Effect of Explicit Instructions on Creativity Test Performance: A Case Study of Hong Kong University Students

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Abstract

**Objectives.** This study examined the effects of three types of instructions on creative performance, which was operationalized as divergent thinking in terms of fluency, flexibility, and originality.

**Methods.** One hundred and sixty-eight undergraduate students from two Hong Kong universities completed questionnaires that consisted of a creativity personality traits list, four divergent thinking tasks, and a demographic data part. The creativity personality traits list comprised of four subscales of different personality traits: (1) Chinese creative personality traits, (2) Chinese personality trait, (3) Western personality traits, and (4) Western creative personality traits. The four divergent thinking tasks were two verbal and two visual tasks with either “be creative” instructions, “be practical and reasonable” instructions, or standard instructions.

**Results.** Results showed that there was no significant difference between the divergent thinking scores of the groups working under “be creative” instructions and standard instructions. However, detrimental effects on divergent thinking scores were found in the group receiving “be practical and reasonable” instructions. No gender difference was found in the fluency and flexibility scores, but males outperformed females in both areas of verbal
and visual originality. Positive significant correlations were found between Chinese creative personality traits and divergent thinking outputs in verbal fluency and verbal flexibility, but not in visual tasks and originality. Also, a positive significant correlation was found between motivation and creativity performance.

**Discussion.** The lack of incremental effect of “be creative” instructions on divergent thinking outputs seems to have theoretical implications, that creativity is not a transient state but a long-standing trait.
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Brief Definitions of the Three Dimensions in Guilford’s Structure-of-Intellect (SOI) Model

Examples of Specific Divergent-Production Factors and Tests

Reliability of Creative Personality Traits Scale with its Subscales Listed

Pearson Correlations between Fluency, Flexibility, and Originality of the Four Divergent Thinking Tasks Employed in the present study

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Effect of Explicit Instructions on Creativity Test Performance:

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Creativity plays an essential role in driving human civilization and development. It leads to new scientific findings, novel inventions, innovative progresses in artistic production, and new social programs (Sternberg & Lubart, 1999). Creativity is related to better utilization of problem solving techniques (Guilford, 1950). Human history is filled with all sorts of new inventions. From highly scientific machines (such as space shuttles) to new dishes that housewives made for their loved ones. Creativity is often regarded as the most valued processes that keep humans advancing and developing.

Having such importance to human development, creativity often attracts great interest from all sort of people: academic researchers, government officials, educators, strategic planners, commercial managers, parents, students, etc. People are eager to learn and discover more about creativity. For instance, how can we measure one's creativity? What are the reasons for interpersonal and / or intrapersonal differences in creativity? Are there any ways to help people developing their creativity? Or is creativity simply an innate giftedness (or a personal trait) that won't allow much alteration?

There has been a debate among creativity researchers as to whether creativity is an inborn, stable, personality trait or rather a fleeting mental process (i.e. a state) of a person which can be changed. In case creativity is a personal trait or personality characteristics, it would not be easy to manipulate one's creative performance by external cues. Guilford (1950)
defined creativity as a set of traits that are characteristics of creative persons. He stated that a
trait is any relatively enduring way in which persons differ from one another. Thus, creativity
is a rather stable and unchangeable personal quality.

Sternberg (2000), however, claimed that creative giftedness is not a fixed trait, but a
decision-making skill that can be developed. According to creative cognition approach,
everybody can be creative, on condition that he or she knows how to use his or her mind
Every person can become more creative if a suitable training is given. Feldman (1999) also
argued that creativity is a developmental matter. That is creativity is a kind of developmental
shift, which includes an essential rearrangement of knowledge and understanding (Feldman,
1999).

Various investigations have been initiated to find out if creative performance can be
modified. For instance, instructions to "be creative" were found to have an incremental
effect on creative performance (O'Hara & Stemberg, 2000-2001; Eisenberger & Cameron,
1996; Runco & Okuda, 1991). Similarly, "criteria-cued instructions" showed an
improvement on creative outputs (Buyer, 1988). The goal-setting theory also poisted that
specific instructions to be creative, practical, or analytical would result in better functioning
in the respective areas (Latham & Locke, 1991).

In addition, empirical findings showed that there were "potential differences" in
creative performance enhancement through instructions. "Be creative" instructions perk up
the creative performance of only those high creative potential male subjects who scored in the upper third of the Creativity Personality Scale (a scale derived from the Adjective Check List) but not for lower creative potential group (Harrington, 1975). Yet, some other studies found conflicting results on using instructions to modify creative behavior. Oziel, Oziel, and Cohen (1972) illustrated that a highly creative group did not improve under "be creative" instructions; while on the other hand, a less creative group did increase their creativity outputs.

Apart from potential differences, there were also "gender differences" in applying "be creative" instructions. It was found that "be creative" instructions only improved the magnitude of men's but not women's responses (Katz & Poag, 1979; Lissitz & Willhoft, 1985).

Nonetheless, if creativity is a habitual trait, it will seem unlikely for an immediate performance modification through explicit instructions or other external cues. Research results of Bamber, Jose, and Boice (1975) observed that undergraduate respondents did not generate any differences in the creative outputs under instructions like "as a test", "as a game" or "without instructions".

As a highly desirable human characteristic, creativity deserves our great attention to investigate how to facilitate, enhance, and improve this potential among us. If instructions can lead to better creative performance, we can consider creativity-enhancement programs for
children, youngsters, and adults by using suitable instructions. If creativity is a habitual trait, more attention will be required throughout the entire developmental processes of child, adolescence, and adult stage.

Therefore, the main purposes of this study are to investigate whether:

1. Will "be creative" instructions bring any incremental effect on modifying creative performance?

2. There are any differences in creativity outputs when applying different types of instruction cues.

3. There are any gender differences in creative performance upon usage of explicit instructions.

4. There are other factors that associated with the positive response to "be creative" instructions.

This research report comprises of five chapters, namely, Introduction, Literature Review, Method, Results, and Discussions. The importance of creativity has been outlined. The Introduction delineates the research background and explains why it is meaningful to study whether "be creative" instructions are able to alter human creativity. The second chapter, Literature Review, presents concepts and theories of creativity, creativity measurements, and findings of previous studies on usage of instructions to change creativity performance. The third chapter, Method, demonstrates the definitions of the operational
variables of the construct - creativity, and illustrates details of the subjects involved, instruments used and the procedures of data collection in this research. The fourth chapter, Results, portrays the findings of this research. The last chapter discusses implications of the research results, provides suggestions for future studies and illustrates limitations of the present study.

**Literature Review**

This chapter starts with an overview of how creativity is construed and delineates the common measuring tools of creative personality, creative process (in particular divergent thinking), and creative products. Then, major findings of using explicit instructions to manipulate divergent thinking performance in various empirical studies are analyzed. Finally, the major hypotheses of the present study will be presented.

### 2.1 Conceptualization of Creativity

According to Barnhart and Barnhart (1992), the word *create* originates from the Latin word *create*, which signifies "to make a thing which has not been made before; to bring into being" (p. 486). In psychological studies, creativity is very commonly defined as the ability to generate novel responses that are appropriate in content and treasured by others. There is consensus among creativity researchers that creative products should be both original and meaningful (Csikszentmihalyi, 1996; Simonton, 1999; Sternberg, 1999). Simonton (1999) suggests three paramount viewpoints of creativity:-
• Creativity is a trait or personality profile that characterizes a person. That implies creativity is the personal capacity or quality that varies from person to person. Personality psychologists take on this perspective, and they try to identify the eminent creative individuals from those of lower level of creativity (e.g. Barron, 1969; Eysenck, 1993).

• Creativity is a mental process (or collection of processes) that are the consequence of the generation of concurrent original and adaptive ideas. Cognitive psychologists who experimentally study problem solving tend to adopt this perspective (e.g. Smith, Ward, & Finke, 1995; Sternberg & Davidson, 1995).

• Creativity is a characteristic of a product, such as a poem, painting, invention, or composition. A product is considered to be creative if it satisfies the twin criteria of originality and adaptiveness. By originality, a product should be novel, causing surprise and sometimes including complexity. By adaptiveness, a product should be beautiful, truthful, elegant and display virtuosity. Psychologists favored in experimental aesthetics (e.g. Martindale, 1990; Simonton, 1989) counted on this view.

In the present study, we are mainly interested to see if creativity is a stable trait (characteristics which cannot be modified easily or in short-term) or a transient state (mental processes which can be enhanced through training, prompting, or motivational cues).
2.1.1 Creativity as a Trait

In addressing his presidential work to the American Psychological Association, Guilford (1950) identified creativity as abilities that shared among creative people. Creative abilities decide whether an individual has the strength to express creative behavior to a remarkable extent. Guilford (1950) suggested that whether an individual who has the requisite capabilities will actually produce something creative will still depend upon his motivational and temperamental traits. Creativity is regarded as a permanent and stable trait in a person. Guilford (1950) defined a trait as any relatively durable style in which persons differ from one another. An individual's personality is his/her unique pattern of traits.

Guilford (1950) hypothesized eight primary abilities which elicited creativity. According to Guilford (1950), a creative person should possess following abilities, namely, sensitivity to problems, power to generate large number of ideas (i.e. fluency), capability to produce novel suggestions (i.e. originality), ability to change one's mental set (i.e. flexibility), synthesizing ability, analyzing ability, ability to deal with interrelated ideas at the same time (i.e. complexity), and capability to make evaluation.

Guilford viewed creativity as part of intelligence. Therefore, to understand Guilford's model of creativity, we should understand his general model of intelligence - the Structure of Intellect (SOI) Model - first.
The SOI Model has been developed from Thurstone's (1938) theory and incorporates all the seven primary mental abilities that Thurstone suggested. These 7 primary mental abilities are: verbal comprehension, verbal fluency, numerical fluency, spatial visualization, associative memory, perceptual speed and inducing reasoning. Guilford enriched these primary abilities with new abilities so that the number of capability features increased from 7 to 120. Thurstone considered these primary mental abilities as inter-correlated while Guilford perceived them as independent. According to Guilford (1967), there are three ingredients in every mental task. They are, namely, an operation, a content, and a product.

