

In this Issue

First neural evidence for the unconscious thought process

‘... I learned not to think about anything that I was writing from the time I stopped writing until I started again the next day. That way my subconscious would be working on it...’

Ernest Hemingway

Hemingway (1964/2010) describes a process that people who engage in creative pursuits from time to time recognize. While you are engaged in one thing—say a conversation with friends—consciously, something that you had been working on beforehand is still simmering unconsciously. At times the simmering is quite vigorous, and the repeating conscious intrusions can make it difficult to fully concentrate on your current activity—talking to your friends.

The idea of that incubation or unconscious thought can aid creativity or problem solving is old (Schopenhauer, 1851), and 10 years ago, we started to link the process of unconscious thought to decision making in a series of experiments (Dijksterhuis, 2004; Dijksterhuis and Nordgren, 2006; Dijksterhuis *et al.*, 2006). The idea was based on two considerations. The first was that it is quite a small step from problem solving to decision making and the second was that the process of unconscious thought as described in the first paragraph can often be sensed, introspectively, when one is in the process of making an important decision such as buying a house or choosing between one’s job and a job offer for a new one.

In our initial experiments, we gave participants the task to choose between four alternatives (houses, cars, roommates, etc.) on the basis of a number of aspects (often 12 per alternative). Participants either decided immediately after reading the decision information, or after a period of conscious thought, or after a period of distraction during which unconscious thought was assumed to take place. In our early experiments, unconscious thinkers made better decisions than participants in the other two conditions. We initially called this the deliberation without attention effect; however, now we prefer the term unconscious thought effect (UTE).

These initial findings led a number of colleagues to also investigate the relation between unconscious thought and decision making and, looking back now at 10 years of unconscious thought research, the research seems to have revolved around two questions. The first is whether unconscious thought indeed leads to better decisions than conscious thought or no thought, the second is whether unconscious thought really exists in the first place (and if so, what exactly is it)? The contribution by Creswell *et al.* (2013) constitutes a major step towards answering the second question, so I focus briefly on the first before

devoting the remainder of this introduction to the second and to the work by Creswell *et al.*

Does unconscious thought lead to better decisions? As such things tend to go, 10 years of research has led to a rather predictable answer: Probably, but only under some circumstances. The paradigm we developed turned out to be much more fragile than we had hoped, and although the UTE has been replicated independently in well over dozen laboratories, at least equally often people did not obtain any evidence for improved decision making after unconscious thought. Some individual papers, as well as a recent meta-analysis (Strick *et al.*, 2011), identified a number of moderators. It seems that unconscious thought is beneficial when decisions are based on a lot rather than on little information, when the decision information is presented blocked by decision alternative rather than completely randomized, when the distraction task is not too cognitively taxing, and when the decision information contains visual stimuli in addition to verbal stimuli. It is encouraging for proponents of the work on unconscious thought that unconscious thoughts seem to be more fruitful when the experimental set-up becomes more ecologically valid.

That being said, some people have argued that unconscious thought does not really exist in the first place. People may make better decisions after being distracted, but that does not yet mean that any decision related mental activity took place while they were distracted. Some have proposed, for instance, that participants in unconscious thought conditions form an impression of the decision alternatives online—that is, while they read the decision information—and later simply retrieve this information. These participants may perform better than conscious thinkers, because under some circumstances, conscious thought can actually hamper decision making. Although it is indeed very likely that a reasonable proportion of participants in some unconscious thought experiments indeed merely retrieved online impression (which, by the way, can be prevented by presenting the stimulus materials rapidly), this cannot explain why unconscious thinkers also often outperform immediate decision makers (Strick *et al.*, 2010), something that has been curiously overlooked when this alternative explanation was first published. However, there is also evidence that people who are not given the goal to make a decision before they are distracted make worse decisions than people who do have the goal (Bos *et al.*, 2008), and this rules out this alternative explanation even more effectively. Unconscious thought is a goal-directed unconscious process, and merely distracting people does not do anything.

