

Comparisons of Creative Styles and Personality Types Between American and Taiwanese College Students and the Relationship Between Creative Potential and Personality Types

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The purpose of the study was to compare differences in creative styles (Kirton, 1976) and personality types between Americans and Taiwanese and to examine the relationships among various personality types and creative potential. Creative potential was measured by the Torrance Test of Creative Thinking-Figural, and personality types were measured by the Keirsey Temperament Sorter II. Ninety-three American and 76 Taiwanese college students specializing in teacher education participated in this study. The results indicated that Americans are more adaptively creative than Taiwanese, whereas there is no difference between the two groups in Innovative creative style. The results also indicated that there are significant relationships between Adaptive creative style and Intuition, between Creative Strengths and Intuition, and between Creative Strengths and Perceiving. It is concluded that there is a cultural difference in creative potential and personality types and that there are relationships between particular subscales of creativity and personality types.

Keywords: creativity, Torrance Tests of Creative Thinking, personality, Keirsey Temperament Sorter II, cross-culture

People interpret their world through cultural artifacts, ideas, and beliefs. Cross-cultural studies have shown how culture and creativity interact and how culture affects the expression of creativity by how much it values the expression of creativity. For instance, Chinese people view creativity as an ability to contribute to the society, and, thus, politicians are recognized as more creative than other creators like 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. Starko (1994) concluded that cultural contexts can determine the definition of creativity prevalent in a culture. Further, cultural influences on creativity are also critical to its development and expression (Fielding, 1997).

Can Culture 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 environmental conditions allow enough safety and freedom to develop creativity. In some cultures, creative behaviors conflict with cultural norms and create barriers to creativity, such as social influence, expectations, and conformity pressures (Davis, 1992; Torrance, 1963, 2002). Alternatively, if a culture considers creative behaviors valuable, such behaviors will be encouraged.

According to the “Four Ps of Creativity theorized by Rhodes (1961)—Person, Process, Product, and Press—, even if a person has the process and product to be a successful creator, achievement may fall short if prevailing social and cultural conditions (i.e., press) do not value the creative output (Kim, 2007). Cross-cultural studies, highlighting social and cultural elements, have shown cultural diversity in the value and expression of creativity (e.g., Lim & Plucker, 2001; Lubart, 1990, 1999; Sternberg & Lubart, 1999; Yue & Rudowicz, 2002). Furthermore, many researchers (Bond, 1992; Fielding, 1997; Kim, 2009; Rudowicz & Ng, 2003; Saeki, Fan, & Van Dusen, 2001) concluded that people from Confucian Asian societies tend to exhibit less creativity than people from more individualistic societies. In East Asian cultures, Confucianism is the core of the cultural framework (Kim, 2007). Kim (2009) found that some elements of Confucianism including unconditional obedience, gender inequality, and suppression of expression have negative relationships with scores on a measure of creative potential. Ho and Ho (2008) explained that because of the strong controlling power of Confucianism over the entire society,

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elements of Confucianism (e.g., authority relations or authoritarian control) have negatively impacted the development of creativity in Confucian-heritage cultures.

Creativity and Jung's Personality Types

Jung's Theory of Personality Types

Jung's theory of personality types has gained widespread acceptance in psychology (Arnau, Rosen, & Thompson, 2000). Jung (1923, 1971) believed that personality types do not change although the self-report of it might change as people focus on developing different mental processes at various stages in life. His theory describes human behavior as being innate and classifiable based on fundamental similarities in preferences for Extroversion or Introversion; Feeling or Thinking; Intuition or Sensing; and implied Perceiving or Judging functions. Jung identified six personality types (Extroversion or Introversion; Feeling or Thinking; Intuition or Sensing) and suggested the possibility of another type, Judging and Perceiving. Later, the work of Myers and Myers (1980) added Perceiving and Judging as a recognized function. The Myers-Briggs Type Indicator and the Keirsey Temperament Sorter are based on Jung's theory of the preferences of personality types (Francis, Craig, & Robbins, 2008; Howell, 2004). The preferences (Dollinger, Palaskonis, & Pearson, 2004; Myers & Myers, 1980; "Myers-Briggs Type Indicator," 2007) are as follows.

Extroversion or introversion. Extroversion or introversion refers to preference for focusing toward the outer-objective world or the inner-subjective world. Extroverted people prefer the outer world of people and things, whereas introverted people are more interested in the inner world of ideas.

Feeling or thinking. Feeling or thinking refers to the preference for personal values or compassion versus logic and reasoning in making decisions. Feeling people tend to base their decisions on values and subjective evaluation of person centered concerns, whereas thinking people tend to base their decisions on logic and objective analysis of cause and effect.

