levels.

Variability for each measure, the Torrance Test of Creative Thinking and the Parent Perceptions questionnaire (developed for this study), was examined at the item level. Although all items were not normally distributed, there clearly was variability in the answers to each question. With this assurance, analyses of hypotheses proceeded.

The first hypothesis stated that there is no difference in the creativity of parent and child. Paired sample t-tests were calculated using parent and child subscale raw scores (i.e. fluency, originality, abstractness of title, etc.) and the subscale Standard Scores and Creativity Index Standard Scores, standardized to the national norms were run (Torrance et al., 1992). The Creativity Index Standard Score was used as the total creativity score. The results are shown in

Table 2. With one exception (fluency raw score), there was clearly a significant difference between parent and child creativity. However, it is informative to notice that less than 20% of variance was explained in any test. Although stable differences were found between parent and child scores, the differences were very small.

It was interesting to look at "local" (raw) results as well as the Standard Score results. There was no significant difference in Fluency raw scores, $t = 1.723$, $p = .092$. Fluency is defined as the creation of many ideas, and is considered important in scoring of the TTCT. This will be discussed further in later in this paper. In contrast to the raw score, the fluency Standard Score showed significant difference (see Table 2). This may be due to the standardization process of the raw score to the standard score.

The second hypothesis stated that there is no relation between the nature of the home environment and the child creativity, when the creativity level of the parent is controlled. The home environment scale consisted of the parent self-reported accounts of books in the home and toys in the home. Regression analysis was calculated using the child Creativity Index Standard Score as the dependent variable, the two home environment variables as predictors, and parent creativity Standard Score as a covariate. The results are shown in Table 3. The home environment, i.e. reports of books and toys, was not related to child creativity.

It is important to notice the variance represented in the analysis of parent and child creativity excluding the environment, $r = .387$, $R^2 = .150$, $p < .01$. This suggests that 15% of the child's creativity is due not to the environment, but is related to the parent creativity levels.

The third hypothesis stated that there is no relation between the mental and behavioral potential of the child and of the parent. Canonical correlation analysis was calculated on the subscales from the parental perceptions of their own creative potential subscales and their

children's creative potential subscales. Results were not significant, suggesting a similarity between parent reports of their own creative potential and that of their children. See Table 4 for results of this analysis.

The fourth and last hypothesis stated that there is no relation between the teacher's perception of the child's creativity and the self-reported perception of the parent's creativity. This hypothesis was not tested because teacher ratings were not found to be reliable or valid. Refer to Table C1 for results of the teacher data factor analysis. In the Torrance Summer program, teachers spent very little time with students so it was not surprising that their evaluations of students appeared random.

CHAPTER 5

DISCUSSION

In order to fully understand the focus of this study on creativity in the family, it would be helpful to first examine what I have concluded about creativity from the literature and this study. I believe that creativity is a cognitive process that manifests in a heightened state of productivity, awareness, and awe (Csikszentmihalyi, 1990; Maslow, 1968/1988) that may be due to a combination of personality characteristics, such as adaptability, openness to experience, a sense of adventure or risk-taking, and a freedom from social constraints (Feist, 1999; Rogers, 1954/1988; Torrance & Safter, 1999), and an appreciation for aesthetics (Kant, 1923/1988; Torrance & Safter, 1999). It is the ability to recognize and to be inspired by information, to use that inspiration to manipulate the information to answer a question or to see what the result of manipulation would be. The creative person is drawn to creative endeavors and people (Roe, 1963/1988). Creativity, to me, does not need to result in a product, as the creative process has as products health (Aristotle, 310?BC/1988; Kubie, 1958/1988), spontaneity, self-esteem, and/or self-expression for the individual (Root-Bernstein & Root-Bernstein, 1999; Sternberg, 1988; Ward, Smith & Fink, 1999). Sometimes creation happens just by asking "what would happen if…" with no real motivation besides curiosity or self-actualization (Maslow, 1968, 1988). The concept of flow (Csikszentmihalyi, 1990) or B-cognition (Maslow, 1968/1988) intrigues me from a scientific point of view, as the "flow" of brain activity and circulation of healthy body chemicals and hormones aides in the coping processes and in general life adaptability. From a mystical point of view, flow interests me as the need to express, the loss of time, and the

spontaneous, productive ability during flow seem to be directed from some external locus of control in the cosmos (Barron, 1969/1988; Jung, 1923/1988; Plato, 340?BC/1988). I agree with Sternberg (2003) that creativity entails problem solving skills and mental management, related to coping and adaptation. But I believe that creativity is more than simple skilled problem solving, although I also agree that creative skills, resulting in a person appearing to be creative, can be learned to a certain extent. Creativity, to me, is different from but often incorporates talent (Kant, 1923/1988). I believe that creativity works like multiple intelligences (Gardner, 1982), in that it can be seen in one of a number of fields and in varying degrees. I agree with Guilford (1987), Rogers (1954/1988), and Ward et al. (1999) that everyone has some propensity for creativity, like intelligence is in everyone. I think that people recognize creativity in others, appreciate it, and desire it for themselves and their children; researchers need to be aware of this social desirability so as to account for measurement error (MacKinnon, 1965/1988). I also recognize that there are a variety of environments from which creativity can be fostered (see Bloom, 1985; Carson, et al., 1994; Griffin and McDermott, 1998; Koestner, Walker and Fichman, 1999; Torrance, 1988; Torrance & Safter, 1999; Wright & Wright, 1986). It would be interesting to further explore the commonalities and differences between possible environments (both negative and positive) from where creativity springs. It is impossible, however, to study each aspect of these assumptions about creativity in one thesis project, so I narrowed my interest to the intergenerational transmission of creativity.

