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A comparison of two models of creativity: Divergent thinking and creative expert performance

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ABSTRACT

This study examined whether and how general intelligence, domain knowledge, motivation, creative behavior, and creative personality predict two models of creativity. Two models of creativity were tested on a sample of 143 college students. Structural equation modeling was used to test the models that included the measures of general intelligence, domain knowledge, motivation, creative behavior, and creative personality as predictors of either creativity as divergent thinking or creativity as expert performance. Results were very different for the two models of creativity. General intelligence and creative personality predicted creativity as divergent thinking. However, general intelligence, domain knowledge, and motivation predicted creativity as creative expert performance. In both models, motivation predicted creative behavior.

1. Introduction

Creativity is viewed as multidimensional (Batey & Furnham, 2006; Batey, Furnham, & Safiullina, 2010; Furnham & Bachtiar, 2008; Runco, 2004, 2014). Therefore, there are many ways to conceptualize creativity, including divergent thinking (e.g., Guilford, 1967; Torrance, 1974), creative expert performance (e.g., Amabile, 1996; Baer, 1991, 1993, 2012), biographical inventories of creative behavior (e.g., Batey, 2007; Furnham & Bachtiar, 2008), and self-rating of creativity (e.g., Batey, 2007; Furnham & Bachtiar, 2008). In particular, creativity has been conceptualized as divergent thinking or creative expert performance. For divergent thinking, test-takers are asked to generate as many of their own solutions as possible in response to a domain-general task (Plucker & Renzulli, 1999), and the responses are assessed for fluency, flexibility, and originality (see Charles & Runco, 2000–2001). In contrast, creative expert performance is measured via expert judgments of performances within domains (e.g., Amabile, 1996; Baer, 1991, 1993). Baer (1991) assessed expert performance (verbal and mathematical) using experts' own sense of what is regarded as being creative.

Although both models assume cognitive processes and states underlie creative production, the two models assume different constructs. General cognitive abilities, such as IQ and other measures of general knowledge and skills, have been found to predict divergent thinking (e.g., Batey, Chamorro-Premuzic, & Furnham, 2009; Cho, Te Nijenhuis, Van Vianen, Kim, & Lee, 2010; Furnham, Batey, Anand, & Manfield, 2008; Nusbaum & Silvia, 2011; Rindermann & Neubauer, 2004). On the other hand, when creativity is assessed as creative expert performance, domain-specific knowledge and strategies play key roles in creative performance within domains (e.g., Hass & Weisberg, 2009; Mumford, Baughman, Supinski, & Maher, 1996; Vincent, Decker, & Mumford, 2002; Weisberg, 1999, 2006). When general intellectual zability has been compared to domain-specific knowledge, domain-specific knowledge is a better predictor of superior expert performance (e.g., Chase & Simon, 1973; Recht & Leslie, 1988; Schneider, Körkel, & Weinert, 1989, 1990; Vincent et al., 2002). Moreover, a number of studies found no relationship between measures of general cognitive ability and measures of creative expert performance (e.g., Gough, 1976; MacKinnon, 1961; Simonton, 1976).

In regard to motivation, the motivation to engage in creative behavior, including activity and ideation, is often linked to divergent thinking (e.g., Hocevar, 1980; Milgram & Milgram, 1976; Plucker, Runco, & Lim, 2006; Runco, 1987; Walczyk, Runco, Tripp, & Smith, 2008). A measure of creative activity assesses how often respondents have engaged in creative activities in various fields (e.g., Hocevar, 1980; Runco, 1987) while a measure of creative ideation assesses how often respondents have had creative ideas in everyday life (e.g., Ikari, 2014; Runco, Plucker, & Lim, 2000–2001). Both measures focus on out-of-school (extracurricular) voluntary behaviors. However, motivation in the forms of intrinsic motivation, extrinsic motivation, self-determination, and self-efficacy is the

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focus of research on creative expert performances (e.g., Amabile, Hill, Hennessey, & Tighe, 1994; Eisenberger & Rhoades, 2001; Moneta & Siu, 2002; Rostan, 2010). Intrinsic motivation refers to an internal desire to engage in a task for its own value; extrinsic motivation refers to a desire stemming from an outside stimulus such as getting a good job (Ryan & Deci, 2000); self-efficacy refers to task performers' confidence in their abilities to succeed in a task (Bandura, 1997); and self-determination refers to task performers' beliefs to manage and determine the task process (Deci & Ryan, 1985). The relationship between extrinsic motivation and creative expert performance is not clear. It has sometimes been thought to hurt creative performance by reducing task interest (Amabile, 1982, 1985; Kruglanski, Friedman, & Zeevi, 1971), yet extrinsic motivation may also improve it when extrinsic rewards are linked to the quality of outcomes (Eisenberger & Aselage, 2009; Eisenberger, Pierce, & Cameron, 1999; Eisenberger & Rhoades, 2001).

