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**On the goal-dependency of unconscious thought**

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*Abstract*

Recent research has shown that unconscious thought can improve the quality of complex decisions (Dijksterhuis, 2004; Dijksterhuis, Bos, Nordgren & Van Baaren, 2006). In the present research we investigate whether unconscious thought is goal-dependent. In four experiments participants were given information pertaining to a decision problem or to an impression formation problem. Subsequently, they were either given time to think consciously about the information or they were distracted for some time, during which they could engage in unconscious thought. Of the participants that were distracted however, some were given the goal to further process the information, whereas others were not given such a goal. Our experiments clearly show that unconscious thought is goal-dependent. Without a goal, people do not engage in unconscious thought.

Anyone who has ever bought a house knows that choosing between various complex, multifaceted alternatives can be a daunting task. Common wisdom dictates that

thorough conscious thought improves the quality of people's decisions for such complex objects, but this is often not the case (Dijksterhuis, 2004; Dijksterhuis, Bos, Nordgren & van Baaren, 2006). Conscious thought often leads people to use inappropriate heuristics and conscious thinkers can fall prey to biases that often harm decisions (Dijksterhuis & Nordgren, 2006; Wilson & Schooler, 1991). In addition, conscious capacity is low, making conscious thought more fruitful for relatively simple decisions, but not for complex ones (Dijksterhuis et al., 2006).

However, it has been demonstrated recently that a period of *unconscious* thought can improve the quality of people's decisions (Dijksterhuis et al., 2006; Dijksterhuis & Nordgren, 2006). Unconscious thought can best be defined as thought or reasoning that takes place when conscious attention is directed elsewhere. In research in our laboratory, we demonstrated that unconscious thought can be highly adaptive. In most of our previous experiments, participants were first presented with information pertaining to a decision problem. They were later asked questions about this information (usually they were asked to choose among alternatives) under three different conditions. Participants either decided immediately after being presented with the information, or they decided after a period of conscious thought, or they decided after a period of distraction during which they engaged in unconscious thought. The common result was that unconscious thinkers made better decisions than participants in the other two conditions.

In the current work, we want to shed more light on the process of unconscious thought. The specific nature of our unconscious thought conditions in earlier experiments leaves an important question unanswered: Is unconscious thought goal-dependent? One possibility is that we always (or at least very often) engage in unconscious thought after having processed information. If this is the case, unconscious thought is merely a residual

process that follows the encoding of information. Another possibility is that unconscious thought only takes place when we have the goal to do so. It would mean that, after having encoded information, we only engage in further unconscious thought if it is important, for instance because we have to make a decision with the help of this information. At face value, one could argue that the first possibility – unconscious thought as a residual process following encoding – is rather inefficient. After all, we process enormous amounts of information on a daily basis, and thinking about all of this would become a daunting enterprise, even for the unconscious with its high capacity. That being said, the fact that one alternative may be somewhat inefficient is not a sufficient reason to decline it.

Our earlier work does not speak to whether unconscious thought is goal-dependent. Participants in the unconscious thought conditions were always given a goal, or at least an expectation that they would later have to do something with the information they had encoded (again, usually to make a decision). For instance, after having read about four cars, but immediately before they were distracted, participants were told that they would have to answer questions about the cars later (Dijksterhuis et al., 2006) or after having been presented with information about apartments participants were told that they would later have to choose among them (Dijksterhuis, 2004). Hence, we know unconscious thought takes place when people have a goal that involves further processing of the information, but what happens without such a goal?