The purpose of this study was to explore the intergenerational transmission of creativity by investigating the association of child creativity, parent creativity, and home environment. This study provides a step toward filling a gap in the literature regarding the heritability of creativity. The transmission of creativity has not been studied since Galton in 1869, when the

field of genetics was still in its infancy. The study of creativity in general has risen and declined according to social popularity, seen in ways of finding oneself or self actualization (Maslow, 1968, 1988; Moustakas, 1967). Today, especially with reconsideration of the role of creativity in intelligence tests and standardized college entry exams (Sternberg, 2003), creativity in the family may be considered more important than it has in the past. By exploring the nature of creativity and intergenerational transmission, the nurture of creativity must also be considered (Bronfrenbrenner, 1986, 1993; Plomin, et al., 1994). In other words, in order to fully understand the transmission of creativity, many factors, both environmental and genetic or physiological, need to be considered. This study included evidence of creativity in parents and children, as measured by the TTCT, and in parent perceptions of creativity in themselves and their children. The home environment was explored through parental report of the environment provided to the children through books and toys.

Many researchers have supported the theories regarding child creativity as fostered within the family (Bloom, 1985; Torrance, 1988; Torrance & Safter, 1999; Wright & Wright, 1986). The assumption that creativity can be fostered suggests that (a) there is some propensity for creativity within individual children to be fostered, and (b) the nature of stimulation in the environment has an influence on creativity. In this study, there is some evidence of similarity of creativity of parent and child. That is, there is shared variance between the child and parent creativity levels that appears to be independent of the environment. It appears, however, that the similarity is in only one subscale, the fluency raw score. Furthermore, the relation, or lack there of, between the respected and researched test of creativity, the TTCT, and the parent reports of the environment is interesting. These topics are discussed in further details in accordance to my findings.

Evidence of Heritability

This study was designed to address the question "Is creativity inherited?" Three potential factors that would foster creativity were included: the creativity level of both the child and the parent and evidence of concern for creativity in the home environment. It is important to see the relation between these three factors according to the literature on intergenerational transmission. The genetic influence from parent to child is highly complex, in terms of physical, psychological, and emotional traits. Plomin (2001) has found that no aspect of psychological traits has zero heritability. Values and beliefs, therefore, may also be genetically influenced. The environment may be influenced by genetics, so much so that it can be considered a phenotype (Plomin et al., 1994). This means that the choosing of the environment may be influenced by the genetic code (Plomin et al., 1994; Scarr & McCartney, 1983). In order to explore the heritability of creativity, the complicated relation between these factors must be examined by taking small, logical steps.

The relation between the creativity levels of the parent and the child was explored first. A similarity between parent and child creativity would have suggested hereditability. However, there were significant differences between the parent and child Creativity Index Standard Scores (considered the total creativity scores). The only aspect of creativity that was not different between parent and child was fluency, which will be discussed later.

The next step was to examine the association of child creativity and the home environment. Creativity in the environment was investigated by asking parents what sort of environment they chose for their children, specifically what kind of books and toys they provided for their children, and what the parents were thinking about when they chose those items. The thoughts of the parents about the items show their intent and values about creativity.

It is well established that the environment is influenced by both parental and child factors, including personalities, likes, and needs for control and compliance, etc. (Bronfrenbrenner, 1986, 1993; Csikszentmihalyi, 1990; MacKinnon, 1965/1988; Roe, 1963/1988). Likewise, the environment is created at least in part by the genetics of both the parents and the child (Scarr & McCartney, 1983). In this study, the only active influence included was the parent's. When looking at the results of the regression of the two indicators of home environment scores (Books and Toys) on child creativity with parent creativity held constant, two important findings were observed. One answers the question regarding the part played by the environment in the child's creativity and is discussed more later in this discussion. The other interesting point is that the shared variance of child creativity and the parent creativity excluding the environment was .15. This suggests that at least 15% of the child's creativity is due not to the environment but is related to the parent creativity levels. According to Plomin (2001), the variance explained by environmental influence is the variance not explained by genetics. By removing the variance for environmental influences, the remaining 15% can be considered to be due to family influence, or genetics. This suggests that the child's creativity is at least 15% inherited. This is interesting when considering the amount of heritability observed in general and with specific constructs. Plomin (2000, 2001) found only 50% genotypic similarity between siblings living in shared environments. Likewise, only about 50% of any given personality trait can be attributed to genes (Plomin & Caspi, 1998). Bearing in mind that creativity is considered by some to be a specific combination of personality characteristics seen in the creative individual (Feist, 1999; Guilford, 1987; Kant, 1923/1988; Maslow, 1968/1988; Rogers, 1954/1988; Sternberg, 1988; Torrance & Safter, 1999) it is interesting to see that 15% of creativity might be inherited. In this study, mostly only mothers were tested; only 3 fathers were included. This points to the 15% being due

to the one parent represented in the study. Transmission happens from both sides of the family, from both parents. Considering this, further research including both parents would be especially enlightening to the intergenerational transmission of creativity. This study, even with limited sample, proves that more exploration is necessary.

