

2007

An examination of the relationship between creative potential and personality types among American and Taiwanese college students of teacher education

Yiling Cheng

Follow this and additional works at: <http://commons.emich.edu/theses>



Part of the [Teacher Education and Professional Development Commons](#)

Recommended Citation

Cheng, Yiling, "An examination of the relationship between creative potential and personality types among American and Taiwanese college students of teacher education" (2007). *Master's Theses and Doctoral Dissertations*. 171.
<http://commons.emich.edu/theses/171>

This Open Access Thesis is brought to you for free and open access by the Master's Theses, and Doctoral Dissertations, and Graduate Capstone Projects at DigitalCommons@EMU. It has been accepted for inclusion in Master's Theses and Doctoral Dissertations by an authorized administrator of DigitalCommons@EMU. For more information, please contact lib-ir@emich.edu.

AN EXAMINATION OF THE RELATIONSHIP BETWEEN CREATIVE POTENTIAL
AND PERSONALITY TYPES AMONG AMERICAN AND TAIWANESE COLLEGE
STUDENTS OF TEACHER EDUCATION

by

Yiling Cheng

Thesis

Submitted to the Department of Teacher Education

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF ARTS

in

Educational Psychology

Thesis Committee:

Kyung Hee Kim, PhD, Chair

Alane Starko, PhD

Caroline Gould, MA

June 2007

Ypsilanti, Michigan

© 2007 Yiling Cheng All Rights Reserved

ACKNOWLEDGEMENTS

I would like to acknowledge the funding support from the graduate school at Eastern Michigan University.

I very much appreciate my advisor, Dr. Kyung Hee Kim. She is an excellent, devoted professor who is willing to help students do their best. Dr. Kim has guided me through my graduate study. Under her influence, I have recognized my goal. She has opened my eyes to see the knowledge that I can pursue and enlightened me to see what I can achieve. I am deeply indebted that I had the privilege to be taught by Dr. Kim at EMU.

I also want to thank my other committee members: Dr. Alane Starko and Professor Caroline Gould. Dr. Starko has given me enormously helpful comments about my thesis and helped me to be able to improve it continually. Professor Gould, who has been extremely supportive, guided me through my thesis work.

Special thanks to Dr. Hsiu-Lan Tien at the Department of Educational Psychology and Counseling at National Taiwan Normal University, who helped me collect the data from Taiwan. Special thanks to Patti Maihofer at EMU graduate school for revising my thesis. Without their generous help I could not finish my graduate study on time.

Lastly, I want to thank my family in Taiwan. Thank you for supporting me to study in

the USA. Thank you for patiently helping when I came up with an urgent situation during my thesis work. Thank you for always being there.

ABSTRACT

Previous research has studied the effects of personality on creativity. The present study examined the relationship between personality types and creativity. Creativity was measured by using the Torrance Test of Creative Thinking (TTCT)-Figural, whereas personality type was measured by using Keirsey Temperament Sorter II (KTS II). 57 Americans and 72 Taiwanese college students who specialize in teacher education participated in this study. Consistent with previous research, significant correlation coefficients between the Creativity Index of the TTCT and both the Intuitive ($p < .0001$) and Perceiving ($p = .029$) personality types of the KTS II were found. In addition, significant cultural differences in creativity ($p = .001$) and significant gender differences in personality types ($p = .008$) were found by multivariate analyses of variance.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	iii
ABSTRACT	v
LIST OF TABLES	viii
CHAPTER 1: INTRODUCTION	1
Justification	1
Purpose of the Study	3
CHAPTER 2: LITERATURE REVIEW	4
What is Creativity?	4
Who is Creative?.....	6
Where is Creativity?	10
Gender difference in Creativity.....	13
Personality in Psychoanalytic Perspective and Creativity	13
Creativity and Jung's Personality types	14
The Relationship between Creativity and Intuition (↔ Sensing).....	18
The Relationship between Creativity and Perceiving (↔ Judging).....	19
The Relationship between Creativity and Extrovert (↔ Introvert)	21
The Relationship between Creativity and Feeling (↔ Thinking).....	22

The MBTI and the Torrance Tests of Creative Thinking (TTCT)	23
Research Questions.....	24
CHAPTER 3: METHOD	25
Participants	25
Instruments.....	26
Procedures.....	28
Data analysis	29
CHAPTER 4: RESULTS	32
The Relationship between Creativity and Personality Types.....	32
Cultural and/or Gender Differences in Creativity.....	37
Cultural and/or Gender Differences in Personality Types	39
CHAPTER 5: DISCUSSION.....	42
The Relationship between Creativity and Personality Types.....	42
Cultural and/or Gender Differences in Creativity.....	46
Cultural and/or Gender Differences in Personality Types	47
Implications.....	48
Limitations	48
REFERENCES	51

LIST OF TABLES

Table 1. Participant Demographics.....	26
Table 2. Correlations Between the Subscale of KTS II and the Subscale of TTCT (Culture) ..	32
Table 3. Correlations between the Subscale of KTS II and the Subscale of TTCT (Gender) ...	35
Table 4. Descriptive Statistics for the Creativity Index of the TTCT (Culture)	37
Table 5. Descriptive Statistics for the Creativity Index of the TTCT (Gender).....	38
Table 6. Descriptive Statistics for the Personality types of the KTS II (Culture).....	40
Table 7. Descriptive Statistics for the Personality types of the KTS II (Gender)	41

CHAPTER 1

INTRODUCTION

For many years IQ was the only index educators used to measure a child's potential. However, IQ is limited in that IQ is only predictive of future academic success (Jensen, 1998; Sternberg, Grigorenko, & Bundy, 2001), and IQ measures are influenced by a child's ethnic and socio-economic environment (Rushton, & Jensen, 2006; Turkheimer, Haley, Waldron, D'Onofrio, & Gottesman, 2003). Creativity has been identified as another important ability that is predictive of a child's potential (Cramond, Matthews-Morgan, Bandalos, & Zuo, 2005; Torrance, 2002), and research has shown that creativity can be stimulated during students' learning processes (Huang, 2005; Rose & Lin, 1984; Scope, 1999; Scott, Leritz, & Mumford, 2004). Additionally, creative potential and creative measures are less dependent on a child's ethnic and socio-economic environment (Kim, 2004). If creative people have common personality traits, educators can use personality traits to identify creative potential and encourage creativity in those students who have high creative potential in order to enhance student learning and motivation in school.

Justification

Understanding the personality traits of creative people can deepen our understanding of creativity. However, previous research has reported conflicting results in regard to

personality traits of creative people. Some researchers have reported that creative people have common personality traits (Sternberg, 1999), but others have found different results. For example, some researchers reported that creative people are extroverted (Buchanan & Bandy, 1984; Carne & Kirton, 1982; Ohnmacht, 1970), other researchers reported that creative people tend to be introverted (Feist, 1999; Roy, 1996), and still others reported that creative people tend to be either extremely introverted or extremely extroverted (Eysenck, 1995). Thus, additional research into the personality traits of creative people is needed to understand the personalities of creative people.

Jung's personality types are the most widely tested personality types and can be tested using the Myers-Briggs Type Indicator (MBTI) or, in the alternative, the KTS II (Kelly & Jugovic, 2001). The TTCT is the most widely used and studied measure of creativity (Kim 2004). However, the author could find only two studies that attempt to correlate these common measures of Jung's personality types with TTCT's measures of creative potential, and both of these studies used the MBTI (Alt, 1999; Houtz et al., 1994). Thus, the author intended to study the relationship between creative potential, as measured by the TTCT, and personality types, as measured by the KTS II.

Additionally, creativity seems to manifest itself differently in different cultures (Csikszentmihalyi, 1988). Certainly personality can be different in different cultures.

Therefore, research is needed to determine whether cultural differences exist in creativity and personality. Understanding how creativity and personality are related and how this relationship differs between cultures can allow educators to identify students' gifts, to discover students' potential, and to encourage creativity in students with high creative potential.

The author had access to data from different cultures, Taiwanese and American. Although there are some studies that examine how culture affects creativity, there are few studies that explore the relationship between creativity and personality types by culture. Data collection of this sort additionally allows exploration of other factors, such as differences in personality types by gender or culture.

Purpose of the Study

The primary purposes of the present study are to examine whether there is a relationship between creative potential and personality types and to compare the relationship between two cultures, American and Taiwanese. The secondary purpose is to explore whether the amount of creative potential and personality types differ between the two cultures or gender.

CHAPTER 2

LITERATURE REVIEW

What Is Creativity?

What is creativity? Torrance (1966) defined creativity as

A process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results. (p. 6)

Many creativity researchers define creativity as the ability to produce work that is novel, original, or unexpected, and appropriate, useful, or adaptive concerning task constraints (Barron, 1988; MacKinnon, 1962; Sternberg & Lubart, 1991, 1995, 1996). Thus, an important feature of creativity is related to an observable product (Hughes & Drew, 1984). The widely used Torrance Tests of Creative Thinking are based upon Torrance's product oriented, originality-based definition of creativity (Torrance, 1974).

An evolving definition of Creativity has two halves: “Big C” and “Small c”

(Torff, 1999). “Big C” refers to creativity that produces major "advances", or changes the world, like Einstein’s work. “Small c” refers to the creativity in everyday life of the average person that makes only minor discrete changes in our lives. For example, according to Sternberg’s Triarchic Theory of Intelligence (1988), creativity is anything that requires a person to generate something. It connotes that creativity is associated not only with “big C” but also with “small c.”

The above perspectives of creativity are based on Western ideals inherent in Western culture. Generally, most reported studies have adopted, almost without thought, an implicit Western perspective of creativity.

Eastern people, however, hold a very different view of creativity from Western people. The Eastern perspectives of creativity appears to be less product-oriented and is related to a state of personal fulfillment, the expression of an inner essence of ultimate reality (Chu, 1970; Kuo, 1996; Mathur, 1982). Thus, an important feature of Eastern perspectives of creativity is related to meditation because it helps one to see the true nature of the self or an object (Sarnoff & Cole, 1983). Therefore, Eastern perspectives of creativity involve the reinterpretation of traditional ideas, whereas the Western perspective of creativity involves a break with tradition (Lubart, 1999).

Who is Creative?

Rhodes (1961) indicated that four Ps of creativity explain a multifaceted construct of creativity: Person, Process, Product, and Press. Person includes cognitive abilities, biographical traits, and personality. Process describes the mental processes that are operative in creating ideas, which include preparation, incubation, illumination, and verification. Product includes the ideas expressed in the form of languages or crafts. Press includes the relation between a person and his or her environment. The present study will focus only on Person.