Intuition or sensing. 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, whereas sensing people tend to focus on the present and concrete information gained from their senses, and prefer to receive data from the five senses. Intuitive people focus on the large pattern of meanings and possibilities, whereas sensing people focus on information in terms of practical and tangible details.

Perceiving or judging. Perceiving people tend to prefer a flexible and spontaneous approach to life and keeping their options open, whereas judging people tend to prefer a planned and organized approach to life and having things settled.

The Jungian-Type Inventories

The Myers-Briggs Type Indicator (MBTI). The MBTI (Myers & McCaulley, 1985) is a self-reported personality test developed based on Jung's theory of personality. It is a 94-item self-administered forced-choice format questionnaire that measures individual preferences. It 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, indicating that a large majority of people thinks that their MBTI results reflect their personality (Myers & McCaulley, 1985). Further, Myers and McCaulley found that college students' scores have higher reliabilities than high school students' scores. This might be because older students know themselves better and, thus, report their preferences more consistently. Lower reliability usually occurs on Feeling or Thinking of the MBTI (Alt, 1999). Overall, the reliability and validity of the MBTI have been reported as adequate to measure individuals' personality (Murray, 1990; Wiggins, 1989; Willis, 1984).

The Keirsey Temperament Sorter II (KTS II). The KTS II (Keirsey, 2006) is used widely as an alternative to the MBTI (Kelly & Jugovic, 2001). Based on Jung's theoretical work, the KTS II categorizes personality types: Extraversion/Introversion, Sensing/Intuitive, Thinking/Feeling, and Judging/Perceiving (Francis et al., 2008). The KTS II is a 70-item self-administered forced-choice format questionnaire that measures individual preferences. Scores for Extraversion/Introversion range from 0 to 10, whereas scores on the other three personality types range from 0 to 20. According to Boyar (2007), the psychological dimensions that KTS II and MBTI measure are similar and highly related, although the results might have different percentiles in different dimensions. Keirsey (2006) claimed that MBTI and KTS II produce very similar in results (approximately .75 correlation). Several studies report concurrent validity between MBTI and KTS II, ranging from .54 to .74 (Quinn, Lewis, & Fischer, 1992); from .68 to .84 (Tucker & Gillespie, 1993); and from .60 to .78 (Kelly & Jugovic, 2001). The KTSII has several advantages (e.g., short administration time [15 minutes], easy and quick scoring, low cost, etc.). There is an online version of the KTS II and it is one of the most popular online personality assessments (Reile & Harris-Bowlsbey, 2000), and it is available in many different languages (Kelly & Jugovic, 2001).

The Relationship Between Creativity and Intuition/Sensing

Intuition is an important personality characteristic of creativity. Successful creators, such as Darwin, Freud, and Cantor, seem to have moved along their creative processes in a similar sequence beginning with generative intuitions and ending with more explicitly articulated products after long periods of persistent work (Policastro, 1995). Several studies have found that Intuition of the MBTI is highly related to creativity (Agor, 1991; Burley & Handler, 1997; Hill, 1987; Pope, 1997): Hartzell (2000) interviewed professional artists and found that artistic creative people tend to be intuitive; Agor (1991) found that creative managers tend to be intuitive; Burley and Handler (1997) found that good interpreters tend to be creative and scored higher in Intuition; and Pope (1997) found a significant relationship between Intuition and spontaneous innovation approach of creative behavior on the creative profile measure in his study.

The Relationship Between Creativity and Perceiving/Judging

Myers and Myers (1980) described Perceiving as a gift differing by its tolerance and curiosity that enables Perceiving people to

wait until fragmentary ideas can be organized. Sternberg and Lubart (1991) claimed that tolerance of ambiguity is important for creativity because a person needs to be flexible enough to wait for ambiguous concepts to become clear. Tegano (1990) found that both tolerance of ambiguity and playfulness are related to creativity. Further, several studies (Carne & Kirton, 1982; Gryskiewicz & Tullar, 1995; Isaksen, Lauer, & Wilson, 2003; Jacobson, 1993; Johnson, 2004) examined the relationship between the MBTI and the Kirton's Adaptation- Innovation Inventory (KAI) and found that Perceiving is related to the Innovative creative style of the KAI.

Myers and McCaulley (1985) claimed both Intuition and Perceiving are related to creativity, especially when found together in one person. Two studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986) assumed that psycho dramatists have essential traits, such as spontaneity and creativity and found that the Intuition and Perceiving preference existed in psycho dramatists. Fisher and Scheib (1971) examined brain damage and creativity and found that their creative subjects possessed the Intuition and Perceiving preference. Studies using the MBTI also found that the Intuition and Perceiving preference is related to creativity (Carter, Nelson, & Duncombe, 1983; Richter & Winter, 1966). Further, Helson (1965) found that imaginative play and artistic activity are related to Intuition and Perceiving. Hall (1969) found that creativity is related to Intuition and Perceiving among architects.