The question whether unconscious thought is goal-dependent is important from a theoretical perspective, because it helps us to better understand the process of unconscious thought. An alternative explanation for unconscious thought effects is the

process of set-shifting (see e.g., Schooler & Melcher, 1995, for an elaboration in the domain of creativity). That is, one could assume that the beneficial effects of a period of distraction from a decision problem do not result from an active unconscious thought process, but merely from the disruption of non-productive conscious thought. For instance, people often approach a problem with wrong cues, wrong heuristics and/or wrong information. Following a period of distraction, such wrong approaches become less accessible or are forgotten altogether. The effects of distraction on a change of mental set can be both very pronounced (such as when one tries to solve a chess problem and initially gets truly “fixed” in thinking along a wrong path) or more subtle (such as when distraction attenuates the biasing influence of primacy or recency effects). Such processes are often categorized under the umbrella of the “fresh look” explanation: Putting a problem aside for a while allows for a fresh, unbiased new start.

However, we maintain (see Dijksterhuis, 2004; Dijksterhuis et al., 2006; Dijksterhuis & Nordgren, 2006) that unconscious thought is an active process. During a period of distraction, unconscious thought leads to a different (i.e., better) organization of information in memory and to a more clear, polarized evaluation of different decision alternatives. The present research helps us to distinguish between active, unconscious thought, as we propose, and the “fresh look” alternative whereby people merely benefit from distraction because it interrupts conscious thought. After all, an explanation in terms of set-shifting would predict that unconscious thought effects are independent of goals and that only a period of distraction is necessary for unconscious thought effects to occur.

One may be skeptical about the possibility of unconscious thought being goal-dependent, because goal pursuit has long been associated with the need of conscious guidance (Bandura, 1986; Carver & Scheier, 1998; Deci & Ryan, 1985; Gollwitzer, 1990;

Locke & Latham, 1990; summaries in Gollwitzer & Moskowitz, 1996; Mischel, Cantor, & Feldman, 1996; Oettingen & Gollwitzer, 2001). However, the current state of affairs in the literature on goal-pursuit allows for the possibility of unconscious thought being goal-dependent. In previous experiments conducted in our laboratory, participants in the unconscious thought conditions were told that they would later have to use the information again, for instance to make a decision. This implies that, goal setting (making a decision) was conscious. However, if indeed unconscious thought is goal-dependent, it follows that in our experiments *goal-monitoring* was unconscious. That is, control of the progress towards reaching the goal, which accompanies goal pursuit, was done during unconscious thought. Recent research demonstrates that this is possible indeed. We know that not only can goals be set unconsciously (Bargh & Gollwitzer, 1994; Moskowitz, Gollwitzer, Wasel, & Schaal, 1999), but also that they can be monitored unconsciously (Bongers & Dijksterhuis, 2006; Moskowitz, Li, & Kirk, 2004). In fact, goals can even run to completion without any conscious guidance (Bargh, 1990; Bargh & Chartrand, 1999; Bargh & Gollwitzer, 1994; Bargh, Gollwitzer, Barndollar, & Trötschel, 2001).

#### *Overview of the experiments*

To test whether unconscious thought is goal-dependent, we conducted four experiments. In Experiments 1a and 1b, participants were given information about four cars. One of the four cars was made more attractive than the others, whereas one was made less attractive than the others. In Experiment 1a, participants later judged the cars and the difference between the attitudes towards the two cars was taken as a measure for how well participants could distinguish between the good and the bad car (as in Dijksterhuis, 2004; Dijksterhuis et al., 2006). In Experiment 1b, participants were asked to recall as many aspects of the cars as possible. Before the dependent variables were

administered in Experiments 1a and 1b, participants were divided into three conditions. Participants were either probed after a period of conscious thought, or after a period of distraction that started with the instruction they would have to answer questions about the information (the unconscious thought condition in our previous work). In a third, new condition, participants were distracted after they had been told that the task about the cars was over and hence, that they would not have to answer any questions about the cars anymore (from now on, the “mere distraction condition”).

In Experiment 2, participants were given behavioral information about a target person. They were asked to write down as much as they could remember about the target person, either after mere distraction or after a period of unconscious thought. The amount of clustering of the behavioral information, indicating the organization of the information in memory, was measured (as in Dijksterhuis, 2004).