*Operations* are processes and they determine what the organism is capable to do with the raw materials of information. Information is understood here as those stimulates that the organism discriminates. *Contents* are the types of information or material on which operations are executed. *Products* are outcomes of a particular type of operation applied to a particular kind of content. The original SOI model proposed by Guilford (1959, 1967) contains five kinds of operations, four types of contents and six categories of products. Table 1 delineates the brief definitions of all these dimensions.
<table>
<thead>
<tr>
<th>Operations</th>
<th>Contents</th>
<th>Products</th>
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<tr>
<td>Major intellectual processes;</td>
<td>Types of information with which humans deal</td>
<td>Type of outcome of information processing.</td>
</tr>
<tr>
<td>different ways in which humans</td>
<td></td>
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<tr>
<td>deal with information.</td>
<td></td>
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<tr>
<td>Cognition (C)</td>
<td>Figural (F)</td>
<td>Units (U)</td>
</tr>
<tr>
<td>Discovery or recognition of</td>
<td>Concrete visual, auditory, or other sensory</td>
<td>Mutually exclusive items of information, &quot;things&quot;</td>
</tr>
<tr>
<td>different forms of information;</td>
<td>forms</td>
<td></td>
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<tr>
<td>comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory (M)</td>
<td>Symbolic (S)</td>
<td>Classes (C)</td>
</tr>
<tr>
<td>Storage and potential</td>
<td>Denotative signs (letters, numbers, words, etc.)</td>
<td>Groupings of sets of items based on their common properties</td>
</tr>
<tr>
<td>availability of information in</td>
<td>without consideration of meaning or form</td>
<td></td>
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<tr>
<td>its original form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divergent production (D)</td>
<td>Semantic (M)</td>
<td>Relations (R)</td>
</tr>
<tr>
<td>Generation of variety and</td>
<td>Meaning of words and occasionally pictures;</td>
<td>Connections between items based on variables applying to them (e.g., relative size)</td>
</tr>
<tr>
<td>amount of information, based</td>
<td>important in verbal thinking and communication</td>
<td></td>
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<tr>
<td>on given information; most</td>
<td></td>
<td></td>
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<tr>
<td>involved in creative potential</td>
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<td>Convergent production (N)</td>
<td>Behavioral (B)</td>
<td>Systems (S)</td>
</tr>
<tr>
<td>Generation of conventionally</td>
<td>Nonverbals involved in human interactions;</td>
<td>Organized, interrelating, or interacting groups of items or parts</td>
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<tr>
<td>accepted single best answer to</td>
<td>particularly concerning such things as moods, desires, and intentions</td>
<td></td>
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<td>given problem</td>
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<tr>
<td>Evaluation (E)</td>
<td>Evaluation (E)</td>
<td>Transformation (T)</td>
</tr>
<tr>
<td>Making judgments concerning</td>
<td>Making judgments concerning extent to which a particular piece of information meets given criterion (adequacy, suitability, etc.)</td>
<td>Various types of changes in existing information</td>
</tr>
<tr>
<td>extent to which a particular piece of information meets given criterion (adequacy, suitability, etc.)</td>
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By putting all the three dimensions of the SOI theory elements together into one cross-classification, a cube-like representation of the model is obtained. Figure A shows the original SOI model introduced by Guilford (1967).

Figure A. Guilford's "Structure of Intellect" model of intelligence. Adapted from Guilford, 1967.

With five kinds of operations, four types of content, and six categories of products, there are altogether 120 cells (5 operations x 4 contents x 6 products) in the model, each representing a unique kind of ability corresponding to what is hypothesized to be a first-order ability.

A three letters trigram is used to denote each cell of ability. The order of denotation is operation, content, and product. For instance, cognition of semantic relations is signified by CMR. An example of CMR will be multiple-choice verbal analogies test. For instance, subjects need to identity relationship between given pairs of words like apple-red; banana-yellow and selecting a correct pairs of words with the same pattern of relationship from
provided choices. Another example of convergent production of semantic relations NMR will be to give an item for completion format like TRAIN is to RAIL as BOAT is to \([\text{WATER}]\) (Bachelor & Michael, 1997).

Guilford has modified his original model two times. In 1979, he divided the figural content into two forms, namely, visual and auditory. And his 1988 publication splits the operation of memory into two components of memory recording (short-term) and memory retention (long-term). As the distinction between different kinds of divergent thinking has been largely ignored in many theories of creativity, and divergent thinking is typically thought as a single, universal, and creativity-relevant ability, the writer will keep the original model of 120 cells for discussion. Hence, there are 24 divergent-production factors involved in the original model. Table 2 illustrates some of these specific divergent-production factors and their respective tests.
Apart from the above-mentioned characterized ability traits, it is also essential to observe some distinguished personality and motivational dispositions of a creative person. Prominent personality traits of creative people include: autonomy, deep apprehension, openness to experience, persistence, perseverance, and intellectual (Eysneck, 1993; King & Pope, 1999). Common motivational traits of creative persons include: ambitious, curious,
determined, energetic, passionate, self-assured, and highly devoted (Gough, 1979; Harrington, 1975).

2.1.2 Creativity as a mental process

2.1.2.1 Divergent Thinking Approach

Divergent-production (or more commonly known as divergent thinking) is a term introduced by Guilford (1967). Guilford (1967) gives a formal definition to divergent production as "generation of information from given information, where the emphasis is upon variety and quantity of output from the same source; likely to involve transfer." (p.213).

As briefly illustrated in the previous section, divergent production refers to the twenty four factors (4 contents x 6 products) in Guilford's SOI Model. Guilford differentiated all these 24 different kinds of abilities into four categories, namely, fluency, flexibility, originality, and elaboration.

Fluency - which sub-divides into ideational fluency, associational fluency, and expressional fluency - is the ability to stimulate large number of ideas. Ideational fluency portrays the ability to produce various ideas quickly in response to certain stipulated requirements. For instance, divergent thinking of semantic units (DMU) test requests listing illustration of as many items as possible that are white, edible and sweet. Associational fluency refers to the ability to list words associated with a given word. For example, divergent production of semantic classes (DMC) requires one to cite as many words as possible that
have the same meaning as the word soft. *Expressional fluency* indicates the ability to organize words into phrases or sentences. In the case of divergent production of semantic systems (DMS), one may be asked to restate a particular sentence in a number of dissimilar ways.

Flexibility denotes the capability to generate a wide diversity of thoughts. There are two types of flexibility suggested by Guilford, namely, spontaneous flexibility and adaptive flexibility. *Spontaneous flexibility* denotes the ability to be flexible even if it is not necessary to be so. *Adaptive flexibility* indicates the ability to be flexible when it is indispensable, like in some cases of problem solving (Scott, 1999). For instance, divergent production of figural transformations (DFT) test requires an examinee to remove a specified number of matches so that a given form of specific pattern can be changed to another pattern(s).

Originality means the ability to produce atypical ideas and it is scored by occurrence of statistical infrequency. Elaboration demonstrates the capability to develop or make elegant ideas, and to generate many details to bring an idea into illumination (Baer, 1993).

Since divergent thinking denotes the ability to generate many responses, divergent thinking tasks are often used to evaluate creative potential. Based on Guilford's ideas, Torrance has developed various sets of creative tests to examine the creative potential of people. Torrance (1988) defined creative thinking as "the process of sensing difficulties, problems, gaps in information, missing elements, something askew; making guesses and formulating hypotheses about these deficiencies; evaluating and testing these guesses and
hypotheses; possibly revising and retesting them; and finally communicating the results."

(p.47) Torrance believed that throughout the creative process, there is an element of
responding constructively to the existing or new situations, rather than merely adapting to
them (Torrance, 1988). More discussions on his prominent Torrance Test of Creative
Thinking (TTCT) will be presented in Section 2.2.

2.1.2.2 Triarchic Theory of Creativity

Sternberg and Lubart (1995) have emphasized that creativity should be better
understood in terms of several facets. They seek to understand creativity with considerations
of the mental representations and processes. They proposed three essential elements of
creativity: synthetic, analytical, and practical abilities.

Synthetic ability refers to the capacity to produce ideas that are novel, with prominent
status, and task appropriate. Synthetic ability is regarded as a metacomponent, which is a
higher-order executive process used in planning, scrutinizing, and assessing task performance.
This ability involves the essence of redefining problems which may be different from
conventional ways. Three components are core to this ability: (a) selective encoding relates to
analytical thinking and it entails sifting relevant information from irrelevant information. (b)
selective combination is a process of adaptive originality which corresponds to the concept of
creativity. It manipulates the original seemingly isolated information to be put together into a
new way, and (c) selective comparison encounters the relating of newly acquired information
to information acquired in the past (for instance, problem solving by analogy) (Sternberg & Davidson, 1999).

*Analytical ability* means the judging of one's own ideas and deciding on those worth for pursuing. It is measured by conventional tests of intelligence. *Practical ability* is the ability to utilize one's intellectual skills in everyday contexts. This concerns the effective functioning of selling creative ideas in relevant domains or social contexts (Sternberg, 1999). Creators without practical ability may only be recognized as creative after their death.

2.2 Common tools measuring creativity

Measuring tools of creativity are specific to operationalization of the concept of creativity. As reviewed above, some researchers (e.g. Guilford) construe creativity as a set of traits whilst others (e.g. Sterenberg) perceive it entirely as a cognitive process, especially in terms of divergent thinking (or divergent production). In addition, a direct and objective assessment of creativity will be to evaluate the creative products crafted. Following discussions will be about some most commonly adopted measuring instruments.

Gough's Creative Personality Scale (CPS) (1979) is the most commonly used scale to capture creative personality traits. It is a 30-item scale modified from the Adjective Check List (ACL) which Gough introduced in 1952. Findings revealed that there are 18 positive and 12 negative correlates of creative personality traits (Gough, 1979; Prentky, 1989). Positive attributes include: capable, clever, intelligent, wide interests, confident, inventive, resourceful,
original, unconventional, reflective, insightful, self-confident, egotistical, sexy, humorous, 
individualistic, snobbish, and informal. Negative attributes consist of: commonplace, cautious, 
affected, submissive, conventional, conservative, narrow interests, mannerly, honest, sincere, 
dissatisfied, and suspicious. Other measuring tools of creative personality traits include the 
Myers-Briggs Type Indicator (Briggs & Myers, 1998) and NEO Five Factor Personality 
Inventory (Costa & McCrae, 1991). People with high creative potential will demonstrate 
traits like introversion, low conscientiousness, low agreeableness, and openness to experience 
(Kerr, B. & Gagliardi, C, 2003).

Torrance Test of Creative Thinking [TTCT] (1966) has been the most popular tests to 
measure divergent production. The test materials include a verbal section (i.e. "Thinking 
Creatively with Words") and a nonverbal or figural section (i.e. "Thinking Creatively with 
Pictures"), both of them have two forms - A and B. There are six verbal activities: asking, 
guessing causes, guessing consequences, product improvement, unusual uses, unusual 
questions and just suppose. There are also three figural activities: picture construction, 
picture completion, and lines/circles). The verbal tests are scored in three mental abilities 
areas of fluency, flexibility, and originality while the nonverbal tests yield results for mental 
distinctiveness on fluency, originality, elaboration, abstractness of titles, and resistance to 
premature closure (Cropley, A. J., 2000).
Divergent Thinking Battery of Wallach and Kogan (1965) is a type of gamelike and untimed administration of divergent thinking tests (Plucker, J. A. & Renzulli, J. S., 1999). These tests contain three verbal subtests (Instances, Alternate Uses and Similarities) and two figural subtests (Pattern Meanings, Line Meanings). Originally, these tests were scored by quantifying fluency (i.e. the number of response made). However, nowadays, scoring also includes flexibility, originality (i.e. statistical uncommonness), and usefulness (i.e. practical and reality relevancy).

Person-based and process-based creativity measures seem to be comparatively easier to design. However, one might argue that accessing the results from the workings of the creative process or person is more direct and objective. For instance, some suggested approaches to measure creativity will be having research participants to generate creative products under controlled laboratory conditions and evaluating them by independent judges (e.g. Smith, Ward, & Finke, 1995; Sternberg & Lubart, 1995).