Regarding personality, extraversion is hypothesized to improve divergent thinking by increasing stimulation-seeking and risk-taking (Batey & Furnham, 2006; Eysenck & Eysenck, 1985) whereas openness to experience is hypothesized to increase divergent thinking by improving imagination and openness to novel ideas (Batey et al., 2009; Costa & McCrae, 1992). In support of these hypotheses, divergent thinking is correlated with extraversion and openness to experience (Aguilar-Alonso, 1996; Furnham & Bachtiar, 2008; King, Walker, & Broyles, 1996; Sen & Hagtvet, 1993; Wuthrich & Bates, 2001). In contrast, the contribution of different personality traits to creative expert performance has been found to differ as a function of domain (e.g., Feist, 1998, 1999). For example, within the domain of science, creative scientists tend to be more extroverted and open to experience than less creative scientists (Feist, 1998); within the domain of art, creative artists tend to be more neurotic and less extroverted than less creative artists (Gotz & Gotz, 1973).

Researchers have also examined the role of personality using the Creative Personality Scale which includes items of both positive and negative creative traits (Gough, 1979). The Creative Personality Scale is a significant predictor of divergent thinking (e.g., Carson, Peterson, & Higgins, 2005; McCrae, 1987; Sánchez-Ruiz, Hernández-Torrano, Pérez-González, Batey, & Petrides, 2011). In contrast, the effect of the Creative Personality Scale on creative expert performance differed as a function of domain (e.g., Dollinger, Urban, & James, 2004; Meneely & Portillo, 2005; Wolfradt & Pretz, 2001), but as of yet we know little about how and why it varies.

A critical problem is that the two approaches essentially reflect two distinct theories of creativity with little overlap in the predictors of creative outcomes and different creative outcomes (divergent thinking versus creative expert performance). One step towards unifying the two perspectives is to determine whether there are common constructs that can predict both measures of creative outcomes. No study, however, has compared how the common cognitive, motivational, and personality variables from both perspectives predict two measures of creative outcomes. The present study aims to examine whether and how the same or different cognitive, motivational, and personality variables predict two models of creativity. A model of divergent thinking was compared with a model of creative expert performance.

2. Method

2.1. Participants

Participants include a total of 143 college students (58 men and 85 women) enrolled in six introductory educational psychology courses taught by three different instructors at four different universities in South Korea. The educational psychology course is standardized across universities as a requirement subject for the national employment examination for secondary teachers in Korea (for reference, see the website of the Korea Institute for Curriculum and Evaluation, http://www.kice.re.kr/). It covers the fundamental theories of educational psychology and is a requirement for completion of the teacher-training course of study. Of a total of 143 students, 128 (89.5%) registered for the course as a teaching profession class, four (2.8%) as an elective class, four (2.8%) as a class for general education, and seven (4.9%) as a prerequisite class for the Graduate School of Education.

2.2. Measurement instruments

Each participant completed seven measurement instruments. All measurement instruments, originally written in English, were translated into Korean by three Korean-English bilinguals, two Korean experts in educational psychology, and a Korean-American specialist in education. They were then reverse translated into English to determine their validity. There was a 94.2% inter-rater agreement. Disagreements were settled through discussion. The final items were reviewed for content validity by a Korean expert in the field of educational psychology.

2.2.1. General intelligence

General intelligence was measured using a general verbal intelligence scale, the Comprehension section of the Multidimensional Aptitude Battery-II (MAB-II; Jackson, 1998). Comprehension in the MAB-II was measured by a 28-item verbal scale with a seven-minute time limit. The measure has an internal consistency reliability ranging between .82 and .90, and a test–retest reliability of .95 (Jackson, 1998). Reliability in this study was $\alpha = .62$.

2.2.2. Domain knowledge

Students' course grades in the educational psychology foundation course were collected to obtain a measure of domain knowledge. We obtained individual final raw scores (of 100 total) from instructors and converted these scores to standard *t*-scores.

2.2.3. Creative behavior

The motivation to engage in creative behavior in educational psychology was assessed by two measures of creative activity and ideation. The total scores of each measure were converted to standard *z*-scores and then added together. Although creative behavior measures are often used as a gauge of creative outcome (e.g., Hocevar, 1980; Milgram & Milgram, 1976; Runco et al., 2000–2001), we altered the measure to focus exclusively on motivation by including questions that dealt with the amount of voluntary behaviors. For this, we did not include the items that focused on accomplishments (e.g., receiving an award). Creative behavior was not significantly correlated with creative outcomes ($r = -.05$ and $r = .02$, respectively, for divergent thinking and creative expert performance) as measured in this study; therefore, they were not the same construct.

i) *Creative activity*: Creative activity was measured using the Creative Activities Check List (Okuda, Runco, & Berger, 1991). The original version used by Okuda et al. (1991) was a 50-item scale with five domains (i.e., writing, music, crafts, science, and public performance). For this study, 10 items from the original version were selected and modified to assess students' creative activities related to educational psychology (e.g., "How many times have you participated in an Educational Psychology club or organization?"). The items were scored on a 4-point Likert scale with these options: never (1), once or twice (2), three to five times (3), and six or more times (4). The Creative Activity Check List has a reliability of .91 (Okuda et al., 1991) and good external validities in terms of positive correlations with divergent thinking (Okuda et al., 1991) and creative ideation (Runco et al., 2013). Reliability in this study was $\alpha = .70$.

ii) *Creative ideation*: Creative ideation was assessed using the Runco Ideational Behavior Scale (RIBS; Runco et al., 2000–2001). For creative ideation in educational psychology, 10 items were selected and modified from the original version (e.g., "How often have you