In Experiment 3, participants were given information about two different decision problems, namely cars and roommates. They were then given the goal to either unconsciously think about the cars or about the roommates. After a period of unconscious thought, they were asked to rate both the cars and the roommates on attractiveness. With this experiment we explored to what extent more specific goals can affect unconscious thought. Can we strategically think unconsciously about one thing but not the other, even if the information was encoded at the same time?

### *Experiment 1a: Method*

#### *Participants and Design*

Participants were undergraduate students recruited at the university of Amsterdam. Of the 47 participants, 18 were male. The average age was 20.7 ( $SD=2.89$ ). Participants either received course credits or money (7 euros) for their participation. The participants were assigned to one of three conditions: a conscious thought condition, an unconscious thought condition, or a mere-distraction condition.

#### *Procedure and Materials*

The experiment was conducted in a series of many unrelated experiments. All the experiments were conducted on a computer. Participants were told they would receive information about four cars, named the Dasuka, the Nabusi, the Kaiwa and the Hatsdun. They were asked to pay close attention to the information. The paradigm was the same as the one used by Dijksterhuis et al. (2006). Each of the four cars was described with 12 attributes (for instance, the Dasuka is brand new, the Nabusi has good mileage, etc.). One of the cars was the best car, with 8 positive attributes and 4 negative attributes, one car was the worst, with 4 positive attributes and 8 negative attributes and the other cars were intermediate, with both 6 positive and 6 negative attributes. As not all attributes were equally important, we made sure that the best car excelled on the most important aspects whereas the worst car excelled primarily on unimportant attributes. The 48 pieces of information were presented to the participants on a computer screen. Each piece was presented for 4 seconds, with a 0.5 second interval between .

After the presentation of the information participants were assigned to one of the three conditions. The participants in the conscious thought condition were asked to think about their impression of the cars for four minutes. The participants in the mere-distraction condition were shown a standard screen, used many times previously in experiments in the same research lab, indicating that the experiment was now over and

that they would continue to do another task. They then received a distraction task in which they were asked to solve a word search puzzle. In the word search puzzle, we used only neutral, mundane words (e.g. 'chair' or 'table'). The participants in the unconscious thought condition were told that they would have to perform another task, but that after this task they would be asked about their opinion about the cars, thereby giving them the goal to process the information during the distraction task they received. Their distraction task was the same as in the mere distraction condition.

Afterwards, all participants were given 20-point attitude scales, asking them their opinion about the cars (e.g. "to what extent did you think the Nabusi was a good car?", ranging from 'not at all' to 'very much so').

### *Results*

Participants' performance was assessed by subtracting their attitude score for the worst car from their attitude score for the best car. This created an attitude difference score indicating to what extent participants were able to differentiate between the best and the worst car (taken from Dijksterhuis et al, 2006; see also Dijksterhuis, 2004).

The three difference-scores were compared in an analysis of variance. A main effect of condition was found,  $F(2, 44) = 12.53, p < .01, \eta^2 = 0.36$ . The attitude difference score for the participants in the unconscious thought condition ( $M=7.00, SD=4.04$ ) differed significantly from the attitude difference score for the participants in the conscious thought condition ( $M=1.26, SD=3.49$ ),  $F(1, 32) = 19.71, p < .01, \eta^2 = 0.38$ , and from the attitude difference score for the participants in the mere-distraction condition ( $M=0.54, SD=4.29$ ),  $F(1, 26) = 16.83, p < .01, \eta^2 = 0.39$ . These latter two scores did not differ significantly ( $F < 1$ ).