2.3 Creative performance and explicit instructions

Apart from the context of testing conditions and motivational effects in manipulation of creative performance, the use of explicit instructions has also aroused quite a lot of investigations (Lissitz & Willhoft, 1985).

By applying explicit instructions, there are three types of anticipated effects on the creative performance: incremental (e.g. Buyer, 1988; Eisenberger & Cameron, 1996;

To address whether one type of extrinsic motivator, namely instructions to be creative, will demonstrate the positive goal effect or negative constraint effect on creative performance, O'Hara and Stemberg (2000-2001) have carried out a research using "be creative", "be practical", "be analytical" and standard instructions and compared the creative performance elicited. Results have shown that instructions to be creative had positive goal effect on creative performance and appear to act similarly to instructions tailored to other types of performance (e.g. "be practical" instruction). Similarly, Lissitz, and Willhoft (1985) found highest fluency and flexibility scores for their experimental group with "as many ideas as possible" cue and highest originality scores for their experimental group with "producing unusual, weird or illogical ideas" priming. Chand and Runco (1993) also reported significant enhancement effects of explicit instructions on creative solutions to real world problems. Above evidence has shown prominent incremental effects on utilizing explicit instructions for creativity.

Discouraging to experimenters and educators who believe that using instructions can improve creative outputs, there were also quite a number of studies showing no effects on applying "be creative" instructions. For instance, Oziel, Oziel, and Cohen (1972) noticed that a highly creative group did not improve their divergent thinking outputs under "be creative"
instructions. Likewise, Bamber, Jose, and Boice (1975) found that undergraduate respondents did not generate any differences in the creative output under instructions like "as a test", "as a game" or "without instructions". Trentham (1972, as cited in Lissitz & Willhoft, 1985) also found no difference between subjects who were given standard instructions and subjects given anxiety-producing instructions. Females, in particular, did not benefit from the explicit instructions to raise their creative performance (Katz & Poag, 1979; Baer, 1997). Katz and Poag (1979) illustrated that their female participants did not show any improvement in the quantity of creative responses whereas their male counterparts performance increased under the same instructional guide to "be creative". Johns and Morse (1997) demonstrated that their male undergraduate participants had statistically significant higher means of ideational fluency and flexibility scores than female undergraduate participants under "be creative" instructions. However, as their sample size was small and the number of female subjects (59) was three times larger than the male subjects (20), a robust result in statistical analysis could not be attained. Thus, this study was carried out to replicate the effects of using "be creative" instructions to both male and female undergraduates on creative performance by using a larger sample size.

Possible rationale for explicit instruction effects on modifying creative abilities include implicit attribution theories on abilities and personal motivation.
Studies show that there are two contrasting implicit theories, in attributes (like intelligence, creativity, and moral characters). People adopting an entity theory of capabilities tend to understand outcomes and actions in terms of these fixed traits or dispositions. Whereas people adopting an incremental theory tend to believe their abilities are more dynamic, flexible, and developable (Dweck, Chiu, & Hong, 1995; Hong, Chiu, Dweck, Lin, & Wan, 1999). A person who holds entity theory will perceive abilities like intelligence or creativity as a rather stable, fixed and global trait while a person who holds incremental theory tends to regard such abilities as ever-expanding repertoire of expertise and knowledge (Cheng & Hau, 2003). Therefore, it could be critical whether explicit instructions are applied to entity theory holders or incremental theory holders. On the one hand, people with entity theory belief usually adopt performance goals so as to prove their abilities or to avoid an invalidation of their abilities. On the other hand, people with incremental theory belief usually adopt learning / mastery goals so as to increase their abilities. Goal setting is an essential element for our effort distribution and persistence in completing tasks.

Goal setting theory (Latham & Locke, 1991) states that higher performance results when (a) specific goals are given, (b) difficult goals are set and being accepted, and (c) feedback is provided so that discrepancies can be efficiently identified and elicit improvements. Consistent with the goal-setting theory, "be creative" instructions can act as a goal for respondents to attain.
Instructions can be considered as a type of extrinsic motivator. Although both intrinsic and extrinsic motivations are considered beneficial to operation as a whole, it is argued that only intrinsic motivation is conductive to creative performance (Amabile, 1996; Deci & Ryan, 1985).

According to Deci and Ryan (1985), intrinsic motivation is the propensity to engage in tasks because one regards them interesting, challenging, involving, and satisfying. Extrinsic motivation, nonetheless, is the tendency to engage in tasks because of task-unrelated factors like promise of rewards and punishments, dictates from supervisors, surveillance, and competition. Deci and Ryan (1985) suggested that when performing an activity, only intrinsically motivated behavior can bring about a full enjoyment. Intrinsic motivation, thus, is believed to be the best support for exploratory activities and prolonged efforts in the absence of continuous rewards. Moneta and Siu (2002) claimed that intrinsic motivation correlates positively with creativity, whereas extrinsic motivation correlates negatively.

As delineated above, applying explicit instructions will induce a level of extrinsic motivation on respondents, thus, it is reasonable to find detrimental effects or no effects when such stimulations are used. Another possible reason for decrease in creative output quantities may be due to psychological reactance. According to the theory of psychological reactance (Brehm, 1966), one fights against conditions in which one's freedom is restricted. Hence,
people are motivated to retain their freedom to act how and when they want and will do the opposite of what they have been told to do in reactance to a thwarted condition of their freedom. If participants feel comfortable with non-creative states under their normal functioning, rise in creativity outputs is difficult to ascertain.

Apart from the above, some empirical studies reported performance variations when applying explicit instructions to people with different level of creative personality traits potentials. Datta (1963) found that "be creative" instructions fostered the creative test performance in the scientists rated in the upper third of creativity distribution (which was modified from Taylor's (1962) creativity scale for physical scientists) but depressed the performance of the lower rated scientists. Similarly, Harrington (1975) discovered that the "be creative" instructions improved the creative performance of those men who scored in the upper third of the Creative Personality Scale, which was derived from the Adjective Check List, but lowered the performance of the less creative group. Nonetheless, Oziel, Oziel, and Cohen (1972) found a highly creative group did not improve under "be creative" instructions whereas a less creative group did improve when creative groups were predefined by using the Welsh Figure Preference Test as the personality measure.

In the present study, the writer intends to investigate whether creativity is a habitual trait (which should not be altered easily by explicit instructions), or a transient state (which are momentary mental processes and are subjected to change by external cues and other
factors like motivation). The four main objectives of the present study are to find out whether:

(i) "be creative" instructions will bring incremental effects to creative performance; (ii) when applying different types of explicit instructions, there are differences in creativity outputs; (iii) there are gender differences in creative performance upon usage of explicit instructions; and (iv) there are any other factors related to positive response with "be creative" instructions

2.4 Hypotheses

Based on O'Hara and Sternberg's (2000-2001) and Lissitz and Willhoft's (1985) studies, the present study adopted two types of explicit instructions, namely "be creative" and "be practical and reasonable", in order to see their influences on creative performance. "Be creative" instruction is our major testing area.

Findings of John and Morse (1997) and Katz and Poag (1979) indicated that females did not benefit from the "be creative" instructions for generating higher creativity outputs. Kogan (1972) suggested that females' habitual problem-solving strategies tended to be verbal and were appropriate to divergent thinking outputs even in the standard instruction situation. Hence, comparisons between males' and females' creative performance under different explicit instructions were made. Besides, according to Harrington's (1975) findings, scores of creative personality measures should be positively correlated with divergent thinking outputs.

Findings from Datta (1963) and Harrington (1975) illustrated that people with in the upper third of creative personality distribution accomplished higher creative performance than those
whom were in the lower third of the creative personality distribution, under "be creative" instructions. Previous research (Amabile, Hill, Hennessy, & Tighe, 1994; Csikszentmihalyi, 1990; Halpin & Halpin, 1973) also suggested that the higher level of motivation contributed to higher divergent thinking outputs. Accordingly, the following hypotheses were formulated:

1. There are differences in creativity outputs between groups working under different types of instruction cues. When comparing with standard instructions:
   1.1 "Be creative" instructions will have an incremental effect on divergent thinking scores.
   1.2 "Be practical and reasonable" instructions will have a detrimental effect on divergent thinking scores.

2. Under "be creative" instructions, males will score higher on fluency and flexibility than females.

3. Under "be practical and reasonable" instructions, fluency and flexibility scores of males will be more hampered than females' scores.

4. There is a positive correlation between creative personality traits and divergent thinking scores, in intact / normal conditions (such as working under standard instructions).

5. Under "be creative" instructions, the degree of incremental effects on creative performance is salient to those who scored at the upper third of the Chinese
creative personality traits scale but not to those who scored at the bottom third of the Chinese creative personality traits scale.

6. Level of motivation correlates positively with divergent thinking outputs. The higher the level of motivation to do the test, the higher the divergent thinking scores.

Furthermore, the present study also attempted to explore if implicit theories of abilities, that is, incremental view and entity view have any relationships with divergent thinking capabilities.

Method

The present study involved quantitative analysis of creativity measures, creative personality traits, implicit concepts of abilities (i.e. incremental view or entity view), background characteristics, and motivational factors among local undergraduate students. Questionnaires were used to solicit respective responses from participants. Comparisons of major variables were made between three kinds of working conditions, namely: a) under "be creative" instructions, b) under "be practical and reasonable" instructions, and c) under “standard” instructions.

3.1 Participants

There were 168 undergraduates participating in the present research. All participants were Hong Kong Chinese and came from two local universities, located in Kowloon area. These two universities represented a convenience sample. The number of male and female
participants were 68 and 100 respectively. Mean age of male participants was 21.21 (SD = 1.80) while that of female participants was 20.17 (SD = 1.29). The entire sample comprised of 110 (65.5%) Year 1 students, 49 (29.2%) Year 2 students, and 9 (5.4%) Year 3 students. Among the participants, 33.3% (n = 56) students were from Business English program, 18.5% (n = 31) from English Language Teaching, 12.5% (n = 21) from Engineering, 12.5% (n = 21) from Psychology, 5.4% from Social Work (n = 9), 4.8% (n = 8) from Business Administration and Marketing, 3% (n = 5) from Applied Physics and Applied Biology, 2.4% (n = 4) from Computer Sciences, and the remaining 5.4% (n = 9) from various courses in law, design and technology, environmental science and management, and surveying. There were 4 missing responses (2.4%) on information regarding the study program.

3.2 Instruments

Questionnaires were used to tap the ratings on various variables involved. The questionnaire consisted of three main parts: (1) a creative personality traits list, (2) four divergent thinking tasks (two verbal and two visual), and (3) a demographic data part. The creative personality traits list was adapted from Rudowicz and Hui's (1997) indigenous Hong Kong study. The list comprised of 42 adjective items tapping on four subscales of different kinds of personality traits. These 4 subscales of traits were: (1) Chinese creative personality traits - 28 items; (2) Chinese personality traits - 5 items, e.g. modest, honest, submissive; (3) Western personality traits - 5 items, e.g. cheerful, assertive, individualistic; and (4) Western
creative personality traits - 2 items, i.e. clear thinking and humorous. Remaining 2 items were fillers. Among the 28 items of the Chinese creative personality traits, 23 were positive traits (such as outstanding, flexible, energetic, innovative, imaginative, self-confident, and smart) while 5 were negative traits (such as non-original, unintelligent and non-resourceful).

