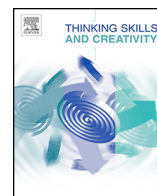




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## Targeted intervention to increase creative capacity and performance: A randomized controlled pilot study



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### ABSTRACT

Creativity is generally regarded as the ability to synthesize novel connections to create meaningful outcomes. Previous studies in adults have mainly focused on creativity as a static construct. In this study, we tested the hypothesis that creativity is a fluid construct within normal adults that can be enhanced with a targeted intervention. We also explored the relationship between baseline personality characteristics and level of creativity enhancement. A 5-week creativity capacity building program (CCBP) was conducted in parallel with a 5-week language capacity building training program (LCBP) designed as a control intervention. Creativity was measured, before and after training using a standardized assessment of creativity: the Torrance Test of Creative Thinking-Figural (TTCT-F). Personality was measured before training using the NEO Five-Factor Inventory (NEO-FFI). Results revealed greater increase for CCBP than LCBP on two primary factors of the TTCT-F: Resistance to Premature Closure and Elaboration. Analysis of NEO-Openness and Extraversion factors revealed more improvement on the TTCT-F scores after intervention for individuals with high Extraversion (E) scores, but this did not differ between groups. Altogether, our results indicate that creativity is a fluid construct, functioning independently of personality traits, which can be enhanced through targeted creativity intervention.

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## 1. Introduction

Creativity has long been a psychological construct of great intrigue to researchers, given the value that our societies have placed on creative achievements over time. Contemporary American culture places a high value on the concept of creativity and the ability of an individual to engage in creative processes (Kern, 2010). Individuals who express higher creative

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capacity may be more desirable to employers (Jin Nam, Anderson, & Villette, 2009; Pace & Brannick, 2010), express greater confidence (Bungay & Vella-Burrows, 2013), and are seen as possessing a special trait (Garcia-Ros, Talaya, & Perez-Gonzalez, 2012). Beyond the obvious external outputs of creative individuals, creativity is also linked to psychological well-being. For example, individuals with higher creative capacity show greater psychological resilience in the face of tragedy, such as Hurricane Katrina and within Holocaust survivors (Coholic, Eys, & Lougheed, 2012; Greene, Hantman, Sharabi, & Cohen, 2012; Lynch, Sloane, Sinclair, & Bassett, 2013; Metzl, 2009). Creative thinking has also been linked to flexibility and adaptation to daily-life demands (Csikszentmihalyi, 1996; Reiter-Palmon, Mumford, & Threlfall, 1998) and entrepreneurial success (Amabile, 1997; Kern, 2010). Given this link between creativity and performance as well as other psychological strengths, finding new ways to foster individual creative capacity represents an important area of research. The main focus of our work is to examine whether targeted creativity training, as compared to parallel control training, can enhance creative capacity at the individual level.

### 1.1. Models of creativity

The dynamic and complex nature of creativity and creative expression has made it challenging to experimentally assess creative capacity in a constrained laboratory environment (Guilford, 1988; Kettner, Guilford, & Christensen, 1959). In the extant literature focused on individual creativity, the construct is commonly defined as a behavior, thought, or output that is both novel and useful (Feist, 1998; Guilford, 1950; Hennessey & Amabile, 2010). In order to conduct research on such an illusive construct, various models of creativity have been purported (Guilford, 1988; Lubart, 2001; Megalaki, Craft, & Cremin, 2012; Scott, Leritz, & Mumford, 2004). Generally, these models seek to deconstruct the creative process itself, in the hope of identifying and measuring the components that result in creative output. Broadly, researchers have identified and studied four components of a creative process: cognitive, affective, environmental, and motivational (Amabile, Barsade, Mueller, & Staw, 2005; Feist, 1998; Megalaki et al., 2012; Scott et al., 2004).

Models of creativity have evolved over time. While initial models focused on a set staged process (Csikszentmihalyi & Getzels, 1971; Lubart, 2001; Scott et al., 2004) later models have expanded to view an integrated or dynamic approach (Hennessey & Amabile, 2010; Lubart, 2001). The dynamic understanding describes an integrated process involving individual elements such as neurological, cognitive, affective, and motivational factors as well as environmental factors (Hennessey & Amabile, 2010; Rubenson & Runco, 1992; Scott et al., 2004). Additionally, social and interpersonal factors have been shown to affect creative outcomes (Byron & Khazanchi, 2012). As such, some previous studies have focused on classrooms or workplaces as both prime venues for individual creative enhancement as well as situations in which creative processes may be implemented to change the overall environment (Craft, 2008; Cremin, Burnard, & Craft, 2006; Fasko, 2001; Treffinger, Solomon, & Woythal, 2012). Although research into creativity as a social practice often focuses on a wide variety of individual and inter-personal factors, similarities also exist within study designs, assessment strategies, and models. For example, divergent thinking, operationalized as the capacity to generate multiple alternate solutions, remains of primary interest in assessing outcomes of a creative process whether at the individual or group level (Claxton, Pannells, & Rhoads, 2005; Schmidt, Soper, & Facca, 2012; Treffinger, 1971; Treffinger et al., 2012). Understanding the influence of social interactions and group factors may prove to be an additional axis along which creative capacity enhancement occurs at an individual level as well. For the purposes of our study we attempt to create a nearly identical learning environment for our intervention and control group so as to mitigate the potential effects of social factors in training. However, our hypotheses and measurement strategies focus on several levels of the creative construct within an individual.

Several studies have investigated underlying personality or characterological factors – attempting to define the creative individual (Cromptley, 1990; Feldhusen & Goh, 1995; Feist & Barron, 2003). Results from these studies indicate that the personality traits of Openness and Extraversion, based on the Five-Factor personality model (Costa & McCrae, 1992; Norman, 1963), are related to creative expression (Batey & Furnham, 2006; Cromptley, 1990; Furnham & Bachtiar, 2008). The influence of these individual personality traits suggest that the underlying cognitive processes of individuals with greater openness and extraversion allows for greater synthesis of connections, motivation for creation and ability to form novel ideas (Ivcevic & Mayer, 2007; Richards, Kinney, Benet, & Merzel, 1988). However, a strong association with personality traits also implies that creativity may be a product of stable attributes that are relatively resistant to modification (Batey & Furnham, 2006; Ivcevic & Mayer, 2007). Using the Five-factor model of personality, we also investigate whether the fluidity of creative capacity is dependent upon stable personality traits.

### 1.2. Assessments of individual creative capacity

Central to the measurement of creative expression is the process of divergent thinking (Guilford, 1950; Kim, 2011; Scott et al., 2004). Divergent thinking abilities can be understood as the generation of multiple or alternative solutions to a given stimuli or problem. Researchers have operationalized divergent thinking into components, such as, originality of ideas, number of relevant ideas (fluency), number of categories utilized (flexibility), level of elaboration for each idea, etc. (Csikszentmihalyi & Getzels, 1971; Kettner et al., 1959; Scott et al., 2004; Torrance, 1999). Early prototypical work of Guilford et al. (1967), who developed the Alternate Uses Test (AUT) to assess divergent thinking, spurred a large number of such assessments that are rigorously tested and standardized. For example, the Torrance Test of Creative Thinking (TTCT), figural version, is one of the widely used standardized measure of divergent thinking. In this test, participants are given a

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