



## Creativity: The role of unconscious processes in idea generation and idea selection

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### ARTICLE INFO

#### Article history:

Received 17 October 2011

Received in revised form

16 November 2011

Accepted 5 December 2011

Available online 15 December 2011

#### Keywords:

Creativity

Unconscious processes

Fostering creativity

Idea generation

Idea selection

### ABSTRACT

Today's world of continuous change thrives on creative individuals. Anecdotal reports suggest that creative performance benefits from unconscious processes. Empirical research on the role of the unconscious in creativity, though, is inconsistent and thus far has focused mainly on one aspect of the creative process – idea generation. This is the first study to assess the role of the unconscious mind for both idea generation and idea selection. Participants generated creative ideas immediately, after conscious thought, or after a period of distraction during which unconscious thought was hypothesized to take place. After having listed their ideas, participants selected their most creative idea. Performance in idea generation was similar between conscious and unconscious thought; however, individuals who had unconsciously thought about ideas were better in selecting their most creative idea. These findings shed more light on the role of unconscious processes in creativity, and provide a means to enhance creative performance.

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### 1. Introduction

In everyday life, creative vision is highly appreciated. For example, a recent survey among 1500 chief executives around the world ranked creativity as the most crucial leadership quality (IBM Corporation, 2010), and creativity was rated as an important determinant of making a psychology article influential (Sternberg & Gordeeva, 1996). In the scientific literature, 'creativity' is defined as the process of bringing into being something that is both new and useful (e.g., Amabile, 1996; Sawyer, 2006; Sternberg & O'Hara, 1999). Given that effort, hard work, and training play an important role in the creative process (Amabile, 1996; Csikszentmihalyi, 1996; Sawyer, 2006), one may expect that creativity is achieved through extensive conscious thought; however, several studies have pointed out that the unconscious mind is also indispensable in creative performance (e.g., Simon, 1996; Smith, 1995). Moreover, the importance of the unconscious in creativity is emphasized by many anecdotes about individuals hailed as geniuses (Ghiselin, 1952; Wallas, 1926; Woodworth & Schlosberg, 1954). For example, the mathematician Poincaré was convinced that his creative ideas emerged from the unconscious, and Einstein reported that he first 'saw' the solution to a problem without being able to express it (Ghiselin, 1952). In arts, experiences of creativity seem to be similar. According to Schopenhauer (1970, p. 41), "everything primary, and consequently everything genuine, works as the forces of nature do, unconsciously."

These and many similar anecdotal reports strongly suggest that creativity cannot be explained by conscious processes alone. According to dual process theories, we have a conscious, rule-based, controlled system, and an unconscious, associative, automatic system (Evans et al., 2009). In creativity, the period during which the unconscious is at work is often called 'incubation'. One of the earliest well-developed concepts of incubation was postulated by Wallas (1926), who assumed that

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during incubation one does not consciously think about the task but rather the mind continues to work on it below the level of consciousness. There is some controversy, though, as to why incubation is helpful. One of the explanations for the positive effects of incubation on creative problem solving is the reduction of mental fatigue (Posner, 1973). According to the mental set-shifting or forgetting-fixation hypothesis, putting a problem aside for a while helps to find creative solutions, as it allows for a fresh, unbiased and new look at a problem and reduces associations with incorrect answers, allowing correct ones to surface (Schooler & Melcher, 1995; Smith & Blankship, 1989). These explanations ascribe to the unconscious a merely passive role, whereas the term 'incubation' itself suggests that the unconscious also actively contributes to solving a problem (e.g., Claxton, 1997; Koestler, 1964). Therefore, these explanations may not be the only benefit of an incubation period, and the question rises as to whether the unconscious also actively contributes to creative problem solving.