The Relationship Between Creativity and Extroversion/Introversion

It is unclear whether Extroverted or Introverted individuals are more creative (Myers & McCaulley, 1985). 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 methods of gathering information for creative writing. Several studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carne & Kirton, 1982; Ohnmacht, 1970) indicated a relationship between Extroversion of the MBTI and creativity. Ohnmacht (1970) examined the relationship between the five measures of divergent production and the MBTI among college students majoring in Education and found that Extroverted students score higher than Introverted students on the measures of divergent production. Two studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986) found that psycho dramatists are Extroverted, and Carne and Kirton (1982) found that Extroversion is related to creativity among experienced management students.

However, Kundu (1987) found that creativity is positively related to ego-strength and Introversion, negatively related to psychoticism, and that the relationship between creativity and Extroversion is curvilinear. Roy (1996) found that artists are more Introverted, independent, and tender-minded than nonartists. Feist (1999) also found that creative people are Introverted in both art and science fields, but Hammond and Edelman (1991) 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 and McCaulley (1985) claimed that the preference for either Feeling or Thinking does not affect a person's creativity. Contradictorily, Yang and Chaun (2004) found that various Thinking types on the Thinking Styles Inventory (Sternberg, 1997) correlated to different personality types on the MBTI. Jacobson (1993) found that Thinking type was the most common among creative managers, and Agor (1991) found that Intuitive managers tend to be more Thinking type. In contrast, Buchanan and Taylor (1986) found that creative psycho dramatists tend to be Feeling type. Moreover, Dollinger et al. (2004) concluded that a combination of Intuition and Feeling best characterize high scores on various creativity measures among college students.

The Jungian-Type Inventories and the Torrance Tests of Creative Thinking (TTCT)

Two studies with small sample sizes (Alt, 1999; Houtz et al., 1994) examined the relationship between the MBTI and the TTCT but found no significant relationship between personality type preference and scores on the TTCT. Alt (1999) found a strong Intuition and Perceiving preference among adults with Attention Deficit Hyperactivity Disorder (ADHD) but did not find a significant relationship between the preference and scores on the TTCT-Figural. Further, in both studies, they found no significant difference in the scores on the TTCT between adults with ($n = 54$) and without ($n = 56$) ADHD. Houtz et al. (1994) also found no significant relationship between personality type preference and the scores on the TTCT-Verbal among 46 student teachers in elementary and secondary preservice programs.

Innovative and Adaptive Creative Styles

The present study examined whether personality types are related to Innovative and Adaptive creative styles. Kirton (1976) proposed that creativity is composed of a single dimension ranging from an "Innovative" to an "Adaptive" orientation. Other researchers (Kim, 2006b; Kim, Cramond, & Bandalos, 2006) suggested that Innovation and Adaptation may be separate dimensions of creativity rather than opposite ends of a continuum. The Innovation-Adaptation orientation identifies the ways individuals approach creativity, problem solving, and decision-making (Puccio, Treffinger, & Talbot, 1995). Innovators create change by threatening the paradigm, whereas Adaptors create change by working within the existing paradigm (Kirton, 1976). Innovators produce quick and novel responses, whereas Adaptors are detailed and deep thinkers. Innovators are more fluent and original than Adaptors (Torrance & Horng, 1980; Isaksen & Puccio, 1988). According to the model hypothesized by Kim (2006b; Kim et al., 2006), individual TTCT variables can be selectively combined to measure Innovative creative style (e.g., a combination of Fluency, Originality, and Resistance to Premature Closure) and Adaptive creative style (e.g., a combination of Elaboration, Abstractness of Titles, and Resistance to Premature Closure). The logic for the double loading by Resistance to Premature Closure originates from Torrance's theoretical assumption of creative individuals (Kim, 2006b).

Research questions. The present study attempted to answer the following questions.

1. Is there a difference in Innovative creative style, Adaptive creative style, and Creative Strengths (see the Instruments section for Creative Strengths) on the TTCT and in Extroversion, Feeling, Intuition, and Perceiving on the KTS II by culture and gender?
2. Is there a relationship between Innovative creative style, Adaptive creative style, and Creative Strengths on the TTCT and Extroversion, Feeling, Intuition, and Perceiving on the KTS II? If so, is there a difference in the relationship by culture and gender?