Participants were asked to indicate on a 6-point scale - ranging from 1 = "Not at all" to 6 = "Extremely well" – the extent to which they find these adjectives describe themselves in general.

Four divergent thinking tasks were used to tap respondents' fluency, flexibility, and originality. Two tasks were presented as verbal stimulus (i.e. *Alternative Uses Test* and *Similarities Test* (Wallach & Kogan, 1965). Participants were asked to list as many ideas as they could think of about: (a) the alternate uses of a newspaper, and (b) the similarities between a radio and a traditional telephone. Another two tasks were presented separately in a small frame as the visual stimulus. The first drawing included five-short vertical straight lines, 2 lines formed the top row while 3 others formed the bottom row. Each adjacent short line was approximately 1.6 cm apart. The second visual task displayed a tangled thread-like drawing. Participants were asked to list as many meanings of these two patterns as they could think of. All divergent thinking test items are standard items from the Wallach and Kogan (1965) battery.
Scoring for both the verbal tasks and visual tasks comprise of three areas, namely: fluency, flexibility, and originality. Fluency signified the ability to produce a large volume of ideas and was accredited for the number of appropriate responses given for a task. Flexibility illustrated the capacity to shift mental frames and was represented by the number of categories that the responses could be sorted into. Each type of category was given one point for flexibility score. Originality represented capability to generate unique ideas. Scores for originality were given for ideas generated by less than 5% of the participants in the respective group. Sum of all scores of the two verbal tasks formed the verbal divergent thinking score while sum of all scores of the two visual tasks formed the visual divergent thinking score. In addition, verbal and visual fluency made up the total fluency score, verbal and visual flexibility made up the total flexibility score while verbal and visual originality made up the total originality score. These three total scores summed up to form an aggregate divergent thinking score. Statistical analysis of creativity measures was carried out on all these divergent thinking scores. The four tasks delineated high correlations among each other and this satisfied the notion of reliability (Please refer to the Results section).

Demographic part of the instrument asked for general background of the participants such as age, sex, year of study, and their study program name. Level of motivation was assessed by two questions: "How much interest did you have in
completing this questionnaire?" and "To what extent did you find yourself highly motivated for completing this questionnaire?" Self-rated creativity level was determined by one item: "How creative do you think you are?" Participants indicated their responses to questions on their motivation and self-rated creativity level on a 6-point scale with 1 = "Not much" and 6 = "Extremely well". In addition, to investigate whether respondents hold an entity view or incremental view of their creative abilities, four items were presented. Items measuring incremental view were: "Effort is the key for development of abilities. Everyone who tries hard can develop in any area he / she likes." and "All types of skills can be trained. If one attempts, one can learn almost everything he / she desires." Items to assess entity view were: "People were born with talents. Their future success or failure all depends on what natural talents they possess." and "If one does not have certain innate skills, no matter how hard one tries, one cannot fully develop such skills." Participants indicated their reflections on these 4 items on a 6-point scale, ranging from 1 = "Not true at all" to 6 = "Extremely true".

3.3 Procedures

Permission of data collection in normal class sessions and agreement on questionnaire completion from respective undergraduate students were firstly obtained. 25 to 30 minutes per class session was allowed to handle questionnaires completion processes with students during normal teaching class at the courtesy of 2 associate professors, one lecturer and 2 instructors from two local universities. Data collection took place in five lectures and two
seminars during March 2004. Participation in this research was on a voluntary basis as no inducement was given in return. There was one on-site refusal for participation. The student who turned down invitation to participate was thanked and the blank questionnaire distributed was immediately collected back.

Data collection proceeded after the concerned lecturers rounded up their respective classes. Questionnaires with three types of instructions (i.e., "be creative", "be practical and reasonable" and "standard") were distributed randomly and each participant received one questionnaire. As all participants were Chinese, verbal instructions on questionnaire completion were given in Cantonese. All participants received the same oral instructions prior to questionnaire distribution. As the manipulation instructions were marked on questionnaires, special verbal emphasis had been made to participants to strictly follow the instructions marked on the questionnaires they received. The "be creative" instructions presented for each divergent thinking task were "BE CREATIVE (i.e. inventive, original, novel, and imaginative) in your answers. We are interested in answers that make you look as creative as possible. So try to think of interesting, unusual, and clever ideas - something that no one else will think of. Remember there are no right or wrong answers.” The "be practical and reasonable" instructions stated "BE PRACTICAL AND REASONABLE (i.e. address practical implementation and usefulness) in your response. The more you list the better.”

These instruction wordings were adapted partly from O'Hara and Sternberg (2000-2001) and
partly from Lissitz and Willhoft (1985) with mild alternations. For all instructional groups, maximum 5 minutes was allowed to give responses for each divergent thinking task. Since questionnaires with different instructions were distributed at the same class sessions, no discussions with classmates were allowed during the questionnaire completion process. Participants were allowed to ask the experimenter individually any questions in relation to the questionnaire completion requirement prior and during responding process.

3.4 Statistical Analyses

Analysis of variance (ANOVA) had been conducted to test the hypotheses on differences in the divergent thinking performance under the three types of instructions. Estimated effects associated with the types of instruction, gender, and level of Chinese creative personality traits were all tested. ANOVA was useful in comparing the mean differences of divergent thinking scores among various groups and could substantiate whether those mean differences found were contributed by the respective independent variables. Pearson correlation coefficients served to establish relationships between motivation level, intensity of personality traits, and self-rated creativity level with creative performance. A positive correlations indicated the higher the level of an independent variable (say motivation level), the higher the divergent thinking outputs. Conversely, a negative correlation signified the higher the level of an independent variable, the lower the creative performance. Multiple regression analysis was carried out to examine if implicit views of
abilities (i.e. incremental view and entity view) had any causal relationship with divergent thinking performance.

Results

4.1 Reliability of measures employed in the present study

Two established scales were employed in the present study, namely, creative personality traits list (which was adopted from Rudowicz & Hui, 1997) and the divergent thinking scale in terms of fluency, flexibility and originality (which utilized the tests of Wallach & Kogan, 1965).

The creative personality traits list can be regarded as indigenous in nature as it was developed from the data obtained from Hong Kong samples. There are altogether 42 items in the scale. For the 28 items of Chinese creative personality traits, the measure attained high internal consistency with Cronbach's alpha .928. Subscales of Chinese personality traits and Western personality traits though each contained only 5 items, yielded moderate Cronbach's alphas at .452 and .597 respectively. Table 3 presents the details about the measure of reliability of various subscales traits of the scale.
Table 5 presents the descriptive statistics for the entire sample. Participants' performance in fluency and flexibility was higher on the verbal scale than on the visual scale. However, for the originality scores, this was reversed. Mean level of participants' motivation was average ($M = 6.68$, $SD = 1.95$). Among implicit views of abilities, the incremental view was more prevalent. Means and $SD$s of incremental view and entity view of abilities were 7.86 and 1.92, and 6.62 and 1.99 respectively. The mean level of participants' self-rated creativity was average at $3.34$, $SD = 1.12$.

<table>
<thead>
<tr>
<th>Name of Scales</th>
<th>No. of Items</th>
<th>Cronbach's Alpha</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese Creative Personality Traits</td>
<td>28</td>
<td>.928</td>
<td>167</td>
</tr>
<tr>
<td>Chinese Personality Traits</td>
<td>5</td>
<td>.452</td>
<td>168</td>
</tr>
<tr>
<td>Western Personality Traits</td>
<td>5</td>
<td>.597</td>
<td>167</td>
</tr>
<tr>
<td>Western Creative Personality Traits</td>
<td>2</td>
<td>.419</td>
<td>168</td>
</tr>
</tbody>
</table>

*2 items were fillers and not included
* *N reflects the number of participants who completed the questionnaire.

The divergent thinking scores of fluency, flexibility, and originality, generated through four questions (2 verbal and 2 visual) employed in this study were moderately correlated. This supported the notion of the high internal consistency of the four tasks employed. Correlation coefficients are presented in Table 4.

### 4.2 Descriptive results and correlations among the major variables of the present study

Table 5 presents the descriptive statistics for the entire sample. Participants' performance in fluency and flexibility was higher on the verbal scale than on the visual scale. However, for the originality scores, this was reversed. Mean level of participants' motivation was average ($M = 6.68$, $SD = 1.95$). Among implicit views of abilities, the incremental view was more prevalent. Means and $SD$s of incremental view and entity view of abilities were 7.86 and 1.92, and 6.62 and 1.99 respectively. The mean level of participants' self-rated creativity was average at $3.34$, $SD = 1.12$. 
Table 4. Pearson Correlations between Fluency, Flexibility, and Originality of the Four Divergent Thinking Tasks Employed in the present study

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Verbal Task 1 Fluency</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Verbal Task 1 Flexibility</td>
<td>.841(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Verbal Task 1 Originality</td>
<td>.349(∗∗)</td>
<td>.379(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Verbal Task 2 Fluency</td>
<td>.492(∗∗)</td>
<td>.403(∗∗)</td>
<td>.062</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Verbal Task 2 Flexibility</td>
<td>.474(∗∗)</td>
<td>.394(∗∗)</td>
<td>.028</td>
<td>.955(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Verbal Task 2 Originality</td>
<td>.344(∗∗)</td>
<td>.337(∗∗)</td>
<td>.217(∗)</td>
<td>.598(∗∗)</td>
<td>.607(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Visual Task 1 Fluency</td>
<td>.385(∗∗)</td>
<td>.310(∗∗)</td>
<td>.109</td>
<td>.517(∗∗)</td>
<td>.502(∗∗)</td>
<td>.254(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Visual Task 1 Flexibility</td>
<td>.341(∗∗)</td>
<td>.275(∗∗)</td>
<td>.101</td>
<td>.473(∗∗)</td>
<td>.456(∗∗)</td>
<td>.237(∗∗)</td>
<td>.963(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Visual Task 1 Originality</td>
<td>.207(∗∗)</td>
<td>.174(* )</td>
<td>.111</td>
<td>.237(∗∗)</td>
<td>.250(∗∗)</td>
<td>.081</td>
<td>.706(∗∗)</td>
<td>.694(∗∗)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Visual Task 2 Fluency</td>
<td>.405(∗∗)</td>
<td>.361(∗∗)</td>
<td>.156(∗)</td>
<td>.469(∗∗)</td>
<td>.462(∗∗)</td>
<td>.273(∗∗)</td>
<td>.675(∗∗)</td>
<td>.657(∗∗)</td>
<td>.486(∗∗)</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>11. Visual Task 2 Flexibility</td>
<td>.386(∗∗)</td>
<td>.364(∗∗)</td>
<td>.160(∗)</td>
<td>.415(∗∗)</td>
<td>.430(∗∗)</td>
<td>.245(∗∗)</td>
<td>.663(∗∗)</td>
<td>.651(∗∗)</td>
<td>.529(∗∗)</td>
<td>.945(∗∗)</td>
<td>—</td>
</tr>
<tr>
<td>12. Visual Task 2 Originality</td>
<td>.207(∗∗)</td>
<td>.188(∗∗)</td>
<td>.218(∗∗)</td>
<td>.326(∗∗)</td>
<td>.326(∗∗)</td>
<td>.296(∗∗)</td>
<td>.531(∗∗)</td>
<td>.528(∗∗)</td>
<td>.460(∗∗)</td>
<td>.661(∗∗)</td>
<td>.690(∗∗)</td>
</tr>
</tbody>
</table>