Creative Person's Cognitive Ability, Biographical Traits, and Personality

Creative Person's Cognitive Ability

Rhodes (1961) identified three types of characteristics that contribute to the creativity of a person: cognitive abilities, biographical traits, and personality. Cognitive abilities, or thought processes, involve both intelligence and thinking. However, intelligence and creativity are separate constructs. Highly intelligent individuals may or may not be highly creative. The Threshold Theory assumes that above an IQ of 120 there is little correlation between intelligence and creativity (Barron, 1961; MacKinnon, 1961; Walberg, 1988). However, a recent meta-analysis (Kim, in press) indicated that there is a ($r = .780$) negligible relationship between intelligence and creativity in any level. Overall, it has been

recognized that creativity and intelligence can be identified by some personality traits but the relationship between them is still unclear (Anastasi & Schaefer, 1971). Guilford (1956, 1959) theorized that creative thinking involves divergent thinking, which emphasizes fluency, flexibility, originality, and elaboration. However, he also indicated that creative thinking is not the same as divergent thinking because creativity requires sensitivity to problems and redefinition abilities beyond divergent thinking.

Creative Person's Biographical Traits

As for biographical traits or the background of creative people, research findings (modified from Kim, 2004) include that creative people:

- ❑ have a background of creative interests (Davis, 1992; Torrance, 2002).
- ❑ are usually left-handed (Davis, 1992).
- ❑ are first-born for status quo scientists and political leaders, and classical composers (Clark & Rice, 1982; Schubert, Wagner, & Schubert, 1977; Stewart, 1977; Torrance, 2002).
- ❑ and are later-born for revolutionary scientist and political leaders, and creative writers (Bliss, 1970; Stewart, 1977; Sulloway, 1996).
- ❑ are well-traveled (Torrance, 2002).
- ❑ have childhood trauma, especially among artistic creators (Berry, 1981;

Goertzel, Goertzel, & Goertzel, 1978; Simonton, 1986).

- ❑ have friends younger and older than themselves (Davis, 1992).
- ❑ have mentors, especially many diverse mentors (Simonton, 1984).
- ❑ have somewhat marginalized family background (Berry, 1981; Goertzel, Goertzel, & Goertzel, 1978; Simonton, 1976).
- ❑ own a cat (Schaefer, 1969, 1970).
- ❑ have an imaginary childhood playmate (Schaefer, 1969, 1970; Somers & Yawkey, 1984).

All these findings comprise a multiplicity of identifiable patterns for creative people.

Creative Person's Personality

According to previous studies (modified from Kim, 2004), creative people tend to

- ❑ be aware of their own creativeness (Walberg, 1988; Walberg & Herbig, 1991).
- ❑ be original (Tardif & Sternberg, 1988).
- ❑ have a sense of humor, have a childlike approach to a problem (Barron, 1969; Fabun, 1968; Getzels & Jackson, 1962).
- ❑ have artistic interests (Davis & Subkoviak, 1978).
- ❑ have high exploratory excitability, high persistence, high self-directedness, and high cooperativeness (Chavez-Eakle, Lara, & Cruz-Fuentes, 2006).

- ❑ be perceptive (Tardif & Sternberg, 1988).
- ❑ be independent (Chambers, 1964; Eiduson, 1962; Rushton, Murray, & Paunonen, 1987).
- ❑ be risk taking (Davis, Peterson, & Farley, 1973; Farley, 1986; Zuckerman, 1975).
- ❑ be energetic (Taylor, 1988).
- ❑ be curious (Eiduson, 1962).
- ❑ be attracted to complexity and novelty; be open-minded (Dacey, 1989; Barron, 1988; Tardif & Sternberg, 1988; Walberg, 1988; Walberg & Herbig, 1991).
- ❑ be open to experience (interested in seeking sensation and more varied experiences), fantasy, and imagination (Domino, 1969; Feist, 1999; MacKinnon, 1962).
- ❑ be autonomous and have an introverted-ability to be alone and away from others (Albert & Runco, 1999; Storr, 1988).
- ❑ have needs for privacy or alone time (Storr, 1988).
- ❑ be more anxious, emotionally labile, impulsive, sensitive, expressive of internal emotional states, low in socialization, nonconformity, rebelliousness; be emotional, manic, expressive, and sensitive (Barron, 1972; ; Feist, 1999;

Getzels & Csikszentmihalyi, 1976).

- be aggressive, anti-social, egocentric, tough-minded (Hammond & Edelman, 1991).
- be dominant, arrogant, hostile, and self-confident (Feist, 1999; Helson & Crutchfield, 1970).
- be impulsive and rate low on conscientiousness (Barron, 1972; Getzels & Csikszentmihalyi, 1976).
- have great self-endorsement of beliefs (Wickes & Ward, 2006).

As can be seen, there are many personality traits that have been studied and are used to identify creative people, however, these results that showed above also show that creative personality traits are vary and seem to conflict. As Csikszentmihalyi (1996) stated, creative people tend to have the ability that use two opposite way of thinking, can have childishness and wisdom, can be smart and naïve. They also tend to own both tendencies even it looks belong to opposite ways, such as extroversion or introversion.

Where Is Creativity?

Kroeber (1944) claimed that there is a cultural configuration in creativity. Some researchers think creativity is a socio-cultural phenomenon (White, 1949). Csikszentmihalyi (1988) describes creativity as an interaction among a person, a field (discipline, or social

organization), and a culture. Suler (1980) considers creativity as a cognitive function that is shaped by the immediate environment and by the larger cultural and historical context in which an individual lives. In other words, creativity is a behavior resulting from a person's characteristics, cognitive abilities, and environment instead of arising from a person's personality or general ability alone (e.g., Amabile, 1983; Mellou, 1996; Torff, 1999). Because a person takes information and action from the culture and produces an innovation, creativity can be deeply shaped by cultural differences. There are at least two cultural influences in the cultural dimension of creativity. First, the definition of creativity may differ among different cultures. Second, culture may encourage or discourage creativity.

Does Creativity Differ across Different Cultures?

Starko (1994) concluded that a cultural context could determine the definition of creativity prevalent in that culture. People interpret their world through their cultural artifacts, ideas, and beliefs. Cross-cultural studies indicate how culture and creativity interact. Such studies have shown culture affects the expression of creativity by the amount that a culture values the expression of creativity (Lee, Park, & Kim, 2000). For example, Chinese people view creativity as an ability to contribute to the society; therefore, politicians are recognized as more creative than other creators such as artists (Chan, 1997). Panda and Yadava (2005) claimed that creativity is viewed in relational, social, and interpersonal effects

as well as cognitive and analytical effects. Fielding (1997) concluded that cultural influences on creativity are critical to its development and expression.

Culture Can Encourage or Discourage Creativity

Rogers (1976) emphasized the importance of setting up situations of psychological safety and freedom as preconditions for creativity. To nurture Creativity, it is important that the environment gives the people enough safety and freedom to develop their creativity. In some cultures, creative behaviors conflict with the culture and create barriers to creativity such as social influence, expectations, and conformity pressures (Davis, 1992; Torrance, 1963, 2002). Alternatively, if a culture considers the creative behaviors valuable, such behaviors will be encouraged providing a new starting point for the next generation.

Even if a person has the process and product to be a successful creator, achievement may fall short if the person's social and cultural conditions do not value the creative output (Kim, in press). These social and cultural elements are highlighted in cross-cultural studies (e.g., Lim & Plucker, 2001; Lubart, 1990, 1999; Sternberg & Lubart, 1999; Yue & Rudowicz, 2002) that have shown cultural diversity in the value and expression of creativity.

Furthermore, many researchers (Bond, 1992; Fielding, 1997; Kim & Sergent, 2004; Rudowicz & Ng, 2003; Saeki et al., 2001) have concluded that there is a tendency for people from Confucian Asian societies to show less creativity than people from the more

individualistic societies. Because some values such as nonconformity, boldness, independence, and risk taking are more encouraged in Western culture, and Confucianism in Asian Society has discouraged individualism for harmony of society.

Gender Differences in Creativity

The results of the previous research on gender differences in creativity are inconclusive. Some studies (e.g., Gupta, 1981; Jaquish & Ripple, 1980; Kim, 2004; Kim & Michael, 1995) have found gender differences, whereas other studies have found no gender differences (e.g., Ogawa, Kuehn-Ebert, & De Vito, 1991; Runco, 1991; Saeki et al., 2001). Even among those who found gender differences, some reported higher scores for male, others reported higher scores for female.

Personality in Psychoanalytic Perspective and Creativity

The psychoanalytic personality approach sees creativity as stemming from the tension between conscious reality and unconscious drives, namely, from sublimation of drives (Mellou, 1995). Freud (2003) proposed that writers and artists produce creative work as a way to express their unconscious wishes in a publicly acceptable fashion. These unconscious wishes may concern power, riches, fame, honor, sexual desire, or love. He used case studies of eminent creators, such as Leonardo da Vinci, to support his ideas.

Although the psychodynamic approaches offered some insights into creativity, its

theory is not the emerging scientific psychology because its view of creativity was rather subjective and not based on empirical investigations (Sternberg & Lubart, 1999).

Creativity and Jung's Personality types

Jung's Theory of Personality types

Jung's theory of personality types is the aspect of his work that has gained the most widespread acceptance in psychology (Arnau, Rosen, & Thompson, 2000). Jung (1923,1971) developed his theory of personality types in 1921 to find some kind of order among the chaotic multiplicity of points of view. Personality types characterize and categorize a person's personality or psychological make-up based on preferences in thinking and behaving. Jung (1971) believed that personality types does not change, although the self-report of it might change, as individual focus on developing different mental processes at various stages in life. His theory of personality types describes human behavior as being innate and classifiable based on fundamental similarities in preferences for Extroversion or Introversion; Sensing or Intuition; Thinking or Feeling' and implied Judging and Perceiving functions. Jung (Jung 1923,1971) originally posited only the six personality types directly and implied Judging and Perceiving indirectly. Later, Myers added Judging and Perceiving officially (Myers & Myers, 1980).

The preferences (Dollinger, Palaskonis, & Pearson, 2004; Myers & Myers, 1980;

Wikipedia, 2007) are as follows:

Extroversion or Introversion

People's perception is perceived from the external environment or toward the inner world of ideas. Extroversion and introversion refer to preference for focusing toward the outer-objective world or the inner-subjective world, respectively. Extroverted people prefer the outer world of people and things, whereas introverted people are more interested in the inner world of ideas.

Sensing or Intuition

People's perceiving dimension relies on the processes of sensing or intuition. Sensing people tend to focus on the present and on concrete information gained from their senses and prefer to receive data primarily from the five senses. In contrast intuitive people tend to focus on the future, with a view toward patterns and possibilities and prefer to receive data from the subconscious, or seeing relationships via insights. Sensing types prefer to take in information in term of practical and tangible details, whereas intuitive types focus on the large pattern of meanings and possibilities.