Fluency

The possible heritability of fluency is important for many reasons. Fluency, generating many ideas, is considered first in the scoring of the TTCT and all of the other subscales, such as originality, resistance to premature closure and the others, are scored in accordance to the amount of fluency. The other subscales are dependent on fluency, as the more ideas seen provide more examples of the other subscales (Torrance et al., 1992). The greater the number of examples of creative thought, the better the chance that the other components would be witnessed. This means that someone who does not score well in fluency will automatically score lower in the other components, even if they are filled with elaborate detail and original ideas. Because fluency has the most power of the subscales, it is important to notice the similarity in parent and child fluency as it may be a sign of greater heritability. This is especially relevant in this small, relatively homogeneous sample. According to Plomin et al. (1994), intergenerational transmission is more easily found and more powerful in larger sample sizes. It is exciting that some evidence of transmission is suggested by the data.

In contrast to the raw scores for fluency, there is no similarity in the standard scores. These scores are created by applying to national standards accepted by Torrance, Ball, and Safter, (1992). This may be explained by the standardization process, which compares the scores from a given sample to those of similar age group across the country. A subtle result such as one accounting for only 15% of the variance may be lost in such a reconfiguration. Likewise,

consideration of the national sample in which the scores are standardized is important. The children, especially, who are tested with the TTCT are considered to be creative or gifted in some way. These children are being tested in order to be allowed into a gifted program in school. The average child does not take the TTCT unless there is special request. This means that the national sample is rather homogeneous, probably naturally scoring higher than the average population.

It would be interesting to take a closer look into the construct of fluency. It seems that fluency is important in terms of intergenerational transmission in that it is a way of thinking, resulting in the generation of many ideas. It seems to be a cognitive process not entirely dependent on experience, in possible contrast to elaboration and originality. It does not seem to be socially driven, as resistance to premature closure might be. It seems to be a similar thought process to creating a title, or abstractness of title, which is either a singular task related to the picture drawn or is the driving force behind the numerous ideas (someone not used to drawing may think first in words and stories and then attempt to draw them, according to Torrance, Ball and Safter, 1992). When considering creativity to be a mental process, the evidence pointing towards similarities in thought processes within families produces new questions. If brain structure, personality, and creativity are somewhat inherited, would not it be interesting to find that the internal cognitive processes, including fluency, are also passed down through generations. Further research is needed to answer such questions. Perhaps a variety of creativity measures would help to tease out the basic functions that are at work here.

The parent perceptions questionnaire was meant to measure some of the aspects of creativity that are not necessarily specified in the TTCT. The parental perceptions of their children's creative potential, as seen in ability and propensity towards creative activities, and in

talent in both creative arenas and those related to creative personalities, such as multitasking, introversion, and androgyny, were seemingly unrelated to the parent creative potential. Recall that parent reports of child creativity included their perceptions of child talent and creative potential or aptitude towards creative activities and thought processes. The lack of significant results was not surprising because those who enroll children in the Torrance Center summer program may have responded according to what they thought would be the "right" response. Further research on the parent perception of child creativity and of their own creativity would be interesting in terms of parental value and its influence on the child and the family environment. In addition, further exploration of the home environment, both physical and psychological, will be interesting. This project was limited to parent report of the books and toys bought by the parents. The environment includes more than just books and toys, however. The physical environment should be considered more globally, including the home itself, the neighborhood, the child's physical space and safety. Likewise, the environment includes more than the physical possessions; it includes the psychological environment as well. The psychological environment includes the interactions between the family members, the love and control. Investigations of home environment may be more successful if they include both positive and negative indicators, for example, positive forms, such as problem solving ability, and a sense of wonder and freedom as well as the traditionally, socially undesirable characteristics of creativity such as rebellion and non-conformity. These may assess the notion of an ideal environment for fostering creativity and the practices necessary for parents to achieve that environment.

Questioning the Creative Home Environment

The concept of intergenerational transmission of creativity includes both the genetic and the environmental components. The lack of a relationship between the home environment scores

from parent self-report and the scores from the parent and child TTCT is interesting to consider in terms of the big picture: what are we talking about and what do we hope to find? Theorists assume that physical environments with safety and a rich availability of manipulatives will foster creativity in children (Bloom, 1985; Csikszentmihalyi, 1990; Nickerson, 1999; Torrance & Safter, 1999). In this study, the toys and books provided to the children seemed to make no difference in the creativity of the child. This calls for further research on the materials provided and the affects on children. It is possible that too much provided stimulation may inhibit creativity in some children, who rather would benefit from using their own imaginations.

Many theorists believe that there is a best, psychological environment for fostering creativity, one with nurturance, support, and freedom to explore (Bloom, 1985; Torrance, 1988; Torrance & Safter, 1999; Wright & Wright, 1986). One might add that a value of creativity within the family is also important. It is assumed by the author that the parents involved in the study and in the Challenge Program of the Torrance Center for Creativity and Talent Development were interested in fostering their children's strengths, intelligences and creativity. However, no relationships between the environment and the resulting child creativity were found. In reviewing the literature on the creative environment, a bias toward the theory of a positive environment seems prevalent. Other researchers have found that negative environments also play an influential role in fostering creativity (Griffin and McDermott, 1998; Guilford, 1987; Koestner, Walker and Fichman, 1999). However, only the very positive environments are portrayed to the public as been successful in fostering creativity.

Little is mentioned on the positives, such as resilience, rebellion, etc., of coming from a more controlling, authoritarian family environment. Likewise, little is said about the drawbacks of providing an over-nurturant environment, providing too much information and not allowing

for the child to find, explore, use imagination, or create alone. Goble, Moran, and Bomba (1991) found that too much maternal aide in problem solving does not allow for much child creativity but trains the child to think like the mother. This begs the question of fostering conformity instead of creativity. Guilford (1987) suggested that the child may conform to the family's ideals, evident in lack of unacceptable behavior, which can be considered novel to the family and society and therefore creative.