*Experiment 1b*

The instruction in the mere distraction condition, where the participants were led to believe they would continue with a different experiment, allows for a different explanation of the findings of Experiment 1a. The results could potentially be explained by a “directed forgetting effect” as described by MacLeod (1998). Work on directed forgetting shows that giving participants an instruction to forget results in poorer memory of information compared to when participants are given an instruction to remember. The instruction our participants in the mere distraction were given, could be conceived of as similar to an instruction to forget. It is possible that the difference in attitude between the unconscious thought and the mere distraction condition was caused not by actual unconscious thought in the appropriate condition, but by differential memory. Perhaps participants in both conditions simply judged on the basis of what they could recall after the distraction task, whereby participants in the mere distraction condition underperformed because they had forgotten the relevant information. As this is an alternative explanation worth exploring, we conducted Experiment 1b. The experiment is exactly the same as Experiment 1a, but instead of their attitudes towards the cars, participants were now asked to write down as much as they could remember about each car.

*Participants*

Participants were undergraduate students recruited at the university of Nijmegen. Of the 126 participants, 35 were male. The average age was 21.6 ( $SD=3.79$ ). Participants either received course credits or money (8 euros) for their participation.

*Procedure*

The procedure for Experiment 1b was almost identical to the procedure for Experiment 1a, but instead of their attitude towards the cars, participants were now instructed to write down as much as they could remember about the cars. They were given three minutes for this task.

### Results

As each of the four cars had been described with both positive and negative information, we analyzed the recall data according to a 3 (Condition: Conscious Thought vs. Unconscious Thought vs. Mere distraction) x 4 (Car A to D) x 2 (Valence: Positive versus Negative information) with the last two factors within-participants. Our analyses of variance confirmed that participants did not differ in their total recall of information, not in the recall of positive information nor recall of negative information, not with respect to recall errors and not with respect to recall of any one of the cars (all  $F$ s < 1).

### Discussion

Experiment 1a clearly showed that participants in the conscious thought condition were outperformed by participants in the unconscious thought condition in their ability to distinguish between the best car and the worst car. With this effect, we replicated our earlier work. More importantly, participants in the unconscious thought condition also outperformed the participants in the mere distraction condition demonstrating that unconscious thought is goal-directed and at the same time refuting a set-shifting or “fresh-look” alternative explanation. Experiment 1b showed that the findings in Experiment 1a cannot be explained by directed forgetting occurring in the mere distraction condition. In sum, in combination the findings of Experiment 1a and 1b provide strong support for the hypothesis that unconscious thought is goal-dependent.

*Experiment 2*

In Experiment 2, we used a different paradigm to test the goal-dependency of unconscious thought. The paradigm was taken from Dijksterhuis (2004, Experiment 5). In that experiment, participants received information about a person, Jeroen, with the instruction to form an impression of him. Jeroen was described by 18 behaviors and these behaviors were all descriptive of one of three personality traits. Later recall data showed that participants who had thought about Jeroen unconsciously had clustered the information in memory around these three traits. Participants who had thought about Jeroen consciously or who had not thought about Jeroen at all did not show this organization of the information in memory. In the present experiment, we try to replicate this experiment with, in addition to an unconscious thought condition, a mere distraction condition.

In Experiment 2, we decided not to include a conscious thought condition. In Experiments 1a and 1b we included such a condition to be able to replicate the effects we found in our earlier work (i.e., that unconscious thought leads to better decisions than conscious thought), but a conscious thought condition is not necessary for the hypothesis under consideration.

In Experiment 1a and 1b, participants in the mere distraction condition were given information about the four cars and were then told that the experiment was over. Although we refuted an alternative explanation in terms of differential recall in Experiment 1b, it could still be the case that the instruction given in Experiment 1a and 1b comes across as odd for participants, as they receive information they are then asked

not to do anything with. For this reason, in Experiment 2 we used a slightly different procedure.

### *Method*

#### *Participants and Design*

Forty native Dutch undergraduate students were recruited at the University of Amsterdam. Of the 40 participants with an average age of 21.2 ( $SD=3.49$ ), 7 were male. Participants either received course credits or money (7 euros) for their participation. The participants were assigned to one of two conditions: an unconscious thought condition and a mere distraction condition

#### *Procedure and Materials*

Participants were told they would be presented with information about a person named “Jeroen.”. Subsequently, 18 short sentences were presented one by one on the screen in random order. A sentence stayed on the screen for 5 seconds, with the next sentence appearing after a pause of half a second. All sentences were pre-tested to load on one of three trait categories. Six of the sentences indicated intelligence, 6 others were indicative of Jeroen being athletic and the remaining 6 were indicative of Jeroen being politically left-wing.