The experiment by Creswell *et al.*—in which they provide the first neural evidence for the UTE—also provides strong evidence for the unconscious thought process. They indeed found that unconscious thinkers made better decisions than conscious thinkers and than immediate decision makers. More importantly, they compared neural activity among people who were thinking unconsciously while they were engaged in a distraction task with the neural activity of people doing this same distraction task without engaging in unconscious thought. They found evidence for *reactivation*. The same regions that were active while people encoded the decision information—the right

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dorsolateral prefrontal cortex and left intermediate visual cortex—were active during unconscious thought. Moreover, the degree of neural reactivation differed between participants and was predictive of the quality of the decision after unconscious thought.

This is a breakthrough in unconscious thought research, and, quite appropriately in a celebratory sort of way, published almost exactly 10 years after the first experiments with the unconscious thought paradigm. Again, Creswell *et al.* provide the first neural evidence, and thereby—in my view at least—unambiguous evidence for the unconscious thought process. Finally, they also provide insight into the characteristics of the unconscious thought process.

Although some aspects of the unconscious thought process can be carefully deduced from moderators, direct process-oriented evidence is scarce. Unconscious thought leads the representations of the decision alternatives in memory to become better organized and more polarized (Dijksterhuis, 2004; Bos *et al.*, 2011) and interestingly, a recent paper shows that unconscious thinkers rely more on gist memory than on verbatim memory (Abadie *et al.*, in press) thereby also integrating fuzzy-trace theory (e.g. Reyna and Brainerd, 1995) and unconscious thought theory. The reactivation account by Creswell *et al.* is fully in line with these earlier findings, as earlier work on reactivation has repeatedly found (for references see the article by Creswell *et al.*) that reactivation improves memory and learning processes.

The work by Creswell and colleagues constitutes a vital step forwards. The combined evidence now suggests that unconscious thought is a goal-directed process of neural reactivation during which memory representations of—in this case decision alternatives—change.

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REFERENCES

- Abadie, M., Waroquier, L., Terrier, P. (in press). Gist memory in the unconscious thought effect. *Psychological Science*.
- Bos, M.W., Dijksterhuis, A., van Baaren, R.B. (2008). On the goal-dependency of unconscious thought. *Journal of Experimental Psychology*, *44*, 1114–20.
- Bos, M.W., Dijksterhuis, A., van Baaren, R.B. (2011). The benefits of “sleeping on things”: Unconscious thought leads to automatic weighting. *Journal of Consumer Psychology*, *21*, 4–8.
- Creswell, J.D., Bursley, J.K., Satpute, A.B. (2013). Neural reactivation links unconscious thought to decision making performance. *Social Cognitive and Affective Neuroscience*, *8*(8), 863–9.
- Dijksterhuis, A. (2004). Think different: the merits of unconscious thought in preference development and decision making. *Journal of Personality and Social Psychology*, *87*, 586–598.
- Dijksterhuis, A., Bos, M.W., Nordgren, L.F., van Baaren, R.B. (2006). On making the right choice: the deliberation-without-attention effect. *Science*, *311*, 1005–7.
- Dijksterhuis, A., Nordgren, L.F. (2006). A theory of unconscious thought. *Perspectives on Psychological Science*, *1*, 95–109.
- Hemingway, E. (1964/2010). *A Moveable Feast*. London: Arrow books, pp. 22–23.
- Reyna, V.F., Brainerd, C.J. (1995). Fuzzy-trace theory: an interim synthesis. *Learning and Individual Differences*, *7*, 1–75.
- Schopenhauer, A. (1851/1970). *Essays and Aphorisms*. London: Penguin.
- Strick, M., Dijksterhuis, A., van Baaren, R.B. (2010). Unconscious-thought effects take place off-line, not on-line. *Psychological Science*, *21*, 484–8.
- Strick, M., Dijksterhuis, A., Bos, M.W., Sjoerdsma, A., van Baaren, R.B., Nordgren, L.F. (2011). A meta-analysis on unconscious thought effects. *Social Cognition*, *29*, 738–63.