In the literature of creativity, little is said about the goodness of fit of parent and child needs in terms of the ideal creative environment. It is possible that the nurturance and freedom to explore will not be beneficial for every child. The results of this study, being so inconclusive, may be proof of this, in that many parents professed a support for creativity and showed values for creativity by participating in the summer program, but their home environment scores did not seem to affect the child creativity. The inconclusiveness of my data opens an opportunity for future research questions regarding other possible variables that create the environment, including a degree of parental control in rule and decision making (an attempt at decision making was also made in this study, but results were also inconclusive).

Further research opportunities suggested by the results of this study include more exploration of the ideal environment (if any) for fostering creativity, the testing of subscales of creativity in terms of heritability, and the intergenerational transmission of creativity. It would be interesting to combine the TTCT and measures of psychological or cognitive creativity, the potential for creativity, and personality variables, in order to search out the depth of creativity in form and function. This project points to future study on the complexity of the environment, including both the physical and psychological. Measurement of the total environment by researchers, who actually visit the home and spend time with the family, observing interactions,

would be fascinating, enriching the study of how creativity and the environment are related, and how creativity is fostered in children. Lastly, future research on the intergenerational transmission of creativity should adhere as much as possible to the recent challenges to old assumptions. Future studies should include as many family members as possible, including both parents, siblings, extended family, and family added through divorces and remarriages. It would be helpful to have a wide variety (and greater number) of people included in the sample. The topic of intergenerational transmission of creativity is neglected in the literature, but with the recent call for study of all aspects of creativity by Sternberg (2003), this may soon change, adding to and enriching the field and answering many questions that were impossible to tackle in all at once in this project.

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Table 1 - Sample of Children

	N	Mean	Valid %
Age	44	7.4	
5-12			
Sex			
Male	22	.50	50
Female	22	.50	50
Ethnicity			
White	39		88.6
African- Amer	2		4.5
Other	3		6.9
Family Relation			
Biological	43		97.7
Adopted	1		2.3
Taken TTCT Prior			
No	31		70.5
Yes	13		29.5

Table 2

Results of Paired Sample T-Test for Parent and Child TTCT

Pair	Standard Score* Mean	Standard Score Std. Deviation	Standard Score t	Standard Score p	Standard Score Variance	Raw Score Mean	Raw Score Std. Deviation	Raw Score t	Raw Score p	Raw Score Variance
PT Flue- CT-Flue	109.98 97.80	20.79 16.66	3.651	.001	.1005	22.25 20.11	7.54 6.72	1.723	**.092**	.1156
PT Orig- CT Orig	118.07 98.66	23.88 18.97	5.331	.000	.1467	19.00 13.61	7.21 5.69	5.187	.000	.2025
PT Elab- CT Elab	88.50 76.09	26.69 17.19	3.315	.002	.1884	6.18 4.14	3.02 1.69	4.798	.000	.1529
PT AOT- CT AOT	98.27 87.89	26.57 23.34	2.517	.016	.1632	9.98 5.39	5.58 2.96	5.872	.000	.1560
PT RPC- CT RPC	114.34 99.73	17.62 18.16	4.314	.000	.0449	14.86 12.57	3.27 3.85	3.523	.001	.0740
PT Creativity Index Score- CT Creativity Index Score	115.23 98.52	18.20 13.39	6.175	.000	.1498					

* Standard Scores are all standardized to Torrance National Norms, according to age group. These are not Z-scores.

Table 3

Results of Regression of Two Home Environment Scores (Books and Toys) on Child Creativity with Parent Creativity Held Constant

Variables	Pearson r	Beta	R^2	R^2_{adj}
Control Variable				
Parent Creativity Index Standard Score (Zscore)	.387	.389	.150*	.129
Predictors				
Toys in the Home	-.048	.043		
Books in the Home	-.120	-.097	.159	.095

* $p < .01$

Table 4

Canonical Correlation of Child Potential and Parent Potential

Variables	Canonical Coefficients*	Function 1
Child		
Synergy (Synergy)	.312	
Experiential Learning (Experlrn)	.568	
Personal (Personal)	-.177	
Active-Social (Actsoc)	-.482	
Openness to Experience (Copenne)	-.108	
Introversion (Introvrt)	.759	
Parent		
Curiosity (Pcuriou)	-.997	
Openness (Popenne)	-.008	
Canonical Correlation		.661
Wilks		.5278
p		.017

*Standardized Canonical Coefficients

APPENDIX A

CONSENT AND ASSENT FORMS

Calling all Families!!! Calling all Families!!!

Please respond at the corner of Alps and Beechwood, during the Challenge Program, June 18th-29th !! You are needed to participate in a very special research project!

Come have lunch with your children and receive a poster!

Amanda Knapp is doing a research project with the families involved in the Challenge Program! Her research will help us think about what we encourage children to do. The results of her study will be very useful to our program and even to you as parents. Based on her research, she will provide information to you periodically that will assist you in knowing about opportunities in the community along with suggestions for home activities.

Lunch will be provided to all families who participate! And, in addition to the information you will receive from Amanda, you will receive a FREE poster, showing E. Paul Torrance's Manifesto of Creativity. In this poster, you and your children will have a whimsical reminder of your summer with the Challenge Program, and some great ideas about how to keep creativity in your everyday life!