Thinking or Feeling

People's judging dimension is relying on thinking or feeling. Thinking-Feeling refers to the preference for logic and reasoning verses personal values, harmonious relationships, or

compassion in making decisions. Thinking people tend to base their decisions on logic "true or false, if-then" connections and on objective analysis of cause and effect. Feeling people tend to base their decisions primarily on values and on subjective evaluation of person centered concerns. Feeling people use "more or less, better-worse" evaluations. Thus, thinking people decide with their heads, whereas feeling people decide with their hearts.

Judging or Perceiving

People's judging or perceiving attitude is representatively used in coping with the environment. Judging-Perceiving refers to a preference for planning, organization, control and closure versus spontaneity, flexibility, and a casual orientation to life. Judging people tend to like a planned and organized approach to life and prefer to have things settled, whereas perceiving people tend to like a flexible and spontaneous approach to life and prefer to keep their options open.

A Personality Test Based on Jung's Theory: The Myers-Briggs Type Indicator (MBTI)

Based on Jung's theory of personality, the Myers-Briggs Type Indicator (MBTI: Myers & McCaulley, 1985), a self-reported personality test was developed in the 1940s. The MBTI is a self-administered questionnaire in forced-choice format that measures an individual's preferences. The MBTI is one of the most commonly used inventories for assessing personality and has generated much research (Dollinger et al., 2004). The MBTI

manual reports that approximately 75% of tested people agree with the results (Myers & McCaulley, 1985). College students have higher reliabilities compared with younger high school students (Myers & McCaulley). It appears that it is more accurate on using in older individuals because the older individuals know themselves better and will report their preference more accurately. Lower reliabilities usually occur on the Thinking–Feeling. However, it can be concluded that the reliability of the results on the MBTI is satisfactory (Alt, 1999). Reviewers (Murray, 1990; Willis, 1984; Wiggins, 1989) of the MBTI were generally positive about use of the inventory.

A Personality Test Based on Jung's Theory: The Keirsey Temperament Sorter II (KTS II)

The Keirsey Temperament Sorter II (KTS II) is used widely as an alternative to the MBTI (Kelly & Jugovic, 2001). The online version of the KTS II is one of the most popular online personality assessments (Reile & Harris-Bowlsbey, 2000) and is now available in many different languages for international audiences (Kelly & Jugovic, 2001). The scores for Extroverted ranged from 0 to 10, whereas the other three personality types ranged from 0 to 20. KTS II comprises 70 forced-choice items, whereas MBTI has 94 forced choice items. Keirsey (2006) claimed that MBTI and KTS are very similar in result (approximately .75 correlation). There are several studies that report concurrent validity between MBTI and KTS, which ranges from .54 to .74 (Quinn, Lewis, & Fischer, 1992); from .68 to .84 (Tucker

& Gillespie, 1993); from .60 to .78 (Kelly, 2001). Waskel (1995) reported internal consistency alpha coefficients in the range of .74 to .89 for the four KTS scales. This study will use KTS II to investigate, in part, whether the results are consistent with previous research using the MBTI.

A Personality Test Based on Jung's Theory:

The Myers-Briggs Type Indicator Creativity-Index (MBTI-CI)

The MBTI-CI is a simple linear combination of MBTI continuous scores ($MBTI-CI = 3SN + JP - EI - .5TF$) and is a numerical representation of creative potential of an individual (Myers & McCaulley, 1985; Fleenor & Sylvester, 1994). Thus, the higher one scores on the scale, the higher level of creativity. The MBTI-CI was based on Gough's research (Fleenor & Sylvester). His research on the MBTI-CI reported that creative persons tend to be more Intuitive than Sensing; more Perceiving than Judging; more Extroverted than Introverted; and more Thinking than Feeling. Thorne and Gough (1991) found that Individuals who were judged to be creative had higher scores on the MBTI-CI than did the general population. However, the present study will not use MBTI-CI as one of the measurements.

The Relationship between Creativity and Intuition (\leftrightarrow Sensing)

Intuition is an important personality characteristic of creativity. Successful creators such as Darwin, Freud, and Cantor seem to have moved along their own creative

processes in a similar sequence starting off with generative intuitions and ending up with more explicitly articulated products after long periods of persistent work (Policastro, 1995). Several studies have found Intuition of the MBTI is highly related to creativity (Agor, 1991; Burley & Handler, 1997; Hill, 1987; Pope, 1997). Intuitive people in some vocations that need creativity also tend to be more creative. Hartzell (2000) interviewed eight mature professional artists and found that artistic creative people tend to be intuitive. Agor (1991) concluded that the creative managers tend to be intuitive. Burley and Handler (1997) indicated good interpreters tend to be creative and scored higher in Intuition. Pope (1997) found a significant relationship between Intuition and spontaneous innovation approach of the C. A. R. E. (Creator, Advancer, Refiner, Executor, Facilitator, and combinations) Profile's Creative behavior (Changing and Adopting). The changing preference describes individual possessing this pattern of behavior as originators of change who originate, recognize, and adopt new trends very early. They tend to be favor fresh perspective, novel fashions, or new technology over the tired and true

The Relationship between Creativity and Perceiving (↔ Judging)

Myers and Myers (1980) described Perceiving as a gift differing by its tolerance, curiosity and zest for experience that make Perceiving types be able to wait a certain time until its fragmentary ideas can be organized. Similarly, Sternberg and Lubart (1991) claimed

that tolerance of ambiguity is important for creativity. He explained that a person needs to be flexible enough to wait for ambiguous concepts to become clear to tolerate ambiguity.

Tegano (1990) used the Adult Behavior Inventory of Playfulness and the MBTI-CI and indicated that tolerance of ambiguity and playfulness are related to creativity.

Studies (Carne & Kirton, 1982; Gyskiewicz & Tullar, 1995; Isaksen, Lauer, & Wilson, 2003; Jacobson, 1993; Johnson, 2003,) examined the relationship between MBTI and Kirton's Adaptation- Innovation Inventory (KAI), a test measuring creativity style, and found that Perception scored high on the innovative type of KAI.

Myers and McCaulley (1985) claimed Intuition and Perceiving are related to creativity, especially when Intuition and Perceiving are combined together in one person. Two studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986) examined specific areas that need creativity and found that Intuition and Perceiving preference exists in professional or prospective psycho dramatists. Fisher and Scheib (1971) study focused on brain damage and creativity found that their creative subjects were found to possess Intuition and Perceiving preference. Some research (Carter, Nelson, & Duncombe, 1983; Richter & Winter, 1966) tested their subject using MBTI and grouped subjects by Intuition and Perceiving and found that Intuition and Perceiving preference is related to creativity. Helson (1965) found that imaginative play and artistic activity and active tomboy play were

associated with Intuition and Perceiving. Hall (1969) found that Intuition and Perceiving were correlated to creativity among architects.

The Relationship between Creativity and Extroverted (↔Introverted)

Myers (1985) was unclear whether Extroversion or Introversion is more creative. Goodson (1989) investigated the relationship between data gathering preference and creative composition of college student writers and found that Extroverted and Introverted people have different ways to gather their information when they do creative writing. Several studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carne & Kirton, 1982; Ohnmacht, 1970) found that there is a relationship between Extroversion of the MBTI and creativity. Ohnmacht (1970) examined the relationship between the five measures of divergent production and MBTI among college students majoring in Education and found that Extroverted students scored higher than Introverted students on the five measures of divergent production. Two studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986) examined the relationship between the MBTI and Psychodramatists. Both studies assumed that Psychodramatists have essential traits such as spontaneity and creativity and found Psychodramatists were Extroverted. Carne and Kirton (1982) found that Extroversion tend to related to creativity among experienced management students.

Studies that did not use the MBTI were contradictory. Kundu (1987) used the

Torrance Tests of Creative Thinking, the Eysenck Personality Questionnaire, and the Bender Gestalt Test and found creativity was positively related to ego-strength and introversion and negatively related to psychoticism, while the relationship between creativity and Extroversion was curvilinear among Indian high school students. Roy (1996) used Cattell's Sixteen Personality Factor Questionnaire and found that artists are more introverted, independent, and tender-minded than nonartists. Feist (1999) found that creative people are introverted in both art and science fields. However, Hammond & Edelman (1991) also cited to studies that found high levels of extroversion in creative performing artists. Finally, Eysenck (1995) concluded that creative persons display apparently contradictory behavior patterns, that is, he found a positive correlation between creativity and both the extremely Introverted and extremely Extroverted.

The Relationship between Creativity and Feeling (↔Thinking)

Myers claimed that either Feeling or Thinking style doesn't affect a person's creativity (1985). However, there are some contradictory research results. Yang and Chaun (2004) found that Sternberg's various thinking types on the Thinking Styles Inventory were correlated to different personality types on the MBTI. Agor (1991) found that Intuitive managers tend to be more Thinking style. Jacobson (1993) found that Intuition, Thinking, and Judging type was the most common among creative managers. In contrast, Buchanan and

Taylor (1986) found that creative professional psychodramatists tend to be Extroverted, Intuitive, Feeling, and Perceiving style. Dollinger et al. (2004) concluded that a combination of Intuition and Feeling best characterized high scores on a composite creativity measure (Test for Creative Thinking–Drawing Production, Creative Personality Scale, and Creativity Behavior Inventory) among college students.

The MBTI and the Torrance Tests of Creative Thinking (TTCT)

There are two studies (Alt, 1999; Houtz et al., 1994) that examined the relationship between the MBTI and the TTCT, but there was no significant relationship between personality types preference and scores on the TTCT. Alt (1999) found a strong Intuition and Perceiving preference among 54 adults with Attention Deficit Hyperactivity Disorder but did not find a significant relationship between the preference and scores on the TTCT-Figural Form A. In addition, there was no significant difference in Creative Index (CI: an overall indicator of creative potential) or five subscales (Fluency, Originality, Elaboration, Abstractedness of the Titles, and Resistance to Premature Closure) of the TTCT-Figural between Adults with (n = 54) and without (n = 56) ADHD. Houtz et al. (1994) also did not find a significant relationship between personality types preference and three subscales (Fluency, Originality, and Flexibility) of the TTCT-Verbal among 46 student teachers in the elementary and secondary pre-service programs (Houtz et al., 1994).

Research Questions

In relation to the literature review above, the present study attempts to answer the following:

1. The relationship between creativity and personality types:

Is there any relationship between TTCT results and personality types measured by the KTS II?

If so, are there any differences in the relationship by culture and/or gender?

2. Creativity:

Are there any differences in TTCT results by culture or gender?

If so, is there any interaction between culture and gender?

The following questions will also be explored with the present study:

3. Personality types:

Are there any differences in personality types on the KTS II by culture or gender?

If so, is there any interaction between culture and gender?