Note. Except verbal task 2, N= 167, all other tasks with N= 168

Verbal Task 1 - Alternate Uses of a Newspaper
Visual Task 1 - Pattern Meanings of 5-Vertical Short Lines Drawing
Verbal Task 2 - Similarities between a Radio and a Telephone
Visual Task 2 - Line Meanings of A Tangled Thread Drawing

Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).
Table 5. Descriptive Statistics of Major Variables for the Entire Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
<th>Scale’s Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>165</td>
<td>20.60</td>
<td>1.60</td>
<td>19</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Chinese Creative Personality Traits</td>
<td>167</td>
<td>117.43</td>
<td>15.97</td>
<td>72.00</td>
<td>164.00</td>
<td>28 - 168</td>
</tr>
<tr>
<td>Chinese Personality Traits</td>
<td>168</td>
<td>21.76</td>
<td>2.81</td>
<td>13.00</td>
<td>29.00</td>
<td>5 - 30</td>
</tr>
<tr>
<td>Western Personality Traits</td>
<td>167</td>
<td>22.66</td>
<td>3.08</td>
<td>11.00</td>
<td>20.00</td>
<td>5 - 30</td>
</tr>
<tr>
<td>Western Creative Personality Traits</td>
<td>168</td>
<td>8.46</td>
<td>1.55</td>
<td>3.00</td>
<td>12.00</td>
<td>2 - 12</td>
</tr>
<tr>
<td>Verbal Fluency</td>
<td>167</td>
<td>16.56</td>
<td>7.04</td>
<td>4.00</td>
<td>38.00</td>
<td></td>
</tr>
<tr>
<td>Verbal Flexibility</td>
<td>167</td>
<td>13.48</td>
<td>5.21</td>
<td>3.00</td>
<td>32.00</td>
<td></td>
</tr>
<tr>
<td>Verbal Originality</td>
<td>167</td>
<td>1.49</td>
<td>1.63</td>
<td>0.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Visual Fluency</td>
<td>168</td>
<td>10.10</td>
<td>5.36</td>
<td>1.00</td>
<td>29.00</td>
<td></td>
</tr>
<tr>
<td>Visual Flexibility</td>
<td>168</td>
<td>8.90</td>
<td>4.80</td>
<td>1.00</td>
<td>28.00</td>
<td></td>
</tr>
<tr>
<td>Visual Originality</td>
<td>168</td>
<td>2.50</td>
<td>2.60</td>
<td>0.00</td>
<td>13.00</td>
<td></td>
</tr>
<tr>
<td>Aggregate Divergent Thinking Score (i.e. sum of all fluency, flexibility &amp; originality scores)</td>
<td>167</td>
<td>53.07</td>
<td>21.82</td>
<td>10.00</td>
<td>138.00</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>168</td>
<td>0.08</td>
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<td>12.00</td>
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<td>Incremental View of Abilities</td>
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<td>7.86</td>
<td>1.92</td>
<td>2.00</td>
<td>12.00</td>
<td>2 - 12</td>
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<tr>
<td>Entity View of Abilities</td>
<td>168</td>
<td>3.02</td>
<td>1.99</td>
<td>3.00</td>
<td>12.00</td>
<td>2 - 12</td>
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<tr>
<td>Self-Rated Creativity</td>
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<td>3.34</td>
<td>1.12</td>
<td>1.00</td>
<td>6.00</td>
<td>1 - 6</td>
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<td>Valid N (listwise)</td>
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<td>162</td>
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</table>

*Note: Since missing responses were excluded from statistical calculation, there might be small variations in the number of participants for each major variable.*
Table 6. Pearson Correlations among Major Variables of the present study (N=168)

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<tr>
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<th>1</th>
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<th>9</th>
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<tbody>
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<td>1. Age</td>
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<tr>
<td>2. Sex</td>
<td>-.319**</td>
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<td>5. Western Personality Traits</td>
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<td>.136</td>
<td>.714**</td>
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<td>6. Western Creative Personality Traits</td>
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<td>.686**</td>
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<td>.567**</td>
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<td>7. Motivation</td>
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<td>.263**</td>
<td>.230**</td>
<td>.172*</td>
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<td></td>
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<tr>
<td>8. Verbal Fluency</td>
<td>-.112</td>
<td>-.026</td>
<td>.110</td>
<td>.096</td>
<td>.054</td>
<td>.096</td>
<td>.278**</td>
<td></td>
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<tr>
<td>9. Verbal Flexibility</td>
<td>-.158*</td>
<td>-.036</td>
<td>.077</td>
<td>.052</td>
<td>.018</td>
<td>.088</td>
<td>.265**</td>
<td>.910**</td>
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<tr>
<td>10. Verbal Originality</td>
<td>.015</td>
<td>-.219**</td>
<td>.030</td>
<td>.112</td>
<td>-.991</td>
<td>.057</td>
<td>.237**</td>
<td>.517**</td>
<td>.540**</td>
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<tr>
<td>11. Visual Fluency</td>
<td>-.192**</td>
<td>-.007</td>
<td>.012</td>
<td>.102</td>
<td>-.002</td>
<td>-.022</td>
<td>.238**</td>
<td>.542**</td>
<td>.513**</td>
<td>.286**</td>
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<tr>
<td>12. Visual Flexibility</td>
<td>-.223**</td>
<td>-.010</td>
<td>.022</td>
<td>.087</td>
<td>-.003</td>
<td>.006</td>
<td>.180**</td>
<td>.497**</td>
<td>.481**</td>
<td>.268**</td>
<td>.971**</td>
<td></td>
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<tr>
<td>13. Visual Originality</td>
<td>-.048</td>
<td>-.178**</td>
<td>.002</td>
<td>.054</td>
<td>-.106</td>
<td>-.033</td>
<td>.119</td>
<td>.314**</td>
<td>.311**</td>
<td>.260**</td>
<td>.764**</td>
<td>.785**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

# There could be small variation (±/-.2) in the number of participants for some major variables due to not fully completion of questionnaires.
Table 6 presents the intercorrelations between demographic data (age and gender), subscales of divergent thinking scores (in fluency, flexibility and originality of verbal and visual forms), subscales of personality traits, and motivation. Age was found to have small but significant negative correlations with verbal flexibility ($r = -0.158$), visual fluency ($r = -0.192$), and visual flexibility ($r = -0.223$). This indicated that the more mature a participant, the lower the divergent thinking scores observed. Gender demonstrated negative correlations to all divergent thinking scores, significantly to verbal originality ($r = -0.219$) and visual originality ($r = -0.178$). This revealed that females' scores on divergent thinking, in particular for originality, were lower than males' scores. In addition, gender showed statistically significant negative correlations with Chinese and Western creative personality traits ($r = -0.185$ and $-0.223$ respectively). All subscales of divergent thinking scores demonstrated statistically significant positive correlations among each other ($r$ ranged from $0.260$ to $0.971$). For the entire sample, all subscales of personality traits did not show significant correlations with fluency, flexibility, and originality scores. This might be due to counter-balancing effect of the three instructional groups. More discussions about relationships of personality traits to divergent thinking scores would be presented when discussing hypothesis 4 and 5. Level of motivation had significant positive correlations with all the divergent thinking variables ($r$ range from $0.172$ to $0.278$), except visual originality, age, and gender.
4.3 Type of Instructions and Performance on Divergent Thinking Tests

To test hypothesis 1.1 "be creative" instructions will have an incremental effect on divergent thinking scores and 1.2 "be practical and reasonable" instructions will have a detrimental effect on divergent thinking scores, a one-way Analysis of Variance (ANOVA) was carried out. The first ANOVA analysis was done to compare the mean aggregate divergent thinking scores of the three groups working under three different instructions (i.e. "be creative" instructions, "be practical and reasonable" instructions, and standard instructions). There was a significant main effect of instructions on the mean aggregate divergent thinking scores, $F(2,164) = 3.97, p < .05$. Fisher's LSD showed that both the groups working under "be creative" instructions and standard instructions significantly outperformed the group working under "be practical and reasonable" instructions. This result supported hypothesis 1.2 that "be practical and reasonable" instructions would have a detrimental effect on divergent thinking scores. However, contrary to our hypothesis 1.1, the group working under "be creative" instructions gained similar mean aggregate divergent thinking scores with the group working under standard instructions. Table 7 presents details of the Fisher's LSD results.
Further analyses were conducted to check whether verbal or visual stimulus was more accountable to the mean difference in aggregate divergent thinking scores. ANOVA analyses were then carried out to compare the group means of total verbal divergent thinking scores and total visual divergent thinking scores. Table 8 illustrates the three groups' means and standard deviations on the aggregate, verbal and visual divergent thinking scores.

Table 7. Fisher's LSD Results of ANOVA analysis on Aggregate Divergent Thinking Scores

<table>
<thead>
<tr>
<th>(I) group</th>
<th>(II) group</th>
<th>Mean Difference (L.D)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Be Creative&quot; Instructions</td>
<td>&quot;Be Practical &amp; Reasonable&quot; Instructions</td>
<td>9.37869(*)</td>
<td>.021</td>
</tr>
<tr>
<td>Standard Instructions</td>
<td>-1.00911</td>
<td>.805</td>
<td></td>
</tr>
<tr>
<td>&quot;Be Practical &amp; Reasonable Instructions</td>
<td>&quot;Be Creative&quot; Instructions</td>
<td>-9.37869(*)</td>
<td>.021</td>
</tr>
<tr>
<td>Standard Instructions</td>
<td>-10.38780(*)</td>
<td>.012</td>
<td></td>
</tr>
<tr>
<td>Standard Instructions</td>
<td>&quot;Be Creative&quot; Instructions</td>
<td>1.00911</td>
<td>.805</td>
</tr>
<tr>
<td>&quot;Be Practical &amp; Reasonable Instructions</td>
<td></td>
<td>10.38780(*)</td>
<td>.012</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.