Amanda and the staff of the Challenge Program will be welcoming you when you drop off and pick up your children! If you would like to participate, and receive your free poster and continuing information, please let them know! Amanda looks forward to meeting you and having you "play" for a while! Come take a well-deserved break and help out a graduate student with her research!

Thank you for thinking about this project. Of course, you are not required to participate. If you do not have time, or just do not want to, that's fine! You and your child will not be pressured in any way. Amanda will not be offended. See you soon!
Enjoy your summer!

Consent Form (for Parents)

I agree to take part in a study of creativity, called "Intergenerational Transmission of Creativity," that is being conducted by Amanda Knapp, Department of Child and Family Development, 542-7018. I do not have to take part in this study; I can stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to me returned to me, removed from the research records, or destroyed.

The reason for this study is to investigate processes associated with creativity.

The benefits from this study include a free poster for my family, describing how we can enhance our lives every day with creativity, and the satisfaction of knowing that we have helped advance knowledge about families and creativity.

If I participate in this study, I will be asked to fill out a measure of creativity, the Torrance Test of Creative Thinking, created by E. Paul Torrance, and a Parent Questionnaire about my thoughts about my own creativity and the creativity of my child. The Torrance Test of Creative Thinking will take about 45 minutes to complete. The Parent Questionnaire will take about 10 minutes.

No stress or discomfort, either physical or psychological is expected with the involvement in this study. No risks are expected. No deception has been used at any time during this study.

According to plans to match my results with those of my family members and my child's teacher, my results will be identifiable. Thus, the data will be held confidential, but not anonymous. At no time will my individual results be made public. The only people who will know that I am a research participant are members of the research team. No information about me or my family will be shared with others without my written permission, or as required by law.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: (706) 542-7018.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form to keep for my records.

_____ _____

Signature of Researcher Date

_____ _____

Signature of Participant Date

_____

Printed Participant's Name

For questions or problems about your rights please call of write: Chris A. Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

Parental Consent Form (for Child)

I agree to allow my child _____ to take part in a study of creativity, called "Intergenerational Transmission of Creativity," that is being conducted by Amanda Knapp, Department of Child and Family Development, 542-7018. My child does not have to take part in this study; but can stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to my child returned to me, removed from the research records, or destroyed.

The reason for this study is to investigate processes associated with creativity.

The benefits from this study include a free poster for my family, describing how we can enhance our lives every day with creativity, and the satisfaction of knowing that we have helped advance knowledge about families and creativity.

If my child participates in this study, he/she will be asked to complete the Torrance Test of Creative Thinking, created by E. Paul Torrance. It will take about 30 minutes.

Teachers in the Challenge Program will also provide information about my child's activities during this program.

No stress or discomfort, either physical or psychological is expected with the involvement in this study. No risks are expected. No deception has been used at any time during this study.

According to plans to match my child's results with mine and my child's teachers, my child's results will be identifiable. Thus, data will be held confidential, but not anonymous. At no time will my child's individual results be made public. The only people who will know that my child is a research participant are members of the research team. No information about me or my family will be shared with others without my written permission, or as required by law.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: (706) 542-7018.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form to keep for my records.

_____ _____

Signature of Researcher Date

_____ _____

Signature of Parent or Guardian Date

For questions or problems about your rights please call of write: Chris A. Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

Documentation of Assent for Child

My name is _____.

Today's date is _____.

I will sit and draw pictures for Amanda Knapp's project.

My parents have said it is all right for me to do this. My parents will get a copy of this form.

If I do not want to keep doing this, then I can stop at any time, with no questions asked. I will be able to sit quietly by myself or go back to my classroom.

My family will get a free poster all about creativity! This poster will remind me of the fun times I had at the Challenge Program this summer and will remind me how to be creative every day.

By putting my name at the top of this page, I am saying that I will participate in this project.

Consent for Teacher Form

I agree to take part in a study of creativity, called "Intergenerational Transmission of Creativity," that is being conducted by Amanda Knapp, Department of Child and Family Development, 542-7018. I do not have to take part in this study; I can stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to me returned to me, removed from the research records, or destroyed.

The reason for this study is to investigate processes associated with creativity.

The benefits from this study will not effect me directly but will advance the literature about creativity.

If I participate in this study, I will be asked to fill out a Teacher Questionnaire about my thoughts about the creativity levels of children which I have observed in the Challenge Program. The Teachers Questionnaire will take about 10 minutes per child.

No stress or discomfort, either physical or psychological is expected with the involvement in this study. No risks are expected. No deception has been used at any time during this study.

According to plans to match my results with those of the family members, my results will be identifiable. Thus, the data will be held confidential, but not anonymous. At no time will my individual results be made public. The only people who will know that I am a research participant are members of the research team. No information about me will be shared with others without my written permission, or as required by law.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: (706) 542-7018.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form to keep for my records.

_____ _____

Signature of Researcher Date

_____ _____

Signature of Participant Date

_____

Printed Participant's Name

For questions or problems about your rights please call of write: Chris A. Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

APPENDIX B

PARENT PERCEPTION QUESTIONNAIRE:

MEASURE AND FACTOR ANALYSES

Parent Perceptions

I am interested in your perceptions of you and your child's activities and preferences. Please answer the following questions -- feel free to write in the margins or on the back of the page if I have missed something that is important to you.