Methods

Participants. A total number of 169 American ($n = 93$) and Taiwanese ($n = 76$) college students participated in this study. The participants were in undergraduate teacher education programs of their respective universities. Participant age ranged from 18–51 years old ($M = 25.25$; $SD = 7.23$); Taiwanese student age ranged from 20–29 years old ($M = 21.76$; $SD = 1.25$), and American student age ranged from 18–51 years old ($M = 29.10$; $SD = 8.65$). The sample was predominately female consisting of 120 female and 49 male students: There were 21 male and 55 female American students and 28 male and 65 female Taiwanese students. One hundred and eight participants were from suburban areas and 59 from urban areas: Seventy-eight of the American students were from suburban areas and 14 from urban areas, whereas 30 Taiwanese students were from suburban areas and 45 from urban areas. The American students were primarily Caucasian, whereas the Taiwanese students were Asian.

Instruments. Jung's personality types are widely accepted and can be assessed using either the MBTI or the KTS II (Kelly & Jugovic, 2001). The TTCT is the most widely used and studied measure of creativity (Kim 2006a); however, the authors could find only two studies that attempt to correlate these common measures of Jung's personality types with the TTCT's measures of creative potential and both of these studies used the MBTI (Alt, 1999; Houtz et al., 1994). The relationship between the MBTI and creativity has been extensively studied; however, the authors are aware of no previously published studies of KTS II and creativity. Therefore, for further understanding the relationship between Jungian-type inventories and creativity, the authors chose to use KTS II as the instrument for measuring personality types, and the TTCT for measuring creativity potential.

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

Torrance developed the TTCT in 1966 (see detailed information in Kim, 2006a). The TTCT has been renormed in 1974, 1984, 1990, 1998, and 2008. The TTCT displays adequate reliability and validity (Cooper, 1991; Treffinger, 1985), has been translated into over 35 languages (Millar, 2002), and is the most researched and analyzed creativity measure (Kim, 2006a). It is also the most referenced and widely used creativity test (Davis, 1997).

The TTCT consists of five subscales: Fluency, Originality, Elaboration, Abstractness of Titles, and Resistance to Premature

Closure, and 13 criterion-referenced measures of Creative Strengths (Ball & Torrance, 1984; Torrance, 1990). The five subscales are as follows.

- *Fluency* (the number of relevant ideas), evidenced by an ability to produce a number of figural images.
- *Originality* (the number of statistically infrequent ideas), evidenced by an ability to produce uncommon or unique responses. The scoring procedure counts the most common responses as "0" and all other legitimate responses as "1." The Originality Lists have been prepared for each item on the basis of normative data.
- *Elaboration* (the number of added ideas), evidenced by the subject's ability to develop and elaborate upon ideas.
- *Abstractness of Titles* (the degree beyond labeling) that is based on the idea that creativity requires an abstraction of thought. It is evidenced by the degree to which a title moves beyond concrete labeling of drawn pictures.
- *Resistance to Premature Closure* (the degree of psychological openness), which is based upon the belief that creative behavior requires a person to consider a variety of information when processing information and to keep an "open mind."

Torrance added the Creative Strengths subscales to the scoring in 1984 (Ball & Torrance, 1984; Torrance, 1990). The Creative Strengths are Emotional Expressiveness, Storytelling Articulate-ness, Movement or Action, Expressiveness of Titles, Synthesis of Incomplete Figures, Synthesis of Lines or Circles, Unusual Visualization, Internal Visualization, Extending or Breaking Boundaries, Humor, Richness of Imagery, Colorfulness of Imagery, and Fantasy. Because Creative Strengths scores are different from the other five subscales in terms of scoring and characteristics (see Kim, 2006a; Kim et al., 2006), the present study examined Creative Strengths separately from Innovative creative style and Adaptive creative style using the TTCT scores.

Procedures. The administration of the TTCT (30 minutes) and the KTS II (15 minutes) took each student approximately 45 minutes to complete. The first author collected and immediately sealed the data of the American group, whereas, the data of the Taiwanese group was sealed and sent to the author via international mail. The only individuals with access to the raw data are the authors and the administrator of the instruments in Taiwan.

Data analysis. The authors did not initially adjust the critical p value, because familywise alpha rate corrections, including the Bonferroni correction, are very conservative, particularly when the dependent variables are correlated (O'Brien, 1984; Toothaker, 1993). Given that most of the correlations among the TTCT subscales are statistically significant at an alpha level of .05 and that there is no research published on the relationship between the TTCT-Figural and the KTS II, the authors wanted to report any probable associations between the two. For this reason, an alpha level was set at .05 first for each test. After that, the authors reported the results using the Bonferroni (1937) procedure. When conducting multiple tests of statistical significance

on the same data, the Bonferroni correction protects against false findings of significance.