CHAPTER 3

METHOD

Participants

One hundred and twenty-nine individuals participated in this study split, between two groups. One group was from Eastern Michigan University in the United States (American group) and a second group was from National Taiwan Normal University in Taiwan (Taiwanese group). The participant demographic information is shown Table 1. Both groups consist of students in the undergraduate teacher educational programs of the respective universities. In regards to age, gender, background, and ethnicity: Participants ranged in age from 20-51 years old with the average age being 24.96. The Taiwanese group ranged in age from 20-31 years old with the average age being 21.76. The American group ranged in age from 20-51 years old with the average age being 29.10. Both groups were predominately female. The entire group consisted of 35 male and 82 female. The Taiwanese group consisted of 18 male and 48 female. The American group consisted of 17 male and 34 female. The entire group has 72 people from suburban areas, and 45 people come from urban areas, the Taiwanese group has 27 people comes from suburban areas, and 39 people come from urban

areas. The American group has 27 people come from suburban areas, and 39 people come from urban areas. The ethnic background of American group is primary Caucasian. The ethnic background of Taiwanese group is Asian (Chinese).

Table 1

Participant Demographics

Group	N	Age		Gender		Education		Region		Relationship	
		M	SD	M	F	U	G	Su	U	S	M
Total	117	24.96	7.16	35	82	115	2	72	45	99	17
T	66	21.76	1.19	18	48	65	1	27	39	66	0
A	51	29.10	9.28	17	34	50	1	45	6	32	17

Note. N= Sample Size; T= Taiwanese, A=American, M = Male; F = Female, U= Undergraduate Students, G = Graduate Students; Su = Suburban, U=Urban; S = Single, M=Married

Instruments

The instruments used in the present study included the Keirsey Temperament Sorter II (KTS II) and Figural A form of Torrance Test of Creative Thinking-Figural Form A.

The Keirsey Temperament Sorter II (KTS II)

The KTS II is described above in the section on “*Personality Tests Based on Jung’s Theory: The Keirsey Temperament Sorter II (KTS II).*” As noted above, an online version

KTS II is available and has significant correlation to MBTI. The author is aware of no previously published studies of KTS II and creativity, however, the relationship between the MBTI and creativity has been extensively studied. Only two studies were reported regarding the relationship between the MBTI and the TTCT.

The Torrance Tests of Creative Thinking-Figural (TTCT Figural)

Torrance developed the TTCT in 1966. The TTCT has been reformed in 1974, 1984, 1990, and 1998 (Kim, 2004). As a test of creativity, the TTCT displays adequate reliability and validity (Cooper, 1991; Treffinger, 1985). The TTCT has been translated into over 35 languages (Millar, 2002) and is more researched and analyzed than any other creativity measure (Swartz, 1988; Treffinger, 1985). The TTCT is the most referenced of creativity test (Lissitz & Willhoft, 1985), and the most widely used creativity test (Davis, 1997).

The TTCT comprises five measures of Fluency, Originality, Elaboration, Abstractness of Titles, and Resistance to Premature Closure, and thirteen criterion-referenced measures of Creative Strengths. The TTCT's creative index (CI) is established by averaging norm-referenced standardized scores of each of five variables according to the TTCT Norms-Technical Manual (Torrance, 1998). The frequency of creative strengths is measured by awarding a "+" or "+ +" on the basis of TTCT's Scoring Guide (Torrance, 1998). The number of "+s" is added (range for Creative Strengths: 0–26) to the averaged standardized scores to

yield the CI (Torrance, 1998).

Procedure

The administration of the TTCT and the KTS II took each student approximately 45 minutes to one hour to complete. All tests are took place in class and that the sample was comprised of class members. Prior to administer the instruments, the participants were informed about the general idea of the study, and asked to volunteer their time. If they agreed, they signed consent forms that guaranteed their confidentiality. Participants were informed that: 1) a code number would represent their identity during the procedures and data analysis process; 2) if they decided at any point after the tests not to participate, their test materials would be destroyed and not used; and iii) they would receive feedback on the results after the study was complete.

The TTCT took approximately 30 minutes. Before starting the TTCT, participants were encouraged that “do anything you like” and were informed that each section of the test was time limited. In the last minute of each section of the test, the administrator informed participants of the time and reminded them not to forget to title their drawing. After finishing the TTCT, participants answered the KTS II questionnaire. The KTS II took about 10-15 minutes. However, participants were advised that there was no time limit.

The data of American group was collected and immediately sealed by the author.

The data of Taiwanese group was sealed and sent to the author via international mail. The only individuals with access to the raw data are committee members and the author (and the administrator of the instruments in Taiwan).

Data Analysis

The results set an alpha level at .05 were reported for each individual test first for the present study, that is, the author did not initially adjust the critical p-value. This was because familywise alpha rate corrections including the Bonferroni correction are very conservative, particularly when the dependent variables are correlated (O'Brien, 1984; Toothaker, 1993). This was considered first in the present study given that most of the correlations among the TTCT subscales are statistically significant at the alpha level of .05. Because there is no research published on the relationship between the TTCT-Figural and the KTS II, the author wanted to report any probable associations between the two. For this reason, an alpha level was set at .05 first for each individual test. After that, the author reported the results also using the Bonferroni procedure. This was because when using multiple correlation coefficients or multiple comparisons per study, the widely used Bonferroni (1937) technique limits the familywise Type I error rate and protects against Type I error.

Correlation coefficients between the six TTCT subscales (as well as CI) and four personality types of the KTS II were calculated to examine whether there is any relationship between TTCT results and personality types measured by the KTS II. . These correlation coefficients were also calculated for Americans and Taiwanese as well as males and females respectively, to examine whether there are any differences in the relationship by culture and/or gender.

Cultural and/or Gender Differences in Creativity

The mean and standard deviation for each scale of the TTCT were examined for the entire group and respective group (by culture and by gender) to examine whether there are any differences in the TTCT results. A 2×2 factorial (culture × gender) ANOVA (analysis of variance) on the CI was conducted to examine whether there is a main cultural effect and a main gender effect as well as culture*gender interaction effect on CI. A 2×2 factorial (culture × gender) MANOVA (multivariate analysis of variance) on the six subscales of the TTCT was conducted to examine whether there is main cultural effect and main gender effect as well as culture*gender interaction effect on each of the six subscales of the TTCT. For the significant main culture effect, main gender effect, and/or culture*gender interaction effect, which subscales of the TTCT contributed to the difference were determined by conducting ANOVA on each of the six subscales of the TTCT as follow-up tests to the MANOVA.

Cultural and/or Gender Differences in Personality Types

Research using the MBTI tends to use the continuous-scale scores as well as the discrete types. Moreover, recent attempts have been made to reinterpret the continuous measures underlying MBTI in terms of four relatively independent dimensions or traits (McCrae & Costa, 1989). Thus, the original continuous scales for the KTS II were used for each analysis.

The mean and standard deviation for each scale of the KTS II were examined for the entire group and respective group (by culture and by gender) to examine whether there are any differences in the KTS II results. A 2×2 factorial (culture × gender) MANOVA (multivariate analysis of variance) on the four subscales of the KTS II was conducted to examine whether there is main cultural effect and main gender effect as well as culture*gender interaction effect on each of the four subscales of the TTCT. For the significant main culture effect, main gender effect, and/or culture*gender interaction effect, which subscales of the KTS II contributed to the difference were determined by conducting ANOVA on each of the four subscales of the KTS II as follow-up tests to the MANOVA.

CHAPTER 4

RESULTS

The Relationship between Creativity and Personality Types

Correlation Analysis for the Entire Group

The correlation coefficients between CI with subscales of the TTCT and personality types of KTS II are shown in Table 2. In the entire group, the correlation coefficients between the CI and Intuitive ($r = .365, p < .0001$) and between the CI and Perceiving ($r = .202, p = .029$) were significant. The correlation coefficient between Intuitive and CI was still significant after the Bonferroni correction ($\alpha = .05/$ the number of computed correlations [$55 = 66, Americans = 51$]) = .0009).

Table 2

Correlations Between the subscale of KTS II and the subscale of TTCT [N = 117 (Taiwanese = 66, Americans = 51)]

	CI	F	O	E	A	R	CS
Whole	.066	-.026	.004	.061	.137	-.082	.115
E Taiwanese	-.010	-.042	-.086	-.043	.092	-.036	.049
American	.286*	.062	.143	.194	.298*	-.016	.308*
Whole	.365***	-.008	.292**	.246**	.222**	.125	.338***

Table 2 (continued)

N	Taiwanese	.330**	.139	.254**	.260*	.199	.028	.351**
	Americas	.395**	.124	.363**	.267	.219	.206	.272
	Whole	.143	.006	.064	.062	.174	.101	.125
F	Taiwanese	.106	.070	.015	.030	.127	.083	.070
	Americas	.232	-.062	.121	.091	.272	.196	.229
	Whole	.202*	-.055	.020	.136	.192*	.162	.319**
P	Taiwanese	.168	-.060	-.095	.090	.212	.140	.368***
	American	.297**	-.032	.146	.185	.215	.284**	.323**

Note. * $p < .05$; ** $p < .01$; *** $p < .05/55$ (Bonferroni correction), two-tailed

The correlation coefficients between the subscales of the TTCT and personality types of KTS II were examined. The significant correlation coefficients were found between Intuitive and Originality ($r = .292, p = .001$), Abstractness of the Titles ($r = .222, p = .016$), Elaboration ($r = .246, p = .007$), and Creative Strengths ($r = .338, p < .0001$), and between Perceiving and Abstractness of the Titles ($r = .192, p = .038$), and Creative Strengths ($r = .319, p < .0001$) of the TTCT. The correlation coefficients between Creative Strengths and both Intuitive and Perceiving were still significant after the Bonferroni correction.

Correlation Analysis between CI and KTS II

for Americans and Taiwanese, Respectively

The correlation coefficients between CI and personality types were examined for

Americans and Taiwanese separately and are shown in Table 2. For Americans, the correlation coefficients between CI and Extroverted ($r = .286, p = .042$), Intuitive ($r = .395, p = .004$), and Perceiving ($r = .297^*, p = .034$) were significant. The correlation coefficient between CI and Intuitive was still significant after the Bonferroni correction.

For Taiwanese, the correlation coefficient between CI and Intuitive ($r = .330, p = .007$) was significant and was still significant after the Bonferroni correction.

Correlation Analysis between Subscales of the TTCT and KTS II

for Americans and Taiwanese, Respectively

The correlation coefficients between the six subscales of the TTCT and the KTS II were examined for Americans and Taiwanese separately and are shown in Table 2. For Americans, the correlation coefficients between Extroverted and both Abstractness of the Titles ($r = .298, p = .033$) and Creative Strengths ($r = .308, p = .028$), and between Intuitive and Originality ($r = .363, p = .009$), and Perceiving and both Resistance to Premature Closure ($r = .289, p = .043$) and Creative Strengths were significant. However, none of the correlation coefficients were significant after the Bonferroni correction.