Table 8.
Three Instructional Groups' Means and Standard Deviations on Divergent Thinking Scores

<table>
<thead>
<tr>
<th>Type of Instructions</th>
<th>Be Creative (n=58)</th>
<th>Be Practical &amp; Reasonable (n=56)</th>
<th>Standard (n=53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Divergent Thinking</td>
<td>55.90 (24.72)*</td>
<td>46.52 (17.33)</td>
<td>56.91 (21.49)</td>
</tr>
<tr>
<td>Verbal Divergent Thinking</td>
<td>32.74 (12.82)</td>
<td>29.43 (11.49)</td>
<td>32.42 (14.39)</td>
</tr>
<tr>
<td>Visual Divergent Thinking</td>
<td>23.16 (14.34)</td>
<td>17.09 (9.42)</td>
<td>24.30 (11.21)</td>
</tr>
</tbody>
</table>

Note. * Standard deviations are in parentheses.
** Since one participant in the standard group gave responses in 'differences' for the required similarities task, her data was excluded from verbal divergent thinking scores calculation.
Sample size of verbal divergent thinking tasks (n=53) was 1 less than that of the visual tasks (n=54).
While the ANOVA's result did not produce a significant main effect of instructions on the verbal divergent thinking scores, $F(2,164) = 1.12, p = .329$, the mean differences among the visual divergent thinking scores $F(2,165) = 5.92, p < .005$ was statistically significant. Additional ANOVA analyses were then conducted to investigate if the type of instruction has different effect on visual fluency, visual flexibility or visual originality. Statistically significant effects of the type of instructions were observed on visual fluency $F(2,165) = 6.53, p < .005$ and visual flexibility $F(2,165) = 6.59, p < .005$ but not on visual originality $F(2,165) = 2.80, p = .06$. Post hoc analyses of Scheffe illustrated that the respective divergent thinking scores of both the groups working under "be creative" instructions and standard instructions achieved higher divergent thinking performance than that of the group working under "be practical and reasonable" instructions. The group working under standard instructions scored slightly higher than that of the "be creative" instructions group, but the difference was not statistically significant. To conclude, the data does not offer support to hypothesis 1.1, thus, this hypothesis is rejected; whereas, hypothesis 1.2 is accepted and fully supported by the data.

4.4 Gender Effect on Fluency and Flexibility Scores

To test hypothesis 2 "Under "be creative" instructions, males will score higher on fluency and flexibility than females." and hypothesis 3 "Under "be practical and reasonable" instructions, fluency and flexibility scores of males will be more hampered
than females' scores." a 2 (gender) x 3 (instructions types) between-subjects ANOVA was performed on the total fluency scores (i.e. sum of verbal and visual fluency) and the total flexibility scores (i.e. sum of verbal and visual flexibility). There was no main effect of gender on total fluency ($F(1,161) = .07, p > .05$) and total flexibility ($F(1,161) = .14, p > .05$). Likewise, there was no significant gender x types of instructions interaction for total fluency ($F(2,161) = .55, p > .05$) and total flexibility ($F(2,161) = .95, p > .05$).

Further investigation of gender effects was carried out separately for verbal and visual stimulus in order to check if there were any counter-balancing effects on the total fluency and total flexibility scores. For verbal fluency and verbal flexibility, gender did not produce any significant main effect ($F(1,161) = .12, p > .05$ and $F(1,161) = .22, p > .05$ respectively). There was also no gender x instruction interactive effect on verbal fluency and verbal flexibility ($F(2,161) = .003, p > .05$ and $F(2,161) = .04, p > .05$ respectively). For visual fluency and visual flexibility, significant main effects were only observed in type of instructions. There was again no main effect of gender on visual fluency ($F(1,162) = .02, p > .05$) and visual flexibility ($F(1,162) = .03, p > .05$). Likewise, no significant gender x type of instructions interaction was found on visual fluency ($F(2,162) = 2.27, p > .05$) and visual flexibility ($F(2,162) = 2.72, p > .05$). Figure B presents the mean fluency scores of verbal and visual tasks while Figure C presents the mean flexibility scores of verbal and visual tasks of the three instructional groups, both figures shown with gender diversification.
ANOVA analysis did not substantiate mean fluency and mean flexibility scores differences were significantly attributed by gender. In short, results of ANOVAs did not support our hypotheses 2 and 3.

![Graph showing mean fluency scores for different types of instructions](image)

**Figure B.** Mean Fluency Scores of the 3 Instructional Groups

*Note: Number of male and female participants under (1) "be creative", (2) "be practical & reasonable", and (3) "standard" instructions were respectively (1) n = 24 & n = 34; (2) n = 23 & n = 33; and (3) n = 21 & n = 33 respectively.*
4.5 Correlations between Divergent Thinking and Chinese Creative Personality Traits

Hypothesis 4 states that "There is a positive correlation between Chinese creative personality traits and divergent thinking scores, in intact / normal conditions (such as working under standard instructions) ". Pearson correlations analyses were conducted. The raw scores of all 28 items in the Chinese creative personality scales were added up for each participant to form their respective scores on Chinese creative personality traits. Table 9 presents the Pearson correlations among the respective Chinese creative personality traits scores (i./ the entire group working under standard instructions ii./ males of the group working under standard instructions, and iii./ females of the group working under standard instructions), the divergent thinking scores and its subscales scores in fluency, flexibility

Note: Number of male and female participants under (1) "be creative", (2) "be practical & reasonable", and (3) "standard" instructions were respectively (1) n = 24 & n = 34 ; (2) n = 23 & n = 33 ; and (3) n = 21 & n = 33 respectively.

Figure C. Mean Flexibility Scores of the 3 Instructional Groups
and originality. Significant positive correlations were found between the Chinese creative personality traits and the aggregate divergent thinking scores, verbal fluency scores and verbal flexibility scores for the entire group working under standard instructions with r values .273, .329, and .271 respectively, all at $p = 0.05$, 2-tailed). Correlation between Chinese creative personality traits and verbal originality, visual fluency, visual flexibility, and visual originality were very low and negligible.

To examine if Chinese creative personality traits correlates divergent thinking performance differently for the two genders, further correlations analyses were done for males and females separately. Results reviewed that for males working under standard instructions, there was not any significant correlation between their self-assessed Chinese creative personality traits and divergent thinking scores. Conversely, for females working under standard instructions, there were significant positive correlations with aggregate divergent thinking scores, verbal fluency, and verbal flexibility ($r$ values were respectively .373, .544, and .398 respectively). Our hypothesis 4 was partially supported because significant correlations were only found in areas of verbal fluency and verbal flexibility but not in visual tasks and in originality tasks.
4.6 Relationship between Level of Chinese Creative Personality Traits and Incremental Effects on Divergent Thinking Scores

Hypothesis 5 posits that "Under "be creative" instructions, the degree of incremental effects on creative performance is salient to those who scored at the upper third of the Chinese creative personality traits scale but not to those who scored at the bottom third of the Chinese creative personality traits scale." To test this hypothesis, a 3 (type of instructions) x 3 (traits level - lower, average, and upper) ANOVA was conducted. In an attempt to replicate the findings of Datta (1963) and Harrington (1975), mean scores on the distribution of the Chinese creative personality traits scale were trichotomized, similar to the what Harrington's (1975) study did. Those who scored at the upper third of the Chinese creative personality traits scale (approximately scored at or above 66.70% of the group) were regarded as an upper-traits group, while those who scored at the bottom third of the Chinese creative personality traits scale (approximately scored at or below 33.30% of the respective
group) were treated as a lower-traits group. Those with personality traits scores in between were regarded as an average-trait group. Table 10 presents the mean trait scores, number of participants, and respective sample percentage of the upper-traits and lower-traits groups for participants working under the three types of instructions.

Table 10.
Mean Chinese Creative Personality Traits Scores, Number of Respective Participants, and Respective Sample Percentage of Lower-traits and Upper-traits Groups for the 3-Type of Working Instructions

<table>
<thead>
<tr>
<th>Trait-Level</th>
<th>Mean Scores of Chinese Creative Personality Traits of the Three Instructional Groups (with sample size &amp; respectively sample percentage)</th>
<th>Be Creative</th>
<th>Be Practical &amp; Reasonable</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%*</td>
<td>Score</td>
<td>n</td>
</tr>
<tr>
<td>Upper-traits Group</td>
<td>19</td>
<td>32.8</td>
<td>&lt;109</td>
<td>19</td>
</tr>
<tr>
<td>Lower-traits Group</td>
<td>19</td>
<td>32.8</td>
<td>&gt;126</td>
<td>19</td>
</tr>
</tbody>
</table>

Note: Entire sample N = 168; Group working under "be creative" instructions n = 58; Group working under "be practical and reasonable" instructions n = 56; Group working under "standard" instructions n = 54.

*% - Indicates percentage of participants in respective sample group. Lower-traits group with the lowest specified percentage scores while upper-traits group with the toppest specified percentage scores in the distribution of the respective group.

Figure D1 to D3 depicts the mean scores of aggregate divergent thinking, total fluency, total flexibility, and total originality for the upper-traits and lower-traits groups working under the three types of instructions. Upper-traits groups under "be practical and reasonable" and "standard" instructions gained slightly higher creative outputs than their respective lower-traits counterparts, though statistically not significant. For the group working under "be creative" instructions, however, the lower-traits group gained higher scores in aggregate divergent thinking and all subscales areas in fluency, flexibility, and originality than the upper-traits
group. There seemed to be an incremental trend prevalent in the lower-traits group.

Nonetheless, the main effect of Chinese creative personality traits on the aggregate divergent thinking scores was not significant $F(2,157) = .687, p > .05$. Neither any significant type of instructions x traits interaction was reported $F(4,157) = 1.44, p > .05$ t-test between mean scores of lower and upper-traits groups with "be creative" instructions also did not show significant results in aggregate divergent thinking $[t(36) = 1.41, p = .17]$, total fluency $[t(36) = 1.20, p = .24]$, total flexibility $[t(36) = 1.53, p = .13]$, and total originality $[t(36) = 1.35, p = .19]$. In sum, the data does not offer support to hypothesis 5.

![Figure D1. Creative Performance of Upper-Traits ($n = 19$) Versus Lower-Traits ($n = 19$) Groups Working Under “Be Creative” Instructions (Entire group $n = 58$)](image-url)
4.7 Correlations between creative performance and motivation

Hypothesis 6 asserts that "Level of motivation correlates positively with divergent thinking outputs. The higher the level of motivation to do the test, the higher the divergent thinking scores." In our study, all participants demonstrated an average level of
motivation with all groups means below 6.90 (Min = 2, max. = 12). Males working under "be creative" instruction yielded the highest mean motivation score at 6.88, \(SD = 1.75\) while males working under standard instructions and females working under "be practical and reasonable" instructions both arrived at lowest mean motivation scores at 6.48 (\(SD=2.06\) and 1.58 respectively). Table 11 presents the mean scores of motivation level and standard deviations of all groups. For the entire sample, Pearson product-moment correlation coefficients illustrated that except with visual originality, motivation correlated positively with all other subscales of divergent thinking.

<table>
<thead>
<tr>
<th>Type of Instructions</th>
<th>Be Creative</th>
<th>Be Practical &amp; Reasonable</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male ((n = 24))</td>
<td>6.88</td>
<td>6.48</td>
<td>6.48</td>
</tr>
<tr>
<td>Female ((n = 34))</td>
<td>6.65</td>
<td>6.48</td>
<td>6.82</td>
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<tr>
<td>Male ((n = 23))</td>
<td>6.78</td>
<td>6.48</td>
<td>6.48</td>
</tr>
<tr>
<td>Female ((n = 33))</td>
<td>6.48</td>
<td>6.48</td>
<td>6.82</td>
</tr>
<tr>
<td>Male ((n = 21))</td>
<td>6.48</td>
<td>6.48</td>
<td>6.82</td>
</tr>
<tr>
<td>Female ((n = 33))</td>
<td>6.82</td>
<td>6.48</td>
<td>6.82</td>
</tr>
</tbody>
</table>

*Note. Standard deviations are in parentheses.*

Further correlation analyses of each instructional group illustrated that under the most constraint situation, i.e. under "be practical and reasonable" instructions, the level of correlations was significant and positive between motivation and divergent thinking outputs.