Results

Cultural and/or Gender Differences in Creativity

Table 1 shows the descriptive Statistics for Innovative creative style, Adaptive creative style, and Creative Strengths of the TTCT. To examine main culture and main gender effects as well as culture * gender interaction effect on the TTCT, a 2 × 2 (culture × gender) factorial MANOVA was conducted on the TTCT scores. Significant main culture, Wilks’s Λ = .90, $F(3, 163) = 6.25, p < .001$, and gender effects, Wilks’s Λ = .92, $F(3, 163) = 4.59, p = .004$, were found, however, the culture * gender interaction effect, Wilks’s Λ = .96, $F(3, 163) = 2.42, p = .068$, was not significant.

As follow-up tests to the MANOVA, ANOVAs were conducted on Innovative creative style, Adaptive creative style, and Creative Strengths to determine their contribution to the significant main culture/gender effect. A significant gender difference (females > males) in Innovative creative style, $F(1, 165) = 6.18, p = .014$, was found after the Bonferroni correction, $p < \alpha = .0167(.05/3)$; however, cultural difference in Innovative creative style, $F(1, 165) = 2.29, p = .133$, was not significant.

As Figure 1 shows, significant cultural and gender differences in Adaptive creative style were found after the Bonferroni correction, $p < \alpha = .0167(.05/3)$. Americans had higher average scores than Taiwanese, $F(1, 165) = 6.16, p = .014$, and females had higher average scores than males, $F(1, 165) = 10.20, p = .002$. No significant culture, $F(1, 165) = .72, p = .398$, or gender, $F(1, 165) = 1.93, p = .167$, difference in Creative Strengths was found.

Cultural and/or Gender Differences in Personality Types

Descriptive Statistics for the subscales of the KTS II are shown in Table 2. To examine main culture and gender effects as well as culture * gender interaction effect on the KTS II, a 2 × 2 (culture × gender) factorial MANOVA was conducted on the KTS II scores. A significant main gender effect, Wilks’s Λ = .88, $F(4, 157) = 5.18, p = .001$, was found on the combined four subscales (*Extroversion, Feeling, Intuition, and Perceiving*). Neither main culture effect, Wilks’s Λ = .96, $F(4, 157) = 1.79, p = .133$, nor culture * gender interaction effect, Wilks’s Λ = .97, $F(4, 157) = 1.13, p = .345$, was significant.

As follow-up tests to the MANOVA, ANOVAs were conducted on each of the four subscales of the KTS II to determine their

contribution to the significant main gender effect. A significant gender difference (females > males) in Feeling type, $F(1, 160) = 8.69, p = .004$, was found after the Bonferroni correction, $p < \alpha = .0125 = .05/4$, as Figure 2 shows. However, no significant gender difference in Extraversion, Intuition, or Perceiving was found.

The Relationship Between Creativity and Personality Types

The relationship between creativity and personality types was examined, and the correlation coefficients are shown in Table 3. A significant correlation was found between Innovative creative style and Intuition ($r = .224, p = .003$). Adaptive creative style significantly correlated with Intuition ($r = .268, p < .0001$), Extraversion ($r = .173, p = .027$), and Feeling ($r = .161, p = .037$). Significant correlations were found between Creative Strengths and both Intuition ($r = .325, p < .0001$) and Perceiving ($r = .240, p = .002$). The correlation between Adaptive creative style and Intuition, as well as, the correlations between Creative Strengths and both Intuition and Perceiving were significant after the Bonferroni correction ($p < \alpha = .05/21 = .0023$).

The relationship between creativity and personality types by culture. The correlation coefficients between creativity and personality types were examined separately for Americans and Taiwanese. For Americans, a significant correlation was found between Innovative creative style and Intuition ($r = .240, p = .021$). Adaptive creative style correlated significantly with Intuition ($r = .307, p = .003$), Extraversion ($r = .250, p = .018$), and Feeling ($r = .211, p = .042$). Creative Strengths significantly correlated with Extraversion ($r = .316, p = .002$), Intuition ($r = .285, p = .006$), and Perceiving ($r = .241, p = .020$). The correlation between Creative Strengths and Extraversion maintained significance after the Bonferroni correction ($p < \alpha = .05/21 = .0023$).

For Taiwanese, a significant correlation was found between Adaptive creative style and Intuition ($r = .255, p = .026$). Significant correlations were found between Creative Strengths and both Intuition ($r = .343, p = .002$) and Perceiving ($r = .293, p = .010$). The correlation coefficient between Creative Strengths and Intuition was still significant after the Bonferroni correction ($p < \alpha = .05/21 = .0023$).

The relationship between creativity and personality types by gender. The correlation coefficients between creativity and personality types were examined separately for males and females. For males, no significant correlations were found between creativity and personality types.