When answering these questions, I will be thinking about Name of Child _____

How much do you think about the following issues when you **buy toys** for this child? *(please circle your answer)*

Creativity	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Intelligence	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Social experiences	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Problem solving skills	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Visual stimulation	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Beauty	NEVER	RARELY	OFTEN	ALMOST ALWAYS
School improvement	NEVER	RARELY	OFTEN	ALMOST ALWAYS
What is appropriate for girls or boys	NEVER	RARELY	OFTEN	ALMOST ALWAYS

How much do you think about the following issues when you **buy books** for this child? *(please circle your answer)*

Creativity	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Intelligence	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Social experiences	NEVER	RARELY	OFTEN,	ALMOST ALWAYS
Problem solving skills	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Visual stimulation	NEVER	RARELY	OFTEN	ALMOST ALWAYS
Beauty	NEVER	RARELY	OFTEN	ALMOST AL WAYS
School improvement	NEVER	RARELY	OFTEN	ALMOST ALWAYS
What is appropriate for girls or boys	NEVER	RARELY	OFTEN	ALMOST ALWAYS

Please check all that apply to you and this child. . .

- My child has a wide variety of toys for my child to play with
- My child has many different kinds of books to read
- I read to this child

How **talented** is this child at the following things? *(Please circle your answer)*

Art	NOT AT ALL	AVERAGE	VERY
Science	NOT AT ALL	AVERAGE	VERY
Music	NOT AT ALL	AVERAGE	VERY
Dance	NOT AT ALL	AVERAGE	VERY

Sports	NOT AT ALL	AVERAGE	VERY
Drama or Theater	NOT AT ALL	AVERAGE	VERY
Building Things	NOT AT ALL	AVERAGE	VERY

To what extent do you think this child. .. *(please circle your answer)*

Is aware of his/her own feelings	NOT AT ALL	AVERAGE	VERY
Expresses empathy for others	NOT AT ALL	AVERAGE	VERY
Understands other points of view	NOT AT ALL	AVERAGE	VERY
Makes friends	NOT AT ALL	AVERAGE	VERY
Tries new things	NOT AT ALL	AVERAGE	VERY
Does lots of different things at one time	NOT AT ALL	AVERAGE	VERY
How creative is this child?	NOT AT ALL	AVERAGE	VERY
How important is it for this child to be creative?	NOT AT ALL	A LITTLE	VERY

How much do you believe the following are **true for this child?** *(Please circle your answer)*

Likes art, music and/or theater.	NOT AT ALL	AVERAGE	VERY
Likes to learn.	NOT AT ALL	AVERAGE	VERY
Likes to try new foods.	NOT AT ALL	AVERAGE	VERY
Asks questions.	NOT AT ALL	AVERAGE	VERY
Likes puzzles.	NOT AT ALL	AVERAGE	VERY
Likes to figure out the answers to problems.	NOT AT ALL	AVERAGE	VERY
Likes experiencing new things.	NOT AT ALL	AVERAGE	VERY

Enjoys museums and zoos.	NOT AT ALL	AVERAGE	VERY
Does not like to be touched.	NOT AT ALL	AVERAGE	VERY
When things get stressful, this child looks for friends and family.	NOT AT ALL	AVERAGE	VERY
When this child is scared or worried, he/she wants to be alone.	NOT AT ALL	AVERAGE	VERY
Thinks deeply a lot.	NOT AT ALL	AVERAGE	VERY

I take this child to the library.	NEVER	OCCASIONALLY	OFTEN
I take this child to the movies	NEVER	OCCASIONALLY	OFTEN
I take this child to the theater/concerts	NEVER	OCCASIONALLY	OFTEN
I think this child's school offers a wide variety of things for my child to do	NEVER	OCCASIONALLY	OFTEN

NOW, please answer just a few questions about yourself.

How **talented** are you at the following things? *(Please circle your answer)*

Art	NOT AT ALL	AVERAGE	VERY
Science	NOT AT ALL	AVERAGE	VERY
Music	NOT AT ALL	AVERAGE	VERY
Dance	NOT AT ALL	AVERAGE	VERY
Sports	NOT AT ALL	AVERAGE	VERY
Drama or Theater	NOT AT ALL	AVERAGE	VERY
Building Things	NOT AT ALL	AVERAGE	VERY

To what extent do you think you. . . *(please circle your answer)*

Are aware of your own feelings	NOT AT ALL	AVERAGE	VERY
Express empathy for others	NOT AT ALL	AVERAGE	VERY
Understand other points of view	NOT AT ALL	AVERAGE	VERY
Make friends	NOT AT ALL	AVERAGE	VERY
Try new things	NOT AT ALL	AVERAGE	VERY
Do lots of different things at one time	NOT AT ALL	AVERAGE	VERY

How creative do you consider yourself to be?	NOT AT ALL	AVERAGE	VERY
How creative do you think your daily work is?	NOT AT ALL	AVERAGE	VERY

How much do you believe the following are **true for** you? *(Please circle your answer)*

I like art, music and/or theater.	NOT AT ALL	AVERAGE	VERY
I like to learn.	NOT AT ALL	AVERAGE	VERY
I like experiencing new things.	NOT AT ALL	AVERAGE	VERY
I like puzzles.	NOT AT ALL	AVERAGE	VERY
I like to try new foods.	NOT AT ALL	AVERAGE	VERY
I like to figure out the answers to problems.	NOT AT ALL	AVERAGE	VERY
I ask questions.	NOT AT ALL	AVERAGE	VERY
I do not like to be touched.	NOT AT ALL	AVERAGE	VERY
When things get stressful, I look for friends and family.	NOT AT ALL	AVERAGE	VERY

When I am scared or worried, I want to be alone.