Table 12 presents all the correlations data between motivation and subscales of divergent thinking scores. For males working under "be practical and reasonable" instructions,
moderate positive correlations were found in visual fluency and visual flexibility ($r = .677$ and .548 respectively, $p=.001$, 2-tailed). For females working under "be practical and reasonable" instructions, moderate positive correlations were found in all subscales of divergent thinking except visual originality was not significant. To the group working under "be creative" instructions, mild negative correlations were found between males' motivation and divergent thinking performance, but these results were not significant. For females working under "be creative" instructions, all motivation correlations were positive, similarly not significant. Regarding the group working under standard instructions, there were significant correlations found between males and verbal originality ($r = .446$) and females and visual flexibility ($r = .346$). Apart from the males working under "be creative" instructions, almost all correlation relationships with motivation were positive. This implied that higher motivation was positively associated with higher divergent thinking performance.

To examine whether the higher the level of motivation to do the test, the higher the divergent thinking scores observed, t-tests on mean divergent thinking scores between the higher motivation group and the lower motivation group were carried out. Due to the size of our sample ($N = 168$), participants whose motivation scores were above entire sample mean plus 1 SD were treated as the higher motivation group ($n = 27, M = 9.93, SD = 1.00$), while those who scored below entire sample mean minus 1 SD were treated as the lower motivation group ($n = 17, M = 3.29, SD = .85$). Table 13 presents the t-test results between upper
motivation group and lower motivation group in aggregate divergent thinking scores and all subscales of divergent production. Except visual originality ($p > .05$), all t-tests demonstrated significant results ($p < .05$, 2-tailed). From the statistical results of our data, we concluded that hypothesis 6 was supported.

Table 12. Correlations between Motivation and Divergent Thinking of Males and Females

<table>
<thead>
<tr>
<th>Type of Working Instructions</th>
<th>Verbal Fluency</th>
<th>Verbal Flexibility</th>
<th>Verbal Originality</th>
<th>Visual Fluency</th>
<th>Visual Flexibility</th>
<th>Visual Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire Sample (N=168)</td>
<td>.278(**)</td>
<td>.265(***</td>
<td>.237(***</td>
<td>.238(***</td>
<td>.186(*)</td>
<td>.119</td>
</tr>
<tr>
<td>Be Creative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire Group</td>
<td>.211</td>
<td>.112</td>
<td>.100</td>
<td>.097</td>
<td>.050</td>
<td>.084</td>
</tr>
<tr>
<td>Males (n = 24)</td>
<td>.053</td>
<td>-.029</td>
<td>-.056</td>
<td>-.052</td>
<td>-.070</td>
<td>-.034</td>
</tr>
<tr>
<td>Females (n = 34)</td>
<td>.331</td>
<td>.247</td>
<td>.223</td>
<td>.255</td>
<td>.175</td>
<td>.213</td>
</tr>
<tr>
<td>Be Practical &amp; reasonable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire Group</td>
<td>.379(**)</td>
<td>.344(***</td>
<td>.358(***</td>
<td>.445(***</td>
<td>.377(**)</td>
<td>.285(*)</td>
</tr>
<tr>
<td>Males (n = 23)</td>
<td>.205</td>
<td>.176</td>
<td>.318</td>
<td>.677(**)</td>
<td>.548(**)</td>
<td>.264</td>
</tr>
<tr>
<td>Females (n = 33)</td>
<td>.590(**)</td>
<td>.555(***</td>
<td>.398(*)</td>
<td>.399(*)</td>
<td>.347(*)</td>
<td>.336</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire Group</td>
<td>.269</td>
<td>.324(*)</td>
<td>.250</td>
<td>.249</td>
<td>.201</td>
<td>.049</td>
</tr>
<tr>
<td>Males (n = 21)</td>
<td>.171</td>
<td>.367</td>
<td>.446(*)</td>
<td>.177</td>
<td>.056</td>
<td>-.081</td>
</tr>
<tr>
<td>Females (n = 33)</td>
<td>.344</td>
<td>.300</td>
<td>.126</td>
<td>.337</td>
<td>.346(*)</td>
<td>.177</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).
4.8 Exploratory Investigations on Implicit Theories of Abilities and Divergent Thinking Performance

An exploratory investigation was conducted to see if there was any relationship between the implicit views of abilities and divergent thinking performance. People adopting an incremental theory tend to believe their abilities are more dynamic, flexible, and open to growth while people adopting an entity theory tend to treat their capabilities in terms of fixed traits or unchanging disposition (Dweck, Chiu, & Hong, 1995; Hong, Chiu, Dweck, Lin, & Wan, 1999). Presumably, incremental view holders may be more susceptible to external cues since they are more flexible to abilities development; while entity view holders may be less influenced by explicit instructions as they believe capabilities are fixed and stable.
Incremental view of abilities was found to be more prevalent in the entire sample. Table 14 presents the means and standard deviations of participants' incremental views' and entity views' scores in different types of instruction groups. The group working under "be practical and reasonable" instructions delineated the highest mean scores of incremental view ($M = 8.02, SD = 1.59$), and at the same time, the lowest in the mean scores of entity view ($M = 6.16, SD = 1.92$).

<table>
<thead>
<tr>
<th>Implicit Views of Abilities</th>
<th>Be Creative ($n = 58$)</th>
<th>Be Practical &amp; Reasonable ($n = 56$)</th>
<th>Standard ($n = 54$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Incremental View</td>
<td>7.86</td>
<td>1.78</td>
<td>8.02</td>
</tr>
<tr>
<td>Entity View</td>
<td>7.07</td>
<td>2.07</td>
<td>6.16</td>
</tr>
</tbody>
</table>

Table 15. Multiple Regression Examining the Relation of Implicit Theories of Incremental View and Entity View with Verbal and Visual Divergent Thinking Performance ($N = 168$)

<table>
<thead>
<tr>
<th>DV = Verbal Tasks</th>
<th>Fluency</th>
<th>Flexibility</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental View</td>
<td>-.046</td>
<td>.016</td>
<td>.012</td>
</tr>
<tr>
<td>Entity View</td>
<td>.214*</td>
<td>.184</td>
<td>.152</td>
</tr>
<tr>
<td>DV = Visual Tasks</td>
<td>Fluency</td>
<td>Flexibility</td>
<td>Originality</td>
</tr>
<tr>
<td>Incremental View</td>
<td>-.064</td>
<td>-.073</td>
<td>-.094</td>
</tr>
<tr>
<td>Entity View</td>
<td>.155</td>
<td>.123</td>
<td>.042</td>
</tr>
</tbody>
</table>

* $D. V.$ = Dependent variable
* $p < .05$
Multiple regression models were used to examine if there were any effects of the predictor variables (i.e. incremental view and entity view) on divergent thinking performance. Table 15 presents the multiple regression results. Incremental view of abilities did not show significant relationship with any subscales of divergent thinking. This reflected that incremental view of abilities did not account for significant variance in the dependent variable, divergent thinking performance. Nonetheless, for entity view, significant results were found in verbal fluency ($R^2 = .049$, $F(2, 14) = 4.27$, $p < .05$). Higher levels of entity view were associated with higher level of divergent thinking outputs in verbal fluency. Regression results with entity view on all other subscales were not significant ($p > .05$). To conclude, there seemed not to be a causal relationship between incremental view of abilities and divergent thinking scores, while data of entity view of abilities supported that entity view explained a significant variance on creative performance in verbal fluency.

4.9 Gender Differences in Originality Scores

Gender differences were not proved significant in areas of fluency and flexibility, but in originality, significant gender difference was found. Between-subjects ANOVA delineated significant results in both verbal originality ($F(1,161) = 8.03$, $p = .005$) and visual originality ($F(1,162) = 5.68$, $p \leq .05$). For verbal originality, males outperformed females in all instructional groups. For visual originality, except to the group working under "be practical and reasonable" instructions, males also gained higher performance than females. Significant
t-test results were observed in verbal originality for the male group working under "be creative" instruction, $t(56) = 2.13, p < .05$, and also in visual originality for the male group working under standard instructions, $t(52) = 2.25, p < .05$. Figure E presents the mean originality scores of the three instructional groups with diversification in gender.

![Graph showing mean originality scores for three instructional groups with diversification in gender](image)

**Note:** Number of male and female participants under (1) "be creative", (2) "be practical & reasonable", and (3) "standard" instructions were respectively (1) $n = 24$ & $n = 34$; (2) $n = 23$ & $n = 33$; and (3) $n = 21$ & $n = 33$ respectively.

**Figure E. Mean Originality Scores of the 3 Instructional Groups**

**Discussion**

The objectives of the present study are to investigate whether explicit instructions would bring any effect on creative performance and there is any gender difference in
response to explicit instructions. The writer is also interested to examine if there were other factors associated with positive responses to "be creative" instructions. In this chapter, interpretations of the results of the present study will be presented. Possible theoretical and practical implications will be highlighted. In addition, limitation of the present study and suggestions for further research will be discussed.

5.1 Effect of instructional cues on divergent thinking outputs

Results of the present study have shown that "be creative" instructions do not exhibit significant incremental effects on divergent thinking scores while "be practical and reasonable" instructions have put on significant detrimental effects on participants' aggregate creative performance \(F(2,161) = 4.48, p < .05\). The mean aggregate divergent thinking scores of the group working under standard instructions is 56.91 while those of the group working under "be creative" and "be practical and reasonable" instructions are 55.90 and 46.52 respectively.

Contrary to previous research that "be creative" instructions did bring an incremental effect on divergent production (Baughman & Mumford, 1995; Chand & Runco, 1993; Eisenberger & Cameron, 1996; Harrington, 1975; O'Hara & Sternberg, 2000-2001; Runco & Okuda, 1991), in the present study, the experimental group working under "be creative" instructions yields slightly lower creativity outputs than the group working under standard instructions.
A possible explanation of our result is the constraining or "self-imposed censorship" effect as suggested by Manske and Davis (1968). Research by Manske and Davis (1968) found that participants gave significantly more creative outputs under nonspecific (i.e. standard) instructions than under prompting conditions like "be original" and "be original and practical". They claimed that due to this "self-imposed censorship" effect, the total number of creative responses was reduced as compared with the nonspecific conditions. Buyer (1988) also suggested that criteria-cued instructions inhibited respondents from expressing responses not meeting the solution constraints.

Other possible explanations of the present findings can be supported by Runco's (1986) study. His research in gifted, talented, and nongifted children on divergent thinking performance evidenced that for all children, fluency and flexibility scores were higher in the standard instructions than in "be creative" instructions condition. His study further evidenced that when explicit instructions were used to prompt respondents to come up with original ideas, the respondents' respective fluency and flexibility scores would drop. The "be creative" instructions used in the present study read as follows:

"BE CREATIVE (i.e. inventive, original, novel, and imaginative) in your answers. We are interested in answers that make you look as creative as possible. So try to think of interesting, unusual, and clever
ideas - *something that no one else will think of*. Remember there are

*no right or wrong answers.*

The phrase that "*something that no one else will think of*” might have increased the stress level of participants working under "be creative" instructions to use more time to think of responses that conformed with this requirement. Thus, the total number of their responses in all divergent thinking areas decreases when comparing with the group working under standard instructions. This implies that task perception may lead to a constraining effect on participants' creative responses as earlier discussed.