For Taiwanese, the correlation coefficients between Intuitive and Originality ($r = .254, p = .039$), Elaboration ($r = .260, p = .035$), and Creative Strengths ($r = .351, p = .004$) and between Perceiving and Creative Strengths ($r = .364, p = .003$) were significant.

However, none of the correlation coefficients were significant after the Bonferroni correction.

Correlation Analysis between CI and KTS II for Males and Females, Respectively

The correlation coefficients between CI and personality types were examined for male and female separately and are shown in Table 3. The correlation coefficients between CI and Intuitive were significant for both for male ($r = .319, p = .004$) and female ($r = .370, p = .029$) was significant. However, neither of the correlation coefficients was significant after the Bonferroni correction.

Table 3

Correlations Between the Subscale of KTS II and the Subscale of TTCT [N = 117 (male = 35, female = 82)]

		CI	F	O	E	A	R	CS
	Whole	.066	-.026	.004	.061	.137	-.082	.115
E	Male	.165	.161	.169	.016	.154	-.104	.230
	Female	-.016	-.139	-.088	.160	.010	-.111	.055
	Whole	.365***	-.008	.292**	.246**	.222**	.125	.338**
N	Male	.370*	.104	.341*	.252	.362*	.066	.326
	Female	.319**	.123	.238*	.123	.221*	.098	.343**

	Whole	.143	.006	.064	.062	.174	.101	.125
Table 3 (continued)								
F	Male	.295	.050	.192	.279	.207	.195	.263
	Female	-.017	-.081	.050	.076	-.040	-.015	.034
	Whole	.202*	-.055	.020	.136	.192*	.162	.319**
P	Male	.323	-.017	.249	.348*	.238	.173	.305
	Female	.162	-.063	-.079	.140	.102	.179	.330*

Note. * $p < .05$; ** $p < .01$; *** $p < .05/55$ (Bonferroni correction), two-tailed

Correlation Analysis between Subscales of the TTCT and KTS II

for Males and Females, Respectively

The correlation coefficients between the six subscales of the TTCT and the KTS II were examined for males and females separately and are shown in Table 3. For males, the correlation coefficients between Intuitive and Originality ($r = .341, p = .045$), Abstractness of Titles ($r = .362, p = .033$), and Creative Strengths ($r = .351, p = .004$), and between Perceiving and Abstractness of Titles ($r = .348, p = .041$) were significant. However, none of the correlation coefficients were significant after the Bonferroni correction.

For females, the correlation coefficients between Intuitive and Originality ($r = .238, p = .031$), Elaboration ($r = .221, p = .046$), and Creative Strengths ($r = .343, p = .002$), and

between Perceiving and Creative Strengths ($r = .330, p = .003$) were significant. However, none of the correlation coefficients were significant after the Bonferroni correction.

Cultural and/or Gender Differences in Creativity

Cultural and/or Gender Differences in CI

Descriptive Statistics for the CI of the TTCT are shown in Tables 4 and 5. The mean score of the CI for the entire group was 119.96 ($SD = 15.34$); for Americans the mean score was 116.54 ($SD = 13.30$); and for Taiwanese it was 122.60 ($SD = 16.35$). The mean score of the CI for males was 114.09 ($SD = 16.32$); and for females it was 122.47 ($SD = 14.27$).

To examine main culture and main gender effects as well as culture*gender interaction effect on CI, a 2×2 (culture \times gender) factorial ANOVA was conducted on CI. A significant main gender effect ($F [1, 113] = 6.61, p = .011$: females' mean CI score was higher than males') was found on CI, but was not significant after the Bonferroni correction ($\alpha = .05/\text{the number of ANOVAs conducted } [7] = .007$). Neither main culture effect ($F [1, 113] = 1.457, p = .230$) nor culture* gender interaction effect ($F [1, 113] = 3.036, p = .084$) on CI was significant.

Table 4

Descriptive Statistic for the Creativity I of the TTCT [N = 117 (Americans = 51, Taiwanese = 66)]

Group	Total	Americans	Taiwanese
Fluency Mean	118.55	115.20	121.14
SD	21.86	17.94	24.28
Originality Mean	107.38	107.00	107.67
SD	19.36	18.82	19.90
Elaboration Mean	115.20	117.76	113.21
SD	20.61	18.36	22.13
Abstractness of titles Mean	100.25	95.16	104.18
SD	24.62	21.84	26.06
Resistance to premature closure mean	107.07	100.43	112.20
SD	15.76	13.50	15.54
Creative strengths Mean	10.27	9.43	10.92
SD	3.89	3.50	4.07
Creativity index Mean	119.96	116.54	122.60
SD	15.34	13.30	16.35

Note. Score range of the Creativity Index is 80–159.60.

Table 5

Descriptive Statistic for the Creativity Index of the TTCT (N = 117 [Male =35, Female = 82])

Group	Total	Male	Female
Fluency Mean	118.55	111.83	121.41
SD	21.86	22.26	21.18
Originality Mean	107.38	102.46	109.48
SD	19.36	19.03	19.24
Elaboration Mean	115.20	111.29	116.87
SD	20.61	19.10	21.12
Abstractness of titles Mean	100.25	93.06	103.32

SD	24.62	23.36	24.65
Resistance to premature closure	107.07	101.54	109.43
Mean			
SD	15.76	15.85	15.21
Creative strengths	10.27	10.06	10.37
Mean			
Table 5 (continued)			
SD	3.89	4.32	3.71
Creativity index	119.96	114.09	122.47
Mean			
SD	15.34	16.32	14.27

Note. Score range of the Creativity Index is 80–159.60.

Cultural and/or Gender Differences in the TTCT Subscales

Descriptive Statistics for the subscales of the TTCT are shown in Tables 4 and 5. To examine main culture and main gender effects as well as culture*gender interaction effect on the TTCT subscales, a 2×2 (culture \times gender) factorial MANOVA was conducted on the TTCT subscales. A significant main culture effect (Wilks's $\Lambda = .82$, $F[6, 108] = 3.94$, $p = .001$) was found on the combined six subscales. Neither main gender effect (Wilks's $\Lambda = .91$, $F[6, 108] = 1.83$, $p = .100$), nor culture*gender interaction effect (Wilks's $\Lambda = .94$, $F[6, 108] = 1.18$, $p = .321$) was significant. For the significant main culture effect, which subscales contributed to the difference were determined by conducting ANOVA on each of the six subscales of the TTCT as follow-up tests to the MANOVA. The ANOVA on Resistance to Premature Closure ($F[1, 113] = 13.52$, $p < .0001$) was significant and was still significant after the Bonferroni correction.

Cultural and/or Gender Differences in Personality Types

Cultural and/or Gender Differences in KTS II

Descriptive Statistics for the subscales of the KTS II are shown in Tables 6 and 7. To examine main culture and main gender effects as well as culture*gender interaction effect on the KTS II subscales, a 2 × 2 (culture × gender) factorial MANOVA was conducted on the KTS II subscales. A significant main gender effect (Wilks’s $\Lambda = .88$, $F[4, 110] = 3.60$, $p = .008$) was found on the combined four subscales. Neither main culture effect (Wilks’s $\Lambda = .95$, $F[4, 110] = 1.29$, $p = .279$), nor culture* gender interaction effect (Wilks’s $\Lambda = .96$, $F[4, 110] = 1.14$, $p = .343$) was significant. For the significant main gender effect, which subscales contributed to the difference were determined by conducting ANOVA on each of the four subscales of the KTS II as follow-up tests to the MANOVA. The ANOVA on Feeling ($F [1, 113] = 4.56$, $p = .035$) was significant but was not significant after the Bonferroni correction ($\alpha = .05/\text{the number of ANOVAs conducted } [4] = .013$).

Table 6

Descriptive Statistics for the Personality types of the KTS II [(N = 117 Americans = 51, Taiwanese = 66)]

Types	Total	Americans	Taiwanese
Extrovert mean	4.83	5.26	4.52

SD		2.37	2.26	2.43
Intuition	mean	8.54	8.04	8.92
SD		3.78	3.20	4.16

Table 6 (continued)

Feeling	mean	12.18	12.41	12.00
SD		3.51	3.95	3.16
Perceiving	mean	7.55	7.82	7.35
SD		3.46	3.93	3.07

Table 7

Descriptive Statistics for the Personality Types of the KTS II [N = 117 (male = 51, Female = 66)]

Types		Total	Male	Female
Extrovert	mean	4.83	4.46	4.99
	SD	2.37	2.34	2.38
Intuition	mean	8.54	7.51	8.96
	SD	3.78	3.97	3.64
Feeling	mean	12.18	11.14	12.62
	SD	3.51	4.00	3.21
Perceiving	mean	7.55	7.77	7.46
	SD	3.46	3.81	3.32

CHAPTER 5

DISCUSSION

The Relationship between Creativity and Personality Types

Correlation Analysis for the Entire Group

The main focus of the present study was to determine if there was a relationship between creativity and personality types. The results indicate significant positive relationships between CI and both Intuitive and Perceiving personality types. This is consistent with the previous research in that Intuitive and/or Perceiving individuals are more creative than Sensing and Judging individuals (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carter et al., 1983; Fisher & Scheib, 1971; Hall, 1969; Myers & McCaulley, 1985; Richter & Winter; 1966). The significant correlation coefficient between CI and Intuitive after the Bonferroni correction indicates that Intuitive personality type is highly related to Creative potential.

The correlation coefficients of the six subscales of TTCT and the KTS II indicates relationships between Intuitive and Originality, Abstractness of Titles, Elaboration, and Creative Strengths, as well as between Perceiving both Abstractness of Titles and Creative Strengths. The significant correlation coefficient between Creative Strengths and both Intuitive and Perceiving after the Bonferroni correction indicates that Intuitive is highly

related to Creative potential. This finding that Intuitive and Perceiving are related to Abstractness of Titles and Creative strengths suggests 1) Intuitive and Perceiving might be similar personality types, and also the correlation indicated that they have significant relationship ($r = .538, p < .0001$). 2) According to Torrance (1998), creative strengths is a critical index to measure creativity, the result that Intuitive and Perceiving both related to Creativity further clear the doubt that previous research have only proved that Intuitive and Perceiving only are related Creativity styles. The result indicated Intuitive and Perceiving are also important personality types that could indicate Creative Strengths.