The idea of an active unconscious was supported by a pioneering experiment from Bowers, Regehr, Balthazard, & Parker (1990). Participants had to guess a target word while they were given successive hints. Whereas individuals felt clueless for quite some time and then suddenly came up with the correct answer, participants' prior guesses show that they were slowly getting closer to the right solution before the solution reached their consciousness. Further evidence for an active unconscious was provided by Zhong, Dijksterhuis, & Galinsky (2008), who examined the effect of 'unconscious thought' (i.e., task-related thought processes that occur while conscious attention is directed elsewhere; Dijksterhuis & Nordgren, 2006) on two outcomes of a remote association test (RAT): implicit accessibility and conscious reporting of answers. The accessibility of RAT answers, but not the number of correct answers, was higher after unconscious thought than after an equal duration of conscious thought. Interestingly, the level of activation of RAT answers was also higher than in the mere-distraction condition, which suggests that the increased accessibility after unconscious thought was not due to relaxation or the release of incorrect associations, as suggested by the forgetting-fixation or mental set-shifting hypothesis. Unconscious thought seems to think actively and, thereby, facilitates the discovery of remote associations. Besides the scientific evidence for an active unconscious, though, and the tremendous anecdotal evidence for the importance of the unconscious in creativity, research has yielded no sound empirical support for the beneficial effect of unconscious processes on creative performance (Sio & Ormerod, 2009). How can this discrepancy be explained? Is it possible that the beneficial effect of unconscious processes on creative performance is especially visible during the idea selection phase?

Various creativity theories have suggested a role for the evaluation and selection of ideas, as being creative includes both generating many novel options and subsequently identifying the single best option. In cognitive theories, creating ideas is distinguished from evaluating ideas (Cropley, 2006). Moreover, sociocultural theories suggest that having an idea is easy, whereas it is difficult to develop an idea so that the domain's audience accepts it (Sawyer, 2006; Sternberg, 2006). Also, in Darwinian theories, a distinction is made between processes that generate ideas and processes that selectively preserve the most creative idea (Simonton, 1999). Several good efforts have been made to gain more insight into how individuals (Rietzschel, Nijstad, & Stroebe, 2010; Runco & Smith, 1992), groups (Faure, 2004), and eminent creators (Kozbelt, 2007) select ideas; however, research on idea generation has overshadowed the question of idea evaluation. To the best of our knowledge, no previous research has investigated whether unconscious processes may help people to be more discerning. Is it possible that a period of unconscious thought enables individuals to converge more toward the selection made by trained raters?

From previous research we know that after a period of unconscious thought people are better at selecting the most attractive alternative among several options (e.g., Dijksterhuis, 2004; Dijksterhuis et al., 2006; Ham, Van den Bos, & Van Doorn, 2009; Lerouge, 2009). In a typical unconscious thought experiment, participants have to choose the most attractive alternative among several options. They either do so immediately after having received the information, or after a period during which they were allowed to consciously think about the options, or after a period of distraction, during which 'unconscious thought' was assumed to take place. The best decision, as judged from a normative perspective, is usually made by the unconscious thinkers. It is assumed that unconscious thought helps to make complex decisions, as it is good at evaluating, weighting, and integrating attribute information concerning various alternatives (Dijksterhuis & Nordgren, 2006). Given that selecting one's most creative idea can be considered a decision making process, these findings suggest that thinking about one's ideas unconsciously may also have a beneficial effect on the idea selection part of the creative process. If it is, indeed, the case that the role of the unconscious is especially visible during idea selection, this would explain why anecdotes of creative people, which rely on real life creativity and, therefore, on idea generation as well as on idea selection, support the role of the unconscious in creativity, whereas scientific studies, which mainly focus on idea generation, provide only weak evidence.

In the current studies, we do not use the term 'creativity' to refer to achievements of geniuses such as Einstein, Poincaré and Schopenhauer. Rather, we focus on two aspects of creativity: the generation of creative thoughts and the ability to select one's most creative idea. The aim of the current experiments is to investigate the role of the unconscious mind in the idea generation and the idea selection part of the creative process. Based on previous findings, we hypothesize that thinking about ideas unconsciously especially facilitates the idea selection phase of the creative process. The findings of the current studies may shed more light on the role of unconscious processes in creativity, and may provide a means to enhance individuals' creative performance.

## 2. Experiment 1

Participants were asked to think of as many ideas as possible to solve a problem. After having listed their ideas, they were asked to select their most creative idea. This task allowed us to untangle the role of unconscious processes in the idea generation, as well as the idea selection part of the creative process.

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