

**Incubation Effects: Incubation Period and Type of Task to Discover Mechanisms Behind
the Creative Process**

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ABSTRACT

This study aimed to investigate incubation effects and the mechanisms fueling increased creative activity after an incubation period. This study used a 2x2 between-subjects design with independent variables of presence of an incubation period (to test the existence of an incubation effect) and type of task (to test whether or not unconscious processes are contributing towards creative thinking). The idea is that the more similar the task, the more interrupted unconscious thoughts will become and the smaller the incubation effect will be. This particular study used the RAT to measure creativity due to its ability to measure of divergent thinking. The two different types of tasks used were an Alternative Uses Task (verbal task, similar to the RAT) and a binocular rivalry task (nonverbal and dissimilar to the RAT). The study concluded that there was in fact a main effect for incubation, thus providing evidence for an incubation effect. However the study could not find a main effect for the “first task” incubation task, nor could it find an interaction between the independent variables, and so no evidence was found in support of unconscious processes influencing our creative prowess.

INTRODUCTION

This study evaluates the effects of incubation on creative problem-solving. This study aims to not only test the existence of an incubation effect but also to analyze the differences between types of tasks during incubation. An incubation is a time interval in which an individual takes a break from a certain task and occupies their mind on a different activity and then returns to their initial task. Recent research suggests that incubation periods help individuals with creative tasks, particularly when the individual is “stuck” and cannot reach a conclusion or determine any new findings to reach a conclusion (Ritter & Dijksterhuis, 2014, p. 8). Incubation periods can vary, and are most often found in the forms of mind-wandering (a shorter incubation period) and sleep, particularly REM sleep (a longer incubation period). This study focuses on mind-wandering, which Ritter and Dijksterhuis define as “a state of mind that occurs spontaneously, and largely autonomously, whenever an awake individual is not engaged in a cognitively demanding task” (Ritter & Dijksterhuis 2014, p. 2). Mind-wandering occurs during undemanding tasks, and so it is assumed that undemanding tasks will produce a more beneficial incubation period (Ritter & Dijksterhuis, 2014, p. 2).

The general finding within the literature suggests that there is in fact an effect from incubation. However, there is much debate regarding the reasoning behind the effect and the processes that cause the incubation effect to actually occur. There are two main theories: unconscious work theory and conscious work theory. Unconscious work theory argues that unconscious processes are at play during the incubation period and add to positive incubation effects. On the other hand, conscious work theory argues that other factors are at play. These

conscious factors include the effects of merely having a distraction, such as relaxation and overcoming mental sets and picking up on environmental cues (Ritter & Dijksterhuis, 2014, p. 4). Much of the research focuses on investigating whether or not unconscious processes influence creative thinking, and the implications and importance of such a discovery. However, Ritter and Dijksterhuis still mention the importance of conscious processing, stating “conscious processing is needed to establish a knowledge base, to know what problems to tackle, and to verify and implement new ideas” (Ritter & Dijksterhuis, 2014, p. 8). Although both theories suggest opposing viewpoints/reasons, Ritter and Dijksterhuis propose that the both unconscious and conscious processes work together to shape our creativity, stating “future research may investigate what combination of conscious and unconscious processes is most fruitful for creativity” (Ritter & Dijksterhuis, 2014, p. 8).

There has been more research conducted on the influence of the unconscious in regards to decision-making. A study by Bos et al (2008) (as cited by Ritter and Dijksterhuis) tested an unconscious thought group (in which participants were told they would have to make a decision on the given information after an incubation period) compared to a mere distraction group (in which participants were not told they would have to make a decision on the given information and then proceeded with the same task the unconscious thought group received during their incubation period). They found that the unconscious thought group benefitted from the incubation period and exhibited better decision-making, whereas the distraction group did not. This suggests that unconscious thought plays an important role in decision making, and supports the plausibility of an important role of active unconscious thought in creative processes.

Although this study focuses more on shorter incubation periods like mind-wandering, much valuable information has been gathered from sleep studies. It has been found that REM sleep is particularly helpful for increasing creative performance. Ritter and Dijksterhuis define REM (Rapid Eye Movement) sleep as “a stage of sleep characterized by the rapid and random movement of the eyes, and typically occupies 20–25% of total sleep” (Ritter & Dijksterhuis, 2014, p. 3). REM and NREM differ in their memory structure they use and thus are believed to have different effects on our memory consolidation and integration of new associations in the brain, which would affect divergent thinking and creativity. This suggests that unconscious thought is helpful to the creative process. If incubation effects were merely due to effects predicted by the conscious theory such as relaxation, environmental cues, etcetera, then there should be no difference between REM and NREM sleepers. However, REM sleepers showed a significant increase in creative activity and greater positive incubation effects (Ritter & Dijksterhuis, 2014, p. 3).

Current research suggests that the incubation task should also be unrelated to the initial task in order to maximize incubation benefits. Gilhooly et al (2013)’s research (as cited in Ritter and Dijksterhuis) found that “spatial incubation benefitted verbal-rated creativity & verbal incubation benefitted spatial-rated creativity” (Ritter & Dijksterhuis, 2014, p. 2). This suggests that dissimilar tasks should enhance creativity, and similar types of tasks will inhibit unconscious processes.