NOT AT ALL AVERAGE VERY

I think deeply a lot.

NOT AT ALL AVERAGE VERY

What do you think about these ideas..... ?

Do you think it is important for children to follow rules?

YES
SOMEWHAT
NO

Who should make rules for children

PARENTS
CHILDREN & PARENTS TOGETHER
CHILDREN

Who should choose activities for children?

PARENTS
CHILDREN & PARENTS TOGETHER
CHILDREN

Aside from issues like safety, health, and survival, how much do you want your children to depend on you?

NOT AT ALL
LITTLE QUITE
A BIT ALWAYS

One More

Very Important

Page

Finally, these questions are very important.

Please circle your answers.

What is your age?

16-20
21-25
26-35
36-45
46-55
56-65
66+

With what race/ethnic heritage do you identify most?

WHITE
AFRICAN-AMERICAN
ASIAN
AMERICAN INDIAN
HISPANIC
OTHER *(please specify)* _____

What is the highest level of education you have attained?

MIDDLE SCHOOL
HIGH SCHOOL
COLLEGE
GRADUATE SCHOOL

I am the

MOTHER

FATHER

The child I was thinking of while answering these questions is

Gender	Relation to you
FEMALE	ADOPTED
MALE	BIOLOGICAL
	OTHER

Do you know if your child has ever taken the Torrance Test of Creative Thinking? YES I think s/he has
NO I think *s/he* has not

Thank you for answering my questions!

If there is anything else you want to tell me, please do.

Table B1

Constructs and Subscales of the Parent Perception Questionnaire

Construct	Source	Items	Scoring
Home Environment			
Toys			
	Author	1,3,4,5	1=Never 2=Rarely 3=Often 4=Almost Always
Books			
	Author	12,13,14	1=Never 2=Rarely 3=Often 4=Almost Always
Parent Potential			
Openness	Author	58-60,67,72	1=Not At All 2=Average 3=Very
Curiosity	Author	61-63,71	
Child Potential			
Synergy	Author	38-40	1=Not At All 2=Average 3=Very
Experiential Learning	Author	31,35,36,42	
Personal	Author	27-29	
Active/Social	Author	30,32,46	
Openness	Author	37,41	
Introversion	Author	43,44*,45	

* Reversed in scoring

Table B2

Results of Principle Component Analysis for Home Environment- Toys

Item #	Item Text	Factor 1
pp1	How much do you think about the following issues when you BUY TOYS for this child? (Please circle your answer) Creativity	.602
pp3	How much do you think about the following issues when you BUY TOYS for this child? (Please circle your answer) Social experiences	.850
pp4	How much do you think about the following issues when you BUY TOYS for this child? (Please circle your answer) Problem solving skills	.701
pp5	How much do you think about the following issues when you BUY TOYS for this child? (Please circle your answer) Visual stimulation	.772
	h^2 =	54.298

KMO = .684
Bartlett's = .000

Table B3

Results of Principle Component Analysis for Home Environment- Books

Item #	Item Text	Factor 1
pp12	How much do you think about the following issues when you BUY BOOKS for this child? (Please circle your answer) Problem solving skills	.834
pp13	How much do you think about the following issues when you BUY BOOKS for this child? (Please circle your answer) Visual Stimulation	.875
pp14	How much do you think about the following issues when you BUY BOOKS for this child? (Please circle your answer) Beauty	.757
		h^2 = 67.788

KMO = .658
Bartlett's = .000

Table B4

Results of Principle Component Analysis for Parent Potential

Item #	Item Text	Factor 1	Factor 2
pp58	Aware of own feelings	**.666**	.187
pp59	Express empathy	**.836**	0
pp60	Understand other point of view	**.786**	.125
pp67	I like to learn	**.772**	0
pp72	I ask questions	**.726**	.180
pp61	Make friends	0	**.756**
pp62	Try new things	.125	**.865**
pp63	Do lots of different things	.260	**.695**
pp71	Figure answers to problems	.100	**.854**
	h^2 =	41.701	20.700

KMO = .763
Bartlett's = .000

Table B5
Results of Principle Component Analysis for Child Potential

Item #	Item Text	Factor 1	Factor 2	Factor 3	Factor 4
pp40	Likes to figure out the answers to problems	**.794**	-.165	-.254	-.206
pp42	Enjoys museums and zoos	**.689**	0	-.140	.403
pp39	Likes puzzles	**.675**	-.156	.200	-.258
pp46	Thinks deeply a lot	**.520**	.143	0	0
pp38	Asks questions	**.479**	.300	-.330	-.353
pp37	Likes to try new foods	-.149	**.813**	0	-.221
pp41	Likes experiencing new things	.146	**.791**	0	.167
pp44	When things get stressful, this child looks for friends and family	.125	0	**.798**	-.177
pp45	When this child is scared or worried, he/she wants to be alone	-.130	-.175	**.683**	.291
pp43	Does not like to be touched	0	.101	**.534**	0
pp35	Likes art, music, and/or theater	-.116	0	0	**.865**
pp36	Likes to learn	.465	.454	-.152	**.496**
	h^2 =	22.402	14.544	12.947	11.061

KMO = .524
Bartlett's = .001

APPENDIX C

TEACHER PERCEPTION QUESTIONNAIRE:

MEASURE AND FACTOR ANALYSIS

Teacher Perceptions

I am interested in your perceptions of children in the Challenge Program. The parent of the child whose name appears below has given permission for you to answer these questions. I realize that this is time consuming for you. Please accept my deep gratitude for your willingness to help.