For females, a significant correlation was found between Innovative creative style and Intuition ($r = .203, p = .026$). Significant

Table 1
Descriptive Statistics for Innovative Creative Style, Adaptive Creative Style, and Creative Strengths, N = 164 (45 for Male and 119 for Female)

TTCT	Mean for American (n = 90)		Mean for Taiwanese (n = 74)	
	Male (SD)	Female (SD)	Male (SD)	Female (SD)
Innovative	209.50 (33.72)	221.26 (31.77)	215.33 (37.41)	233.82 (39.82)
Adaptive	218.68 (28.01)	221.77 (34.77)	187.81 (42.15)	222.95 (35.51)
Strengths	9.46 (3.06)	9.11 (3.27)	8.76 (5.59)	10.89 (3.71)

Estimated Marginal Means of Adaptive

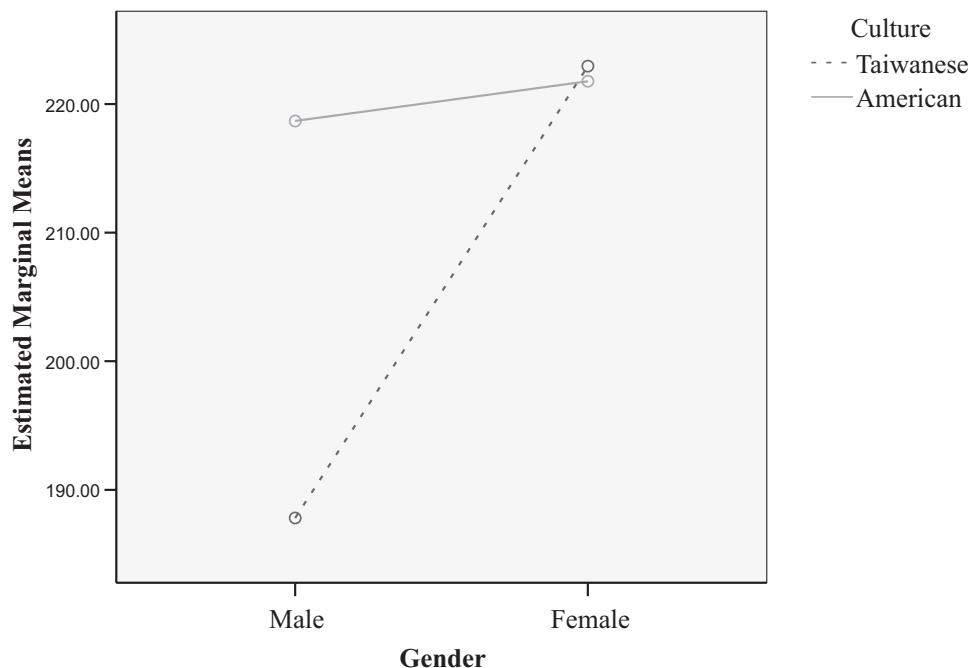


Figure 1. Cultural and gender differences in Adaptive creative style.

correlations were found between Adaptive creative style and both Intuition ($r = .255, p = .005$) and Extraversion ($r = .202, p = .027$). Creative Strengths significantly correlated with both Intuition ($r = .371, p < .0001$) and Perceiving ($r = .288, p = .001$). The correlations between Creative Strengths and both Intuition and Perceiving were significant after the Bonferroni correction ($p < \alpha = .05/21 = .0023$).

Discussion

Cultural and/or Gender Differences in Creativity

The results indicate that there is a significant cultural difference in Adaptive creative style but not in Innovative creative style or in Creative Strengths. The American college students are found to be more adaptively creative than the Taiwanese college students. This result is consistent with previous research (Bond, 1992; Fielding,

1997; Kim & Michael, 1995; Kim, 2009; Kim & Sergent, 2004; Rudowicz & Ng, 2003; Saeki et al., 2001) in that there is a tendency for people from Confucian Asian societies to exhibit less creativity than people from Western societies, even though these studies did not examine Innovative creative style, Adaptive creative style, and Creative Strengths separately. Further, this result might indicate that the Adaptive creative style is more sensitive to and, thus, more influenced by culture. Previous literature indicated that Fluency (a part of Innovative creative style) was not affected by the cultural differences between the U.S. and Japan (Ogawa, Kuehn-Ebert, & DeVito, 1991, as cited in Saeki et al., 2001). Kirton (1976) explained that Adaptors create change by working within the existing paradigm, whereas Innovators create change by threatening the paradigm. Thus, Adaptive creative style may operate as a part of, and be more influenced by, society. Conversely, Innovative creative style may always be creative regardless of social constructs and less influenced by society.