Due to the fact that a similar type of task (in this present study, a verbal task) should interfere with unconscious processes, we can assume that a stronger incubation effect in the dissimilar task (in this study, binocular rivalry) will provide evidence for the influence of

unconscious processes in creative thinking. Therefore, this paper predicts the hypothesis that there will be a significantly stronger incubation effect in the binocular rivalry task when presented as the first task, providing evidence for the influence of unconscious processes.

Thus, this present paper proposes two hypotheses: that there will be a significant incubation effect, and there will be evidence of unconscious processing as seen through a significant difference between a similar (verbal) incubation task and a dissimilar (non-verbal) incubation task. This study will use the RAT to assess divergent thinking. This study will have two independent variables. One will be presence (or lack of thereof) of an incubation period to test for the presence of an incubation effect. The other independent variable will be the type of incubation task first presented or the “first task” which will either be an alternative uses task (verbal and thus similar) or a binocular rivalry task (nonverbal and thus dissimilar). The dependent variable measured is the mean RAT score.

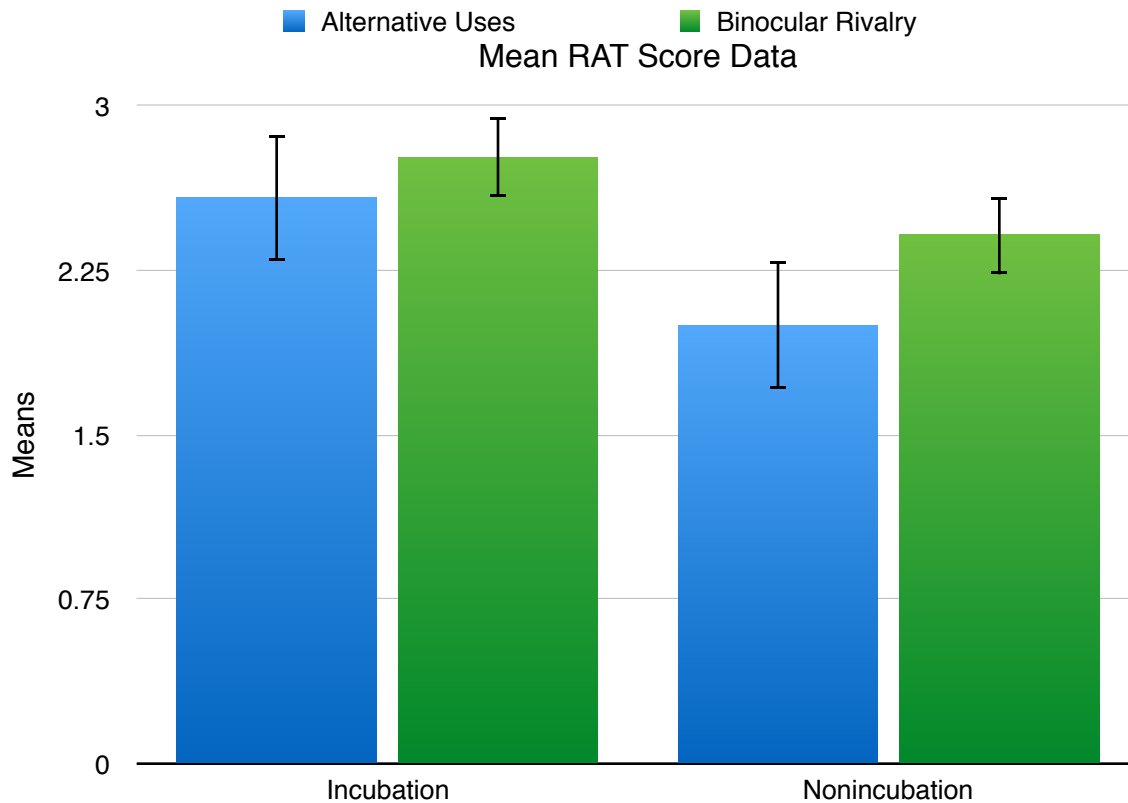


FIGURE CAPTION: This graph shows the mean RAT score for each type of task (alternative uses which is verbal and similar, or the binocular rivalry task which is nonverbal and dissimilar) both with an incubation period or without an incubation period.

DISCUSSION

The results showed a main effect between the incubation and nonincubation groups. This was expected and supports the first hypothesis that there is a significant incubation effect. However, the results were not able to determine a main effect for the first task. This was unexpected and thus, this present study was not able to support the second hypothesis that unconscious processes contribute to creative thinking. Along with much of the literature

regarding incubation, this study was able to provide evidence for the existence of an incubation effect. However, the study was unable to provide evidence for the processes, particularly the influence of unconscious processes, that underlie the incubation effect. This mechanism behind the incubation effect and question of the role of unconscious processes remains a murky and contradictory area in the current literature. The results of this study would then align more with the conscious work theory explanation; that incubation effects are merely caused by distraction consequences (such as relaxation, mental rest, overcoming fixation and mental sets) and these are responsible for the incubation effect, rather than unconscious processes.