*Correlation Analysis between CI and KTS II for
Americans and Taiwanese, Respectively*

The present study identified a cultural difference in correlation coefficients between the CI and the KTS II. Extrovert is significantly related to CI for Americans, whereas a significant relationship was not found for Taiwanese, which may indicate that Extroverted Americans are more creative, but that this relationship may not hold true in Taiwan. In the perspective of relationship between personality types and creativity, this finding consists with previous several studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carne & Kirton, 1982; Ohnmacht, 1970) found that there is a relationship between Extrovert of the MBTI and creativity. However, the fact that Extrovert type of Taiwanese didn't have a significant

relationship with Creativity may suggest three directions: (1) culture difference may exist in creativity, (2) the design of instrument, and (3) the personality complexity has result in a neutralize relationship between Extroverted scale and Creativity.

It could be understood that Western's Creativity related to Extrovert since Western creativity focus on breaking the tradition and focusing on external expressions. Eastern perspectives of creativity involve the reinterpretation of traditional ideas, when I was scoring the TTCT, I found Taiwanese tend to use a simple word and simple line to represent a complex idea, this phenomenon might result from the importance of meditation in Eastern culture because Eastern culture thinks meditation helps one to see the true nature of the self or an object (Sarnoff & Cole, 1983). However, Policastro and Gardner (1999) claimed that creativity is highly related to intrapersonal intelligence, which is an ability that a personal knowledge turned inward to the self. Nevertheless, introverted personality type didn't have a significant relationship with TTCT in the present study even when we examined the relationship with Taiwanese group separately.

On the other hand, since previous research that used MBTI found Extroverted related to Creativity, but other research didn't. It can be assumed that the KTS II, a design of MBTI might result in similar circumstance.

As for the third explanation, in Csikszentmihalyi's (1996) research, he claimed that

the complex personality is a main index of identified Creativity. A person could be extroverted and introverted at the same time. Thus, if the Taiwanese sample who possessed creative potential is extremely extrovert or introvert, the result will appear like a no relationship.

*Correlation Analysis between Subscales of the TTCT and KTS II
for Americans and Taiwanese, Respectively*

The present study identified a cultural difference in the relationship between the TTCT subscales and the KTS II. While creativity is still related to both Intuitive and Perceiving for both Americans and Taiwanese, personality types are related to different subscales of the TTCT across the two cultures. Perceiving is related to Resistance to Premature Closure only for Americans, which may indicate that Perceiving Americans are more creative, but this relationship may not be significant in Taiwan.

*Correlation Analysis between both CI and Subscales of the TTCT and KTS II
for Males and Females, Respectively*

The present study identified a gender difference in the relationship between Intuitive and TTCT subscales. Intuitive is related to Abstractness of Titles for male, whereas it is related to Elaboration for females. Perceiving is also related to Abstractness of Titles for males, whereas it is related to Creative Strengths for females. This may indicate that both

Intuitive males and Perceiving males are creative in abstractive thinking, but Intuitive females are creative in elaborating things and Perceiving females are creative in relation to the thirteen creative strengths outlined earlier in the present paper.

Cultural and/or Gender Differences in Creativity

The results of previous research on gender differences in creativity were inconclusive. However, the present study found that females are more creative than males, which is consistent with Kim's (2004) result among Koreans.

The present study found that Taiwanese samples have more creative potential than American samples do in general. Taiwanese have much higher creative potential than Americans do in Resistance to Premature Closure. However, according to earlier examination, Perceiving Americans are more creative, but this relationship may not be significant in Taiwan. Combining two findings, it can be concluded that Perceiving types is not significant related to Creativity in Taiwanese group although Taiwanese is more creative in Resistance to Premature Closure. According to the TTCT scoring guide (Torrance, 1998), Resistance to Premature Closure is the ability to keep open and tolerate ambiguity enough to perceive information and to form innovated ideas. One possible explanation for this result is Resistance to Premature Closure is already existed in Taiwanese culture, and it doesn't necessarily occur with some specific personality types. However, in American culture, the

peoples who own perceiving types will help them possess more creativity potential.

In addition, this result is inconsistent with previous research (Bond, 1992; Fielding, 1997; Kim & Michael, 1995; Kim & Sergent, 2004; Rudowicz & Ng, 2003; Saeki et al., 2001) that concluded that there is a tendency for people from Confucian Asian societies to exhibit less creativity than people from the more individualistic Western societies. The possible explanation is motivation: Asian are test-oriented, even if it is not a test that will affect their academic achievement; culture requires Asian people to try to do their best on any test. Taking the difference in Fluency scale as an example, most Taiwanese tried to finish the third activity within the time limited. Although the Fluency scale is not the critical reason to contribute to the cultural difference, still it adds some effect on our result since the MANOVA is analysis of all the subscales of TTCT. The second explanation is the different drawing styles between Eastern and Western. Eastern people, especially the Chinese (which is the dominant culture in Taiwan), believe that to leave some blanks is a better way to express beauty. This expression style leads Taiwanese to tend to not close their pictures. However, choosing to close or not to close the incomplete figure is the main criterion of Resistance to Premature Closure.

Cultural and/or Gender Differences in Personality Types

The present study found that there is a significant gender difference in personality types. Females are more Feeling type than males. These results indicate that there were significant gender differences on personality types of the present study that were consistent across culture differences. Although comparing to Feeling types, the other three personality types don't have big gender differences. Still, this finding indicated that the distribution of personality types might exist gender difference.

Implications

Creativity was thought to be a natural-born ability, however, most research has concluded that creativity can be enhanced (Torrance, 1962, 1966; Torff, 1999). Therefore, educators hope that creativity research can help individuals reach their full creative potential.

The present study indicates that individuals who possess Intuitive and/or Perceiving personality types may have more creative potential than individuals who possess Sensing or Judging personality types. Thus, educators should be aware of students who exhibit Intuitive and Perceiving personality types so that they can encourage these students to achieve their full creative potential. Previous research shows that providing a supportive and an evaluation-free environment (Rogers, 1954) can enhance creative potential. The best creative techniques, or the strongest creative personality, cannot compensate for an environment or culture that crushes creativity (Kim, in press).

Limitations

There are several limitations in the present study. One limitation is that the sample size of the present study was small and the characteristics of the participants were homogeneous in terms of their geographic distributions (all participants were either from cities or suburban areas), all were enrolled in educational programs and the size of their university, etc. Thus, the generalization of the results of the present study is limited. For future studies, it would be appropriate to conduct research with a larger sample size and heterogeneous samples that can represent the entire population.

Another limitation of this study is that the Originality Lists of the TTCT in current use was developed in 1984 by Torrance. It is reasonable to assume that the culture has changed over the last twenty years to justify updating the Originality Lists (Kim, 2006). Cultural concerns are also present for the Originality Lists. All participants' TTCT scores were scored under the criteria of the American Originality Lists. From the author's experience scoring the TTCT of Americans and Taiwanese, responses that are unusual in one culture are common in the other were noticed. Thus the Originality Lists for Taiwanese should be different from lists used for Americans. Kim (2004) also noticed this difference among cultural groups when comparing Korean and American responses and suggested the creation of independent criteria for each group. The statistical frequency of various responses

seem to vary among people from different cultures, which makes it misleading to use TTCT-Figural in different cultures without adequate norm groups from their own populations and their own Originality Lists.

Translation of the tests is also one of the limitations. The Taiwanese subjects in the present study need to take tests in Chinese, and the quality of the translation might result in different interpretations of the questions of the KTS II or the instructions for the TTCT.

REFERENCES

- Agor, W. H. (1991). How intuition can be used to enhance creativity in organizations. *Journal of Creative Behavior*, 25,11-19.
- Albert, R. S., & Runco, M. A. (1999). A history of research on creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 16-31). New York: Cambridge University.
- Alt, C. A. (1999). The relationship among attention-deficit/hyperactivity disorder (ADHD), personality type and creativity in adults using the Myers-Briggs Type Indicator (MBTI) and the Torrance Tests of Creative Thinking (TTCT) (Doctoral dissertation, Saint Louis University, 1999). *Dissertation Abstracts International*, 60, 1007.
- Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.
- Anastasi, A., & Schaefer, C. (1971). Note on the concepts of creativity and intelligence. *Journal of Creative Behavior*, 5, 113-116.
- Arnau, R. C., Rosen, D., & Thompson, B. (2000). Reliability and validity of scores from the Singer-Loomis Type Deployment Inventory. *Journal of Analytical Psychology*, 45(3), 409-426.
- Barron, F. (1961). Creative vision and expression in writing and painting. In D. W. MacKinnon (Ed.), *The creative person* (pp. 237-251). Berkeley, CA: Institute of

Personality Assessment Research, University of California.

Barron, F. (1969). *Creative person and creative process*. New York: Holt, Rinehart & Winston.

Barron, F. (1972). The creative personality: Akin to madness. *Psychology Today*, 6(2), 42-44, 84-85.

Barron, F. (1988). Putting creativity to work. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 76-98). New York: Cambridge University Press.

Berry, C. (1981). The Nobel scientists and the origins of scientific achievement. *British Journal of Sociology*, 32, 381-391.

Bliss, W. D. (1970). Birth order of creative writers. *Journal of Individual Psychology*, 26, 200-202.

Bond, M. H. (1992). *Beyond the Chinese face: Insights from psychology*. Hong Kong: Oxford University Press.

Bonferroni, C. E. (1937). Teoria statistica delle classi e calcolo delle probabilita. In *Volume in onore di Ricarrdo dalla Volta* (pp. 1-62). Firenze, Italy: Universita di Firenze.

Buchanan, D. R., & Bandy, C. (1984). Jungian typology of prospective psychodramatists: Myers-Briggs Type Indicator analysis of applicants for psychodrama training. *Psychological Reports*, 55, 599-606.

- Buchanan, D. R., & Taylor, J. A. (1986). Jungian typology of professional psychodramatists: Myers-Briggs Type Indicator analysis of certified psychodramatists. *Psychological Reports, 58*, 391-400.
- Burley, T., & Handler, L. (1997). Personality factors in the accurate interpretation of projective tests. In E. F. Hammer (Ed.), *Advances in projective drawing interpretation* (pp. 359-377). Springfield, IL: Charles C. Thomas Publisher
- Carne, G. C., & Kirton, M. J. (1982). Styles of creativity: Test-score correlations between Kirton Adaption-Innovation Inventory and Myers-Briggs Type Indicator. *Psychological Reports, 50*, 31-36
- Carter, B. A., Nelson, D. L., & Duncombe, L. W. (1983). The effect of psychological type on the mood and meaning of two collage activities. *American Journal of Occupational Therapy, 37*, 688-693.
- Chambers, J. A. (1964). Relating personality and biographical factors to scientific creativity. *Psychological Monographs: General and Applied, 78*, 1-20.
- Chan, J. (1997). Creativity in the Chinese culture. Implicit creativity theories in India: An exploration. *Psychological Studies, 50*(1), 32-39.
- Chavez-Eakle, A. R., Lara, M., & Cruz-Fuentes, C. (2006). Personality: A possible bridge between creativity and psychopathology? *Creativity Research Journal, 18*, 27-38.