Table 2
Descriptive Statistics for Extraversion, Feeling, Intuition, and Perceiving, $N = 164$ (45 for Male and 119 for Female)

KTS II	Mean for American ($n = 90$)		Mean for Taiwanese ($n = 74$)	
	Male (SD)	Female (SD)	Male (SD)	Female (SD)
Extraversion	5.12 (1.97)	5.27 (2.32)	4.47 (2.06)	4.76 (2.36)
Feeling	11.65 (3.82)	13.25 (3.33)	10.63 (3.53)	12.42 (2.72)
Intuition	8.23 (3.60)	8.02 (2.95)	7.21 (4.10)	9.56 (3.79)
Perceiving	8.77 (4.38)	7.32 (3.22)	7.16 (2.97)	7.36 (2.94)

Estimated Marginal Means of Feeling

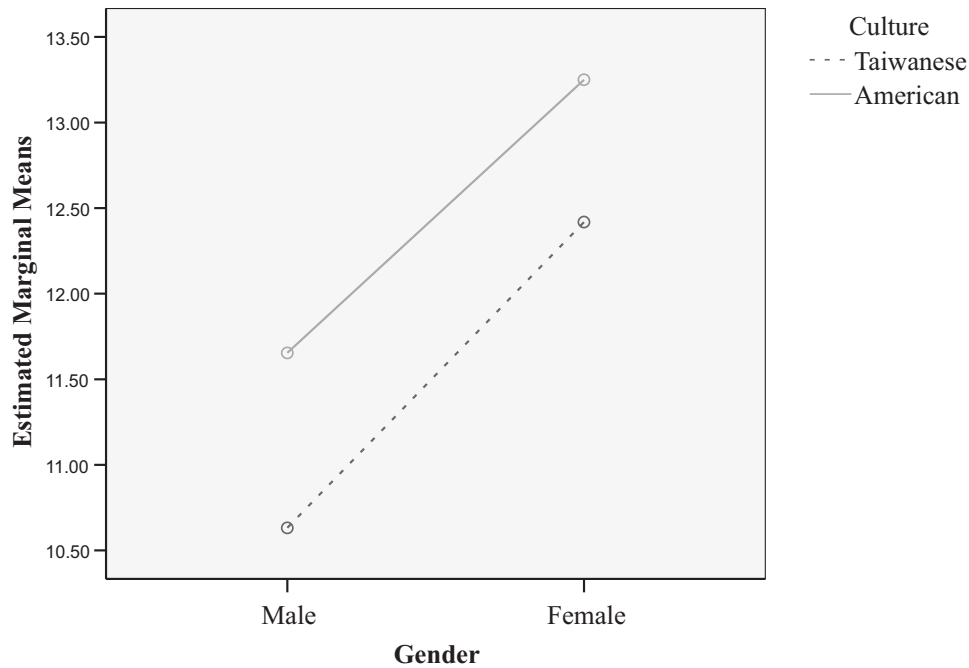


Figure 2. Gender difference in Feeling type.

The results also indicate that females are more creative than males, which is consistent with Kim’s (2004) result among Korean educators. However, research on gender differences in creativity is inconclusive. Gupta (1981); Jaquish and Ripple (1980); Kim and Michael (1995), and Richardson (1986) found gender differences, whereas Ogawa, Kuehn-Ebert, and De Vito (1991), Runco (1991), and Saeki et al. (2001) did not find gender differences. When examining Innovative and Adaptive creative styles and Creative Strengths separately, women tend to show greater levels of Adaptive creative style (Elaboration plus Abstractness of Titles) and Innovative creative style (Fluency plus Originality), whereas there is no gender difference in Creative Strengths. This is partly consistent with Torrance (1974) in

that women tended to score higher in Elaboration; at that time, he had not created Abstractness of Titles and Creative Strengths.

Cultural and/or gender differences in personality types. The present study indicates that there is no cultural or gender difference in Extraversion, Intuition, or Perceiving types. In addition, there is no cultural difference in Feeling type. However, a gender difference exists in Feeling type: females are more Feeling type than males, which is consistent with previous studies (Brown, 2006; Sak, 2004).

The Relationship Between Creativity and Personality Types

The results indicate that Intuition is highly related to both Adaptive creative style and Creative Strengths and that Perceiving is highly related to Creative Strengths. 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) and that people in vocations requiring creativity also tend to be more Intuitive or Perceiving (e.g., Agor, 1991; Burley & Handler, 1997; Hartzell, 2000; Pope, 1997). Further, the results are also consistent with Myers and McCaulley’s claim (1985) that Intuition and Perceiving are related to creativity, especially when found together in one person, which has been confirmed by many studies (Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carter, Nelson, & Duncombe, 1983; Fisher & Scheib, 1971; Hall, 1969; Helson, 1965; Richter & Winter, 1966).