Similar to the Yang et al study (2012) (as cited in Ritter and Dijksterhuis), this study used three minute intervals for the incubation tasks. Yang et al also suggested that a moderate time interval is the most conducive for productive effects of unconscious thought (Ritter & Dijksterhuis, 2014, p. 6). Though it is emphasized that the actual amount of time that constitutes a “moderate time interval” will vary depending on the task, their study also utilized the RAT assessment, and so three minutes for the incubation period can be considered a moderate time interval for this present study, and, in keeping line with Yang et al’s research, should have produced evidence for unconscious thought. A major difference between the Yang et al study and this present study is that the Yang study tested different time lengths of intervals (long - five minutes, short - one minute and moderate - three minutes). On the other hand, this study focused primarily on distinguishing the presence of an incubation effect, and varying the type of task performed in the incubation period to test for the presence of unconscious processes. A similarity is that both kept the same time interval (three minutes) for the incubation period. (Ritter & Dijksterhuis, 2014, p. 6).

A study by Zhong et al (2008) (as cited in Ritter and Dijksterhuis) also used the RAT assessment and their results were found to be “consistent with unconscious thought theory, which systematically differentiates conscious and unconscious thought processes, and suggest that unconscious processing is more adept at associating and integrating information than conscious processing is” (Ritter & Dijksterhuis, 2014, p. 6). The main difference between the Zhong et al study and the present study is that the Zhong study incorporated the idea of goal-oriented unconscious thought processes. Their distinction between unconscious and conscious processes was determined by whether or not the participants had an underlying goal during their incubation period. They either knew they would return to the task (expected unconscious thought group) or thought they had finished and would continue with different tasks (expected distraction thought group). The Zhong et al study also used an incubation time interval of five minutes, which Yang et al’s study suggested was long and not as optimal for unconscious processes. However, the Zhong et al study’s results proved to be closer aligned to the unconscious work theory (Ritter & Dijksterhuis, 2014, p. 6). This provides us with conflicting results about the optimal time interval for the RAT assessment and optimal time period for unconscious processing in general.

This idea of relating unconscious processes with goals is also relevant when discussing mind-wandering. In fact, mind-wandering can be used to connect the two ideas together. The Default Mode Network is a nexus of regions in the frontal and parietal cortex hypothesized to relate to mind-wandering and is known to relate to “complex, evaluative and unconscious forms of information processing” (Ritter & Dijksterhuis, 2014, p. 3). Research by Smallwood & Schooler (2006) (as cited by Ritter & Dijksterhuis) shows both the Default Mode Network and

brain executive system working together during mind-wandering, which “implies that mind-wandering may often be goal oriented” (Ritter & Dijksterhuis, 2014, p. 3).

The current literature has already studied and verified the positive effects of creativity-enhancing techniques associated with conscious processes, such as “set-shifting, questioning assumptions, and using analogies” (Ritter & Dijksterhuis, 2014, p. 7). But the effect of the unconscious realm remain a mystery. Although this present study did not result in evidence to support the possibility of the influence of unconscious processes on creative thinking, it will perhaps incite more research on the area, or at the very least help to solidify that we should focus on creativity-improving techniques that rely on the conscious level, since current research claims there is a significant effect.

One area this study did not focus on was the effect of an undemanding task in comparison to a demanding task. Perhaps future research can investigate the difference between not only different types of incubation tasks (similar and dissimilar) but also incorporate the effect of the demand the task places on the participants’ cognitive capacities. Because the current research suggests that undemanding tasks enhance unconscious thought processes, perhaps choosing particularly undemanding similar and dissimilar tasks will increase the likelihood of detecting the presence of unconscious processes. Using less demanding tasks may also leave more opportunities for mind-wandering which seems to be associated with creativity, especially when potentially goal-oriented.

REFERENCES

- Bos M. W., Dijksterhuis A., van Baaren R. B. (2008). On the goal-dependency of unconscious thought. *J. Exp. Psychol.* 44, 1114–1120.
- Gilhooly K. J., Georgiou G., Devery U. (2013). Incubation and creativity: do something different. *Think. Reason.* 19, 137–149.
- Hudak, M., Gervan, P., Friedrich, B., Pastukhov, A., Braun, J. & Kovacs, I. (2011). Increased readiness for adaptation and faster alternation rates under binocular rivalry in children. *Frontiers in Human Neuroscience*, 5 (Article 128), 1-10.
- Ritter, S. M. & Dijksterhuis, A. (2014). Creativity – the unconscious foundations of the incubation period. *Frontiers in Human Neuroscience*, 8 (Article 215), 1-7.
- Smallwood, J., and Schooler, J. W. (2006). The restless mind. *Psychol. Bull.* 132, 946–958.
- Yang H., Chattopadhyay A., Zhang K., Dahl D. W. (2012). Unconscious creativity: when can unconscious thought outperform conscious thought? *J. Consum. Psychol.* 22, 573–581.
- Zhong C. B., Dijksterhuis A. J., Galinsky A. D. (2008). The merits of unconscious thought in creativity. *Psychol. Sci.* 19, 912–918.