Name of Child _____

Does this child seem to…*(please circle your answers)*

Enjoy art and music	NOT AT ALL	AVERAGE	VERY MUCH
Like sports or dance	NOT AT ALL	AVERAGE	VERY MUCH
Like theater or drama	NOT AT ALL	AVERAGE	VERY MUCH
Ask questions	NOT AT ALL	AVERAGE	VERY WELL
Problem solve	NOT AT ALL	AVERAGE	VERY WELL
Make friends easily	NOT AT ALL	AVERAGE	VERY WELL
Handle stress	NOT AT ALL	AVERAGE	VERY WELL
Have fun	NOT AT ALL	AVERAGE	VERY MUCH
Know what to learn	NOT AT ALL	AVERAGE	VERY WELL
Like to try new things	NOT AT ALL	. AVERAGE	VERY MUCH
To think deeply about things	NOT AT ALL	AVERAGE	VERY WELL
Make connections between unlike thoughts or concepts	NOT AT ALL	AVERAGE	VERY WELL

Please continue…

How **talented** is this child at the following things? *(please circle your answer)*

Art	NOT AT ALL	AVERAGE	VERY
Science	NOT AT ALL	AVERAGE	VERY
Music	NOT AT ALL	AVERAGE	VERY
Dance	NOT AT ALL	AVERAGE	VERY
Sports	NOT AT ALL	AVERAGE	VERY
Drama or Theater	NOT AT ALL	... AVERAGE	VERY
Building Things	NOT AT ALL	AVERAGE	VERY

To what extent do you think this child. .. *(please circle your answer)*

Is aware of his/her own feelings	NOT AT ALL	AVERAGE	VERY
Expresses empathy for others	NOT AT ALL	AVERAGE	VERY
Understands other points of view	NOT AT ALL	AVERAGE	VERY
Makes friends	NOT AT ALL	AVERAGE	VERY
Tries new things	NOT AT ALL	AVERAGE	VERY
Does lots of different things at one time	NOT AT ALL	AVERAGE	VERY

The Challenge Program promotes creativity in children.	NOT AT ALL	SOMEWHAT	VERY WELL

Thank You!

Table C1

Results for Principle Component Analysis of Teacher Perceptions

Item #	Item Text	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
T14	Does this child seem to… Make connections between unlike thoughts or concepts	**.893**	0	0	0	.105	.138	0	0
T13	Does this child seem to… To think deeply about things	**.807**	0	-.108	.338	0	-.161	.135	0
T7	Does this child seem to… Problem solve	**.696**	.133	.213	0	-.158	0	0	**.434**
T27	To what extent do you think this child… Does lots of different things at one time	**.694**	.295	0	-.230	.122	.332	.152	0
T16	How talented is this child at the following things? Science	**.666**	0	.360	0	0	0	-.297	.244
T26	To what extent do you think this child… Tries new things	**.645**	0	**.446**	0	0	.235	.298	-.101
T24	To what extent do you think this child… Understands other points of view	**.574**	.109	**.444**	**.447**	0	-.238	.125	.188
T11	Does this child seem to… Know what to learn	**.546**	-.159	.281	.212	**.473**	0	0	0
T12	Does this child seem to… Like to try new things	**.448**	0	.392	.356	0	.167	.365	-.341

Item #	Item Text	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
T4	Does this child seem to… Like sports or dance	0	**.847**	0	-.120	0	0	-.150	0
T20	How talented is this child at the following things? Drama or theater	0	**.830**	.131	.224	0	0	0	0
T18	How talented is this child at the following things? Dance	0	**.829**	0	.282	0	0	-.167	0
T5	Does this child seem to… Like theater or drama	0	**.734**	.237	.105	.242	-.283	.173	.204
T17	How talented is this child at the following things? Music	0	**.627**	0	**.573**	-.254	.131	0	0
T25	To what extent do you think this child… Makes friends	.240	0	**.820**	.323	0	0	0	-.156
T8	Does this child seem to… Make friends easily	.173	0	**.813**	.353	0	0	-.179	-.144
T10	Does this child seem to… Have fun	0	.288	**.799**	-.167	0	.168	.153	0
T9	Does this child seem to… Handle stress	.224	.186	**.521**	.275	-.216	0	**.424**	.165

Item #	Item Text	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
T23	To what extent to you think this child… Expresses empathy for others	.247	.199	.230	**.707**	.194	-.206	-.114	0
T3	Does this child seem to… Enjoy art and music	0	.373	.229	**.656**	0	0	0	.203
T15	How talented is this child at the following things? Art	0	0	.177	**.630**	0	.430	-.239	.397
T22	To what extent do you think this child… Is aware of his/her own feelings	**.541**	0	0	**.627**	.138	0	.220	-.232
T28	The Challenge Program promotes creativity in children	0	-.140	0	0	**.855**	.210	0	0
T6	Does this child seem to… Ask questions	0	.325	**.440**	-.147	**.563**	0	0	.342
T21	How talented is this child at the following things? Building things	0	0	.147	0	.100	**.785**	0	0
T19	How talented is this child at the following things? Sports	.175	.372	-.127	0	.304	**.547**	**-.462**	0
T2	How much non-class time have you spent with this child?	.187	-.176	0	0	.195	0	**.747**	0
T1	How much have you observed this child?	-.157	0	.166	0	0	0	0	**-.828**
	h^2 =	7.695	3.738	2.312	2.199	1.756	1.668	1.374	1.099

KMO = .435
Bartlett's = .000