Table 3
Correlation Coefficients Among TTCT (Innovative Creative Style, Adaptive Creative Style, and Creative Strengths), and Personality Types (Extraversion, Feeling, Intuition, and Perceiving), N = 169 (49 for Male and 120 for Female)

	Innovative	Adaptive	Strengths
Extraversion	-.051	.173*	.136
Feeling	-.030	.161*	.103
Intuition	.224**	.268**	.325**
Perceiving	-.062	.106	.240**

Note. * p < .05, two-tailed. ** p < .0023 = .05/21 (i.e., Bonferroni Correction), two-tailed.

Therefore, the results of the present study using the KTS II are consistent with those of the previous studies using the MBTI, which might indicate that KTS II can be used as an alternative of the MBTI.

Relationship between creativity and personality types by culture. The results indicate that Creative Strengths is related to Intuition for Taiwanese but is related to Extraversion for Americans. The 13 Creative Strengths checklists include Emotional Expressiveness, Storytelling Articulatness, Movement or Action, Expressiveness of Titles, Synthesis of Incomplete Figures, Synthesis of Lines or Circles, Unusual Visualization, Internal Visualization, Extending or Breaking Boundaries, Humor, Richness of Imagery, Colorfulness of Imagery, and Fantasy. Previous studies on the relationship between creativity and Extraversion/Extroversion are inconclusive, and some (e.g., Eysenck, 1995) reported a positive correlation between creativity and both the extremely Introverted and extremely Extroverted. Thus, the lack of a relationship between Creative Strengths and Extroversion for Taiwanese might be due to some of them being extremely extrovert or introvert. Or, it might be Extroverted Americans and Intuitive Taiwanese have more creative potential in terms of the 13 Creative Strengths checklists.

Relationship between creativity and personality types by gender. The results indicate that both Intuition and Perceiving are related to Creative Strengths among only females. However, this difference may be due to the small number of males in this study. Increasing the number of males may uncover a relationship between Intuition and/or Perceiving and Creative Strengths consistent with the previous findings (e.g., Buchanan & Bandy, 1984; Buchanan & Taylor, 1986; Carter et al., 1983; Fisher & Scheib, 1971; Hall, 1969; Myers & McCaulley, 1985; Richter & Winter, 1966).

Implications

It can be concluded that cultural (between Americans and Taiwanese) and gender differences exist in creative potential, and that a gender difference exists in personality types. The study indicates that cultural differences exist in creativity, especially in Adaptive creative style: American college students tend to be more Adaptively creative than Taiwanese college students. Further, this might confirm that individuals' creativity may be influenced by their culture (Kim, 2004, 2007), specifically, Adaptive creative style might be influenced more by culture than Innovative creative style or Creative Strengths.

According to Kim (2007, 2009), there are several distinct principles of Confucianism that conflict with creativity: *Emphasis on Education*, *Family System*, *Hierarchical Relationships*, and *Benevolence*. *Emphasis on Education*—Schooling in Confucian-influenced societies focuses on rote learning, a work-play dichotomy, and a devaluation of play that results in extreme competition designed to ensure the opportunity for students to be successful which can only be accomplished through formal education; *Family System*—This includes strict gender role expectations, rigid parent-child relationships, and an overemphasis on obedience, filial piety, and loyalty; *Hierarchical Relationships*—This decreases creativity through unequal relationships, rigid social structure, gender inequality, and authoritarian relationship between teachers and students;

Benevolence—This stifles creativity through suppression of emotion, the silence ethic, an extreme value of humility, conformity, and stigmatized eccentricity.

If the culture either does not value or discourages creative growth and expression, then the person's creativity cannot flourish. The best creative techniques, or the strongest creative personality, cannot compensate for an environment or culture that crushes creativity (Kim, 2007).

The study also indicates a relationship exists between individuals' creative potential and personality types. Students who have Intuitive and/or Perceiving personality types may have more creative potential than students who have sensing and/or judging personality types. Creativity was thought to be a natural-born ability; however, research has concluded that creativity can be enhanced (e.g., Torrance, 1962, 2002). Therefore, educators should be able to recognize students who exhibit Intuitive and Perceiving personality types so that they might encourage these students to achieve their full creative potential by providing a psychologically safe and supportive environment.

Limitations

There are several limitations in the present study. One limitation is that scoring Originality on the TTCT test requires culture-specific Originality Lists (Kim, 2006a). Taiwanese Originality Lists have not been developed; thus, the present study may not be able to adequately determine if the Originality scores were influenced by culture. The authors noticed, while scoring the TTCT for this American and Taiwanese sample, some responses that were unusual in one culture were common in the other. Another limitation is that the sample size of the present study was small and the characteristics of the participants were homogeneous: All of the subjects in the present study consisted of students in teacher education. This limits generalization of the results to college students in teacher education. The unequal male to female ratio as well as the big difference in dispersion (e.g., standard deviations and range) of age between American and Taiwanese samples is also problematic when interpreting the results of the present study.

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