- Chu, Y-K. (1970). Oriental views on creativity. In A. Angoff & B. Shapiro (Eds.), *Psi factors in creativity* (pp. 35-50). New York: Parapsychology Foundation.
- Clark, R. D., & Rice, G. A. (1982). Family constellations and eminence: The birth orders of Nobel Prize winners. *Journal of Psychology, 110*, 281-287.
- Cooper, E. (1991). A critique of six measures for assessing creativity. *Journal of Creative Behavior, 25*, 194-204.
- Cramond, B., Matthews-Morgan, J., Bandalos, D., & Zuo, L. (2005). The Torrance Tests of Creative Thinking: Alive and well in the new millennium. *Gifted Child Quarterly, 49*, 283-291.
- Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* (pp.325-339). New York: Cambridge University Press.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
- Dacey, J. S. (1989). Discriminating characteristics of the families of highly creative adolescents. *Journal of Creative Behavior, 23*(4), 263-271.
- Davis, G. A. (1992). *Creativity is forever* (3rd Ed.). Dubuque, IA: Kendall/Hunt Publishing Company.

- Davis, G. A., Peterson, J. M., & Farley, F. H. (1973). Attitudes, motivation, sensation seeking, and belief in ESP as predictors of real creative behavior. *Journal of Creative Behavior, 7*, 31-39.
- Davis, G. A., & Subkoviak, M. J. (1978). Multidimensional analysis of a personality-based test of creative potential. *Journal of Educational Measurement, 12*, 37-43.
- Dollinger, S. J., Palaskonis, G. D., & Pearson, J. L. (2004). Creativity and intuition revisited. *Journal of Creative Behavior, 38*, 244-259.
- Domino, G. (1969). Maternal personality correlates of son's creativity. *Journal of Consulting and Clinical Psychology, 33*, 180-183.
- Eiduson, B. T. (1962). *Scientists: Their psychological world*. New York: Basic.
- Eysenck, H. J. (1995). Creativity as a product of intelligence and personality. In D. H. Saklofske & M. Zeidner (Ed.), *International handbook of personality and intelligence* (pp. 231-247). New York: Plenum Press.
- Fabun, D. (1968). *You and creativity*. New York: Macmillan.
- Farley, F. H. (1986). The big T in personality. *Psychology Today, 20*(5), 47-52.
- Feist, J. G. (1999). The influence of personality on artistic and scientific creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). New York: Cambridge University Press.

- Fielding, R. M. (1997). A socio-cognitive perspective on cross-cultural attitudes and practices in creativity development. *Australian Art Education*, 20(1-2), 27-33.
- Fisher, R., & Scheib, J. (1971). Creative performance and the hallucinogenic drug-induced creative experience or one man's brain-damage is another's creativity. *Confinia Psychiatrica*, 14(3-4), 174-202.
- Fleenor, J. W., & Sylvester, T. (1994). Construct validity of three self-report measures of creativity. *Educational and Psychological Measurement*, 54(2), 464-470.
- Freud, S. (2003). *The origin and development of psychoanalysis*. In P. M. Munger (Ed.), *The history of psychology: Fundamental questions* (pp. 258-269). New York: Oxford University Press.
- Gardner, H. (1989). *To open minds*. New York: Basic.
- Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision: A longitudinal study of problem finding in art*. New York: Wiley.
- Getzels, J. W., & Jackson, P.W. (1962). *Creativity and intelligence: Explorations with gifted students*. New York: John Wiley and Sons.
- Goertzel, M. G., Goertzel, V., & Goertzel, T. G. (1978). *Three hundred eminent personalities: A psychosocial analysis of the famous*. San Francisco: Jossey-Bass.
- Goodson, L. K. (1989). The relationship between data gathering preferences of young adult

students, as reported by the Myers-Briggs Type Indicator, and the content of their creative compositions (Doctoral dissertation, University South Carolina, 1989).

Dissertation Abstracts International, 49, 2895.

Gryskiewicz, N. D., & Tullar, W. L. (1995). The relationship between personality type and creativity style among managers. *Journal of Psychological Type*, 32, 30-35.

Guilford, J. P. (1956). The structure of intellect. *Psychological Bulletin*, 53(4), 267-293.

Guilford, J. P. (1959). Three faces of intellect. *American Psychologist*, 14(8), 469-479.

Gupta, A. K. (1981). Sex differences in creativity: Some fresh evidence. *Journal of Creative Behavior*, 15, 269.

Hall, W. B. (1969). Personality inventory correlates of creativity among architects. *Journal of Applied Psychology*, 53, 322-326.

Hammond, J., & Edelmann, R. J. (1991). The act of being: Personality characteristics of professional actors, amateur actors and non-actors. In G. Wilson (Ed.), *Psychology and performing arts*. Amsterdam/Lisse: Swets & Zeitlinger.

Hartzell, E. A. (2000). Visual creativity through the prism of psychological type (Doctoral Dissertation, Pacifica Graduate Institution, 2000). *Dissertation Abstracts International*, 60, 5774.

Helson, R. (1965). Childhood interest clusters related to creativity in women. *Journal of*

Consulting Psychology, 29, 352-361.

Helson, R., & Crutchfield, R. S. (1970). Mathematicians: The creative researcher and the average Ph.D. *Journal of Consulting and Clinical Psychology*, 34, 250-257.

Hill, O. W. (1987). Intuition: Inferential heuristic or epistemic mode? *Imagination, Cognition and Personality*, 7, 137-154.

Houtz, J. C., Leblanc, E., Butera, T., Arons, M. F., Katz, S., Orsini-Romano, C., & McGuire, A. (1994). Personality type, creativity, and classroom teaching style in student teachers. *Journal of Classroom Interaction*, 29(2), 21-26.

Huang, T-Y. (2005) Fostering creativity: A meta-analytic inquiry into the variability of effects, *Dissertation Abstracts International*, 66(04A), 2348A.

Hughes, A. O., & Drew, J. S. (1984). A state creative? *Papers in the Social Sciences*, 4, 1-15.

Isaksen, S. G., Lauer, K. J., & Wilson, G. V. (2003). An examination of the relationship between personality type and cognitive style. *Creativity Research Journal*, 15, 343-354.

Jacobson, C. M. (1993). Cognitive styles of creativity: Relations of scores on the Kirton Adaption-Innovation Inventory and the Myers-Briggs Type Indicator among managers in USA. *Psychological Reports*, 72, 1131-1138.

Jaquish, G. A., & Ripple, R. E. (1980). Divergent thinking and self-esteem in preadolescents.

Journal of Youth and Adolescence, 9(2), 143-152.

Jensen, A. R. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger.

Johnson, R. C. (2004). Study of the relationship between cognitive styles of creativity

and personality types of military leaders. *Dissertation Abstracts International*,

64(10-A), 3859.

Jung, C. G. (1923). *Psychological types or the psychology of individuation*. Oxford, England:

Harcourt, Brace.

Jung, C. G. (1971). *Psychological types*. Princeton, NJ: Princeton University Press.

Keirsey, W. D. (2006). *Is the "Myers-Briggs" the same as Keirsey temperament sorter?*

Retrieved May 15, 2007, from <http://keirsey.com/faq.html>

Kelly, K. R., & Jugovic, H. (2001). Concurrent validity of the online version of the Keirsey

Temperament II. *Journal of Career Assessment*, 9(1), 49-59.

Kim, K. H. (2004, April). *Confirmatory factor analyses and multiple group analyses on the*

Torrance Tests of Creative Thinking. Poster session presented at the Research

Symposium, The Preparation of Educators, Athens, GA of the University of

Georgia (April 30). Sponsored by Georgia Systemic Teacher Education Program.

Kim, K. H. (in press). Meta-analyses of the relationship of creative achievement

to both IQ and divergent thinking test scores. *Journal of Creative Behavior*.

Kim, J., & Michael, W. B. (1995). The relationship of creativity measures to school achievement and to preferred learning and thinking style in a sample of Korean high school students. *Educational and Psychological Measurement*, 55(1), 60-74.

Kim, K. H., & Sergent, D. F. (2004, August). *The relationship between Confucianism and creativity among American and Korean teachers for gifted children*. Poster session presented at the International Council of Psychologists (ICP) conference held in Jinan, Shandong, China, August 3-6, 2004.

Kroeber, A. L. (1944). *Configurations of culture growth*. Berkeley: University of California Press.

Kundu, D. (1987). Creativity and its relation to some personality variables in high school students: An empirical investigation. *Journal of Psychology Research*, 31(2), 55-63.

Kuo, Y-Y. (1996). Taoistic psychology of creativity. *Journal of Creative Behavior*, 30(3), 197-212.

Lee, J., Park, E., & Kim, H. (2000). Literacy education in Korea: A sociocultural perspective. *Child Education*, 76(6), 347-351.

Lim, W., & Plucker, J. A. (2001). Creativity through a lens of social responsibility: Implicit

theories of creativity with Korean samples. *Journal of Creativity Behavior*,
35(2), 115-130.

Lissitz, R. W., & Willhoft, J. L. (1985). A methodological study of the Torrance Tests of
Creativity. *Journal of Educational Measurement*, 22, 1-111.

Lubart, T. I. (1990). Creativity and cross-cultural variation. *International Journal of
Psychology*, 25, 39-59.

Lubart, T. I. (1999). Creativity across cultures. In R. J. Sternberg (Ed.), *Handbook of
creativity* (pp. 339-350). New York: Cambridge University Press.

MacKinnon, D. W. (1961). Creativity in architects. In D. W. MacKinnon (Ed.), *The creative
person* (pp. 291-320). Berkeley, CA: Institute of Personality Assessment
Research, University of California.

MacKinnon, D. W. (1962). The nature and nurture of creative talent. *American Psychologist*,
17, 484-495.

Mathur, S. G. (1982). Cross-cultural implications of creativity. *Indian Psychological Review*,
22(1), 12-19.

McCrae, R. R., & Costa, P. T., Jr. (1989). Reinterpreting the Myers-Briggs Type Indicator
from the perspective of the five-factor model of personality. *Journal of Personality*,
57(1), 17-40.