Apart from task perception and / or instructional constraint effect, researchers have suggested any variability in creative performance after explicit instructions is best represented in terms of metacognitive strategies and cognitive ability (Runco, 1986; Chand & Runco, 1993; Woodman & Schoenfeldt, 1989). Runco (1986) proposed that gifted children might spontaneously distinguish what type of ideational strategy was appropriate for the open-ended tasks even when they were given standard instructions. His study in 1986 found that there was a significant interaction between instructional effect and that of the children's level of cognitive ability. To be more exact, "be creative" instructions inhibited the fluency and flexibility scores of the gifted children (mean IQ 141) more than those of the talented (mean IQ 119) and nongifted children. In addition, the same instructions enhanced the originality scores of the talented and nongifted children more than those of the gifted children.
Results in the present study may suggest that the cognitive ability of our participants working under "be creative" instructions is slightly higher than those working under standard instructions.

Another possible explanation of the present findings can be drawn from a theoretical perspective. If creativity is a transient state, it will be reasonable to induce instantaneous modification through explicit instructions. Nonetheless, by definition, a trait is a relatively stable tendency or enduring personality characteristics of an individual (Kreitler & Kreitler, 1989; Corsini, 1999). Therefore, if creativity is a habitual trait, alteration will be much more difficult and cannot be done through a one-time induction of instructions or training. Result of the present study may support the view that creativity is a permanent trait rather than a temporary state.

5.2 Gender differences in creative performance under explicit instructions

Under different explicit instructions, no significant gender difference is found in total fluency \( F(1,161) = .074, p > .05 \) and total flexibility \( F(1,161) = .135, p > .05 \). Nonetheless, there are significant gender differences found in total originality \( F(1,161) = 9.91, p < .005 \). Male participants working under "be creative" instructions outperformed their female counterparts in verbal originality (mean verbal originality scores of males and females are 2.25 and 1.35 respectively, \( p < .05 \), two-tailed).
There can be two possible explanations of why no gender differences are found in fluency and flexibility. Firstly, there is really no gender difference in our sample. As Raina (1999) suggested that smaller sex difference in creative performance in a United States sample may be due to greater freedom and individuality is permitted in American girls. In Hong Kong, a society that highly promotes equality between men and women, we may infer that females enjoy same opportunity as males to express their ideas and creativity, and to enjoy the same level of freedom. Thus, equality of gender evens out possible gender differences. Alternatively, there may be gender difference between males’ and females’ fluency and flexibility scores, but these differences are shadowed by other confounding factors, so that no difference can be detected. Gall and Mendelsohn (1967) claimed that females had tendencies to comply with directive instructions more than males, especially on a creativity task. Therefore, as long as there were explicit instructions given, females may take more time to select the best fitting responses. This would in turn decrease their creative output performance, which should be originally higher than that of the male respondents. Furthermore, in line with social psychology perspective, females seem to be more likely to conform in directive instructions than males. In addition, the cognitive ability of male and female participants in our sample may be slightly different. Thus, differences in their quantity of divergent thinking outputs have been leveled out. Kogan (1972) argued that for males, their ideational fluency and uniqueness (i.e. originality) was largely affected by their internal
cognitive factors; whereas for females, their performance in the creative domain was apparently more contextually bound.

5.3 Relationship between traits and divergent thinking outputs

As there is no divergent thinking output difference between the groups prompted with "be creative" instructions and "standard" instructions, one may argue that creativity delineates cross-situational generality characteristics (Nicholls, 1972) of a trait. In addition, significant correlation coefficients are found between creative personality traits and aggregate divergent thinking score ($r = .273$), verbal fluency ($r = .329$), and verbal flexibility ($r = .271$) under standard instructions condition.

If creativity is a trait, we may expect that the upper creative personality traits group should show better performance under "be creative" instructions. Then, the result of the present study is somewhat inconclusive. Contrary to Datta's (1968) and Harrington's (1975) empirical findings, the present study reported slightly higher creative performance from lower-traits participants under "be creative" instructions than those of their upper-traits counterparts. Under "be creative" instructions, the mean aggregate divergent thinking score of lower-trait group is 62.05 while that of the higher-traits group is 50.84. Nonetheless, as what Runco's (1986) study has demonstrated, nongifted, talented, and gifted children all attained higher fluency and flexibility scores under "standard" instructions. Applying Runco's
(1986) explanations, apparently any variability in performance after explicit instructions represents the purely cognitive capacity of divergent thinking test performance.

Rushton (1990) further suggested that traits apparently exerting effects on creative output firstly through the cognitive system, and secondly through the social system. Simonton (1988) proposed a "chance-configuration" theory explicated on how novel ideas were being accepted and generated. At the cognitive level, mental elements go through chance transformation until a stable configuration materializes. Then evaluation is done by an intrinsically motivated self-controlled system and integrated with higher-order configurations. Finally, the novel idea is converted into a communicable form. At the societal level, creative products are initially selected or retained through interpersonal influences, including education, culture, and traditions. These novel ideas then become sociocultural rivals for dominance within societies. Finally, creative outputs or products compete on a global scale incorporating various innovations.

5.4 Relationship between level of motivation and creative performance

The level of motivation is found to have positive correlations with divergent thinking outputs, especially in the most constraint situation - i.e. under "be practical and reasonable" instructions. For the entire sample, significant correlation coefficients are observed in verbal fluency \( r = .278 \), verbal flexibility \( r = .265 \), verbal originality \( r = .237 \), visual fluency \( r = .238 \), and visual flexibility \( r = .186 \). Moreover, it is found that the higher the level of
motivation to do the divergent thinking tasks, the higher the creativity scores are obtained. Significant t-test results \( p < .05 \), 2-tailed) are reported between upper motivation group (mean + 1 SD) and lower motivation group (mean - 1 SD) in aggregate divergent thinking scores and all subscales of divergent production, except visual originality.

The intrinsic motivation principle of creativity specifies that intrinsic motivation (which is derived from interest and enjoyment of the activity itself) is conductive to creativity, whereas extrinsic motivation (which is goal-directed and separate from the task) can be attenuated (Amabile, 1983). However, it is later found that extrinsic motivation is not always detrimental. Amabile (1996) further formulated a theory of motivation synergy. This theory proposes that extrinsic motivators can also ameliorate creativity outputs if the extrinsic motivators are perceived as supportive rather than limiting, and providing autonomy and skill development opportunity. Level of motivation incurred in the present study is presumably come from participants' task perception on the divergent thinking tasks employed. Since there is no inducement given in return to all participants, presumably, their motivation is more intrinsically in nature. And as all participants demonstrate very similar level of motivation, we may assume that the "be creative" instructions only induce a very mild effect of extrinsic motivation on our participants. Apparently, we may induce that those participants, who regard the "be creative" instructions to be informational and as a guide for them to comply with the task requirements, obtained higher divergent thinking outputs. Our result supports
the theoretical assertion that a higher level of motivation ascertains a higher level of creativity outputs.

5.5 Theoretical and practical implications of the present study

Although results of the present study seem to provoke a theoretical implication that creativity is more likely to be a trait (enduring personality characteristics that determines a person's behavior) rather than a state (momentary mental process or experiences that vary across situations and time), this will surely need further research in larger representative samples for verifications. The present sample used is a convenience sample of university undergraduate students, it is not a good representative sample of the larger population which should include different people in various occupations, and in different education level.

In addition, in case creativity performance entails ability traits of metacognitive strategies and cognitive skills, further efforts should be put to investigate how to promote such ideational skills, and examine what kind of environment can facilitate such strategies.

As Runco et. al. (1987) has recommended that a useful strategy for responding to some open-ended tasks is to look for environmental cues. Amiable (1996) has proposed that the educational system, overall classroom climate, college and work environment, and family could be essential resources to facilitate or attenuate a person's creativity. Furthermore, Simonton (1999) has suggested to focus on broader environmental contents, such as those contributed from economic, political, social, and cultural conditions. The investment theory
of creativity proposed by Sternberg and Lubart (1995) also recognizes the effect of environment on how creativity is judged. To enhance creativity of our society, researchers, government, and policy makers may need more concerns in the impacts of environmental inputs on creativity.

5.6 Limitations of the present study and suggestions for future research

Owing to limitation on time and resources, the writer can only approach a sample size of 68 male and 100 female undergraduate students. And this is a convenience sample at the courtesy of university lecturers and tutors. To improve the power and generalization ability of study results, larger sample size and population other than university students should be included. Besides, it will be better to incorporate equal number of male and female participants in order to facilitate gender comparison.

To ascertain a more realistic picture on creativity performance, "quality" of the creative outputs should also be taken into account. Presumably, it will be better to integrate some measures on creative quality such as "innovativeness" and "novelty" (Cheung, Rudowicz, Yue, & Kwan, 2003). To evaluate such qualitative aspects will at least require two raters in scoring. The present study cannot cater such creative quality issue since no co-rater is allowed and available. Future studies may try to examine quality of creative responses together with divergent thinking outputs.
Previous studies normally employ *Alternate Uses Test / Unusual Uses Test* for investigation on creative performance. One may suspect whether explicit instructions will also bring incremental or detrimental effects to other types of divergent thinking tasks, like *Plot Title Test* or real-world creative problems. Further investigations may consider applying other type of divergent thinking tasks or instruments for examinations on creative outputs.

In addition, this study mainly aims at finding the correlational nature among dependent and independent variables. Future studies may attempt a longitudinal and/or causal-correlational approach to investigate if explicit instructions or other factors will bring in incremental effects on divergent production in longer period of time.

Finally, as suggested in existing literatures (e.g. Triandis, 1977; Niu & Sternberg, 2001), the worldview of Chinese concerns conformity and collectivism; whereas Westerners place importance in freedom and individualism. Chinese education emphasizes direct coaching by mentors whereas Western education stresses on self-exploration. Hence, direct instructions may help Chinese students more than it may help Western students to raise their creative performance. Further studies may investigate the effects of applying explicit instructions on creative performance to participants with different cultural background.

5.7 *Final highlights*

In the era of positive psychology, it is presumably every psychology practitioner's interest to foster valuable attributes of human beings. Creativity is surely one of the areas that
we would like to have more knowledge and advancement. Finding constructive factors to facilitate development on creativity is crucial for the well-beings of society and human-beings. As pointed out by Plucker and Runco (1999), behavioral scientists empirically study each component of creativity individually because of the effectiveness of narrowly focused strategies. Sternberg and Lubart (1995) suggested that several elements converge to form creativity (e.g. intelligence, accumulated knowledge, cognitive styles, personality traits, motivation, and environmental variables, etc.). Therefore, it may be noteworthy that well-designed enhancement programs on creativity may need to consider all of the components of creativity as well as their interactions.
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