- Mellou, E. (1996). Can creativity be nurtured in young children? *Early Child Development and Care, 11*, 119-130.
- Mellou, E. (1995). Creativity: The interaction condition. *Early Child Development and Care, 109*, 143-157.
- Millar, G. W. (2002). *The Torrance kids at mid-life*. Westport, CT: Ablex.
- Murray, J. B. (1990). Review of research on the Myers-Briggs Type Indicator. *Perceptual and Motor skills, 70*, 1187-1202.
- Myers, I. B. & McCaulley, M. H. (1985). *Manual: A guide to the development and use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychological Press, Inc.
- Myers, I. B., & Myers, B. P. (1980). *Gifts differing*. Palo Alto, CA: Consulting Psychological Press, Inc.
- O'Brien, P. C. (1984). Procedures for comparing samples with multiple endpoints. *Biometrics, 40*, 1079-1087.
- Ogawa, M., Kuehn-Ebert, C., & De Vito, A. (1991). Differences in creative thinking between Japanese and American fifth-grade children. *Ibaraki University Faculty of Education Bulletin, 40*, 53-59.
- Ohnmacht, F. W. (1970). Personality and cognitive referents of creativity: A second look. *Psychological Reports, 26*, 336-338.

- Panda, M., & Yadava, R. (2005). Implicit creativity theories in India: An exploration. *Psychological Studies*, 50(1), 32-39.
- Pope, M. R. (1997). Creativity and the computer professional: The impact of personality perception on innovation approach preferences in terms of creative thinking and behavior(Doctoral dissertation, Colorado Technical University, 1997). *Dissertation Abstracts International*, 58, 1366.
- Policastro, E. (1995). Creative intuition: An integrative review. *Creativity Research Journal*, 8(2), 99-113.
- Policastro, E., & Gardner, H. (1999). From cast studies to robust generalization: An approach to the study of creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). New York: Cambridge University Press.
- Quinn, M. T., Lewis, R. J., & Fischer, K. L. (1992). A cross-correlation of the Myers-Briggs and Keirsey instruments. *Journal of College Student Development*, 33(3), 279-280.
- Reile, D. M., & Harris-Bowlsbey, J. (2000). Using the Internet in career planning and assessment. *Journal of Career Assessment Special Issue: Career Assessment and the Internet*, 8(1),69-84.
- Rhodes, M. (1961). An analysis of creativity. *Phi Delta Kappan*, 42, 305-310.
- Richter, R. H., & Winter, W. D. (1966). Holtzman Inkblot correlates of creative potential.

Journal of Projective Techniques & Personality Assessment, 30(1), 62-67.

Rogers, C. R. (1954). Toward a theory of creativity. *ETC: A Review of General Semantics*, 11, 249-260.

Rogers, C. R. (1976). Toward a theory of creativity. In A. Rothenberg & C. R. Hausman (Eds.), *The creativity question* (pp. 296-305). Durham, NC: Duke University Press.

Rose, L. H., & Lin, H. T. (1984). A meta-analysis of long-term creativity training programs. *Journal of Creative Behavior*, 18, 11-22.

Roy, D. D. (1996). Personality model of fine artists. *Creativity Research Journal*, 9(4), 391-394

Rudowicz, E., & Ng, T. S. (2003). On Ng's "Why Asians are less creative than Westerners" (Book review). *Creativity Research Journal*, 15(2&3), 301-302.

Runco, M. A. (1991). The evaluative, valuative, and divergent thinking of children. *The Journal of Creative Behavior*, 25, 311-319.

Rushton, J. P., Murray, H. G., & Paunonen, S. V. (1987). Personality characteristics associated with high research productivity. In D. Jackson & J. P. Rushton (Eds.), *Scientific excellence* (pp. 129-148). Beverly Hills, CA: Sage.

Rushton, J. P., & Jensen, A. R. (2006). The totality of available evidence shows the race IQ

gap still remains. *Psychological Science*, 17, 921-922.

Sarnoff, D. P., & Cole, H. P. (1983). Creativity and personal growth. *Journal of Creative Behavior*, 17(2), 95-102.

Saeki, N., Fan, X., & Van Dusen, L. V. (2001). A comparative study of creative thinking of American and Japanese college students. *Journal of Creative Behavior*, 35(1), 24-38.

Schaefer, C. E. (1969). Imaginary companions and creative adolescents. *Developmental Psychology*, 1, 747-749.

Schaefer, C. E. (1970). *Biographical inventory-creativity*. San Diego, CA: Educational and Industrial Testing Services.

Schubert, D. S. P., Wagner, M. E., & Schubert, H. J. P. (1977). Family constellation and creativity: First-born predominance among classical music composers. *Journal of Psychology*, 95, 147-149.

Scope, E. E. (1999) A meta-analysis of research on creativity: The effects of instructional variables (Doctoral dissertation, Fordham University, 1999). *Dissertation Abstracts International*, 59, 2348.

Scott, G., Leritz, L., & Mumford, M. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal*, 16, 361-388.

- Simonton, D. K. (1976). Biographical determinants of achieved eminence: A multivariate approach to the Cox data. *Journal of Personality and Social Psychology*, 33, 218-226.
- Simonton, D. K. (1984). Artistic creativity and interpersonal relationships across and within generations. *Journal of Personality and Social Psychology*, 46, 1273-1286.
- Somers, J. V., & Yawkey, T. D. (1984). Imaginary play companions: Contributions of creativity and intellectual abilities of young children. *Journal of Creative Behavior*, 18, 77-89.
- Starko, J. A. (1994). *Creativity in the classroom*. New York: Longman.
- Sternberg, R. J. (1988). A three-facet model of creativity. In R. J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* (pp.125-147). New York: Cambridge University Press.
- Sternberg, R. J. (1999). *Handbook of creativity*. New York: Cambridge University Press.
- Sternberg, R. J., Grigorenko, E. L., & Bundy, D. A. (2001). The predictive value of IQ. *Merrill-Palmer Quarterly*, 47(1), 1-41.
- Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development*, 34(1), 1-31.

Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.

Sternberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, 51(7), 677-688.

Sternberg, R. J., & Lubart, T. I. (1999). The Concept of creativity: Prospects and paradigms. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). New York: Cambridge University.

Stewart, L. H. (1977). Birth order and political leadership. In M. G. Hermann (Ed.), *The psychological examination of political leaders* (pp. 205-236). New York: Free Press.

Storr, A. (1988). *Solitude: A return to the self*. New York: Free Press.

Suler, J. R. (1980). Primary process thinking and creativity. *Psychological Bulletin*, 88, 144-165.

Sulloway, F. J. (1979). *Freud: Biologist of the mind*. New York: Basic Books.

Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. New York: Pantheon.

Swartz, J. D. (1988). Torrance Tests of Creative Thinking. In D. J. Keyser & R. C. Sweetland (Eds.), *Test critique* (vol. 7, pp. 619-622). Kansas, MS: Test Corporation of

America, a Subsidiary of Westport Publisher.

Tardif, T. Z., & Sternberg, R. J. (1988). What do we know about creativity? In R. J.

Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* (pp. 429-440). New York: Cambridge University Press.

Taylor, D. W. (1988). Various approaches to and definitions of creativity. In R. J. Sternberg

(Ed.), *The nature of creativity* (pp. 99-121). New York: Cambridge University Press.

Tegano, D. W. (1990). Relationship of tolerance of ambiguity and playfulness to creativity.

Psychological Reports, 66,1047-1056.

Thorne, A., & Gough, H. (1991). *Portraits of type: An MBTI research compendium*. Palo

Alto, CA: Consulting Psychologists Press.

Toothaker, L. E. (1993). *Multiple comparison procedures*. Newbury Park, CA: Sage.

Torff, B. (1999). Encouraging the creative voice of the child. *The NAMTA Journal*, 25(1),

194-214.

Torrance, E. P. (1962). *Guiding creative talent*. Englewood Cliffs, NJ: Prentice-Hall.

Torrance, E. P. (1963). *Education and the creative potential*. Minneapolis: the University of

Minnesota.

Torrance, E. P. (1966). Rationale of the Torrance tests of creative thinking

ability. In E. P. Torrance & W. F. White (Eds.), *Issues and advances in education psychology*. Ilica, IL: F. E. Peacock.

Torrance, E. P. (1974). *The Torrance Tests of Creative Thinking—norms technical manual—research edition—verbal tests, forms A and B, figural tests, forms A and B*. Princeton, NJ: Personnel Press.

Torrance, E. P. (1998). *The Torrance Tests of Creative Thinking norms technical manual figural (streamlined) forms A & B*. Bensenville, IL: Scholastic Testing Service, Inc .

Torrance, E. P. (2002). *The manifesto: A guide to developing a creative career*. Westport, CT: Ablex Publishing.

Treffinger, D. J. (1985). Review of the Torrance Tests of Creative Thinking. In J. V. Mitchell, Jr. (Ed.), *The ninth mental measurements yearbook* (pp. 1632-1634). Lincoln: Burors Institute of Mental Measurements, University of Nebraska.

Tucker, I. F., & Gillespie, B. V. (1993). Correlations among three measures of personality type. *Perceptual and Motor Skills*, 77(2), 650.

Turkheimer, E., Haley, A., Waldron, M., D'Onofrio, B., & Gottesman, I. I. (2003). Socioeconomic status modifies heritability of IQ in young children. *Psychological Science*, 14, 623-628.

Walberg, H. A. (1988). Creativity and talent as learning. In R. J. Sternberg (Ed.), *The nature*

of creativity (pp. 340-361). New York: Cambridge University Press.

Walberg, H. A., & Herbig, M. P. (1991). Developing talent, creativity, and eminence. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education*. Needham Heights, MA: Allyn & Bacon.

Waskel, S. A. (1995). Temperament types: Midlife death concerns, demographics, and intensity of crisis. *Journal of Psychology: Interdisciplinary and Applied*, 129(2), 221-233.

White, L. (1949). *The science of culture*. New York: Farrar, Straus.

Wiggins, J. S. (1989). Review of the Myers-Briggs Type Indicator. In J. V. Mitchell (Ed.), *The length mental measurements yearbook* (Vol. 10, pp. 536-538). Lincoln, NE: Buross Institute.

Wickes, S. K., & Ward, B. T. (2006). Measuring gifted adolescents' implicit theories of creativity. *Roepers Review*, 28(3), 131-139.

Willis, C. G. (1984). Review of the Myers-Briggs Type Indicator. In D. J. Keyser and R. C. Sweetland (Eds.), *Test critiques* (Vol. 1, pp. 482-490). Kansas City, MO: Test Corp. of America.

Wikipedia. (2007). *MBTI*. Retrieved May, 26, 2007, from the

<http://en.wikipedia.org/wiki/Myers-Briggs>

Yang, S. C., & Chaun, W. L. (2004). The relationship among creative, critical thinking and

thinking styles in Taiwan high school students. *Journal of Instructional*

Psychology, 31(1), 33-45.

Yue, X. D., & Rudowicz, E. (2002). Perception of the most creative Chinese by

undergraduates in Beijing, Guangzhou, Hong Kong, and Taipei. *Journal of Creative*

Behavior, 36(2), 88-104.

Zuckerman, M. (1975). *A manual and research report of the sensation seeking scale*. ETS

Test Collection. Princeton, NJ: Educational Testing Service.