As said, in Experiment 1a and 1b we told participants in the mere distraction condition that the experiment was over immediately after they had encoded the information. Some participants may have found this hard to believe. We deemed such information to be more plausible after giving participants the feeling that they had at least done something with the information they had just read. Therefore, participants were asked how sympathetic they thought Jeroen was immediately after they had read the information about Jeroen. They could indicate their answer on a 9-point scale.

Subsequently, participants were assigned to the conditions. In the mere distraction condition, participants were told the experiment was over and that they would now continue with another task. In the unconscious thought condition, participants were told they would continue with another task, but that they would be asked a couple of questions about Jeroen afterwards. The distraction task consisted of anagrams. After the distraction task, participants were given four minutes to write down as much as they could remember about Jeroen.

### *Results and Discussion*

In order to compare the amount of clustering in memory of the information, a clustering score was computed per participant. We did this by calculating conditional probabilities in the free recall protocol (see Dijksterhuis, 2004; Hamilton, Driscoll, & Worth, 1989 and Dijksterhuis & Van Knippenberg, 1996). The number of same-trait sequences (e.g., an intelligent behavior recalled after another intelligent behavior) was divided by the total number of behaviors recalled minus one. Higher clustering scores represent more integration and organization in memory of the information. . Indeed, the clustering scores are higher in the unconscious thought condition ( $M=0.45$ ,  $SD=1.56$ ) than in the mere-distraction condition ( $M=0.28$ ,  $SD=1.54$ ),  $t(1, 38) = 3.45$ ,  $p < .01$ ,  $\eta^2 = 0.24$ . Participants who were given the goal to think unconsciously show greater organization and integration than participants in the mere distraction.

### *Experiment 3*

In Experiment 3 we go one step further. Now that it is demonstrated that unconscious thought is goal dependent, is it possible that unconscious thought is sensitive to more specific goals? In Experiments 1 and 2, the activated goal was very general in the sense that participants knew they would be probed about the information they had just

read. But what if they know they will only be probed about some of the information, but not all?

In Experiment 3, we present participants with information about two decision problems: One about cars, and one about roommates. Later, some participants are given the goal to reach a decision about the cars, whereas other are given the goal to decide between the roommates. After a period of unconscious thought, all participants are asked about the cars and about the roommates. The question is whether someone who has the goal to decide between cars but not roommates will indeed make a better decision about the cars than about the roommates, and vice versa.

### *Method*

#### *Participants and Design*

138 undergraduate students from the University of Amsterdam participated in the Experiment. Of the 138 participants, with an average age of 21 ( $SD=2.65$ ), 52 were male. They received either course credits or money (7 euros) for their participation. They were assigned to one of two conditions: an unconscious thought condition where they were given the goal to think unconsciously about cars or an unconscious thought condition where they were given the goal to think unconsciously about roommates.

#### *Procedure and Materials*

In Experiment 3 participants received information about three cars and three roommates. Each car and each roommate was described by ten aspects. One of the cars was the best car, with 8 positive and 2 negative aspects. Another car was the worst of the three with 2 positive and 8 negative aspects. The third car had both 5 positive and 5 negative aspects. The roommate materials were constructed the same way: One

roommate had 8 positive and 2 negative aspects, one had 2 positive and 8 negative aspects and the third roommate had both 5 positive and 5 negative aspects.

In total, participants received 60 pieces of information. The information was shown in random order, whereby all information appeared on the screen for 4 seconds. After the presentation of the information, participants were then either told they would later be asked questions about the cars or they were told they would later be asked questions about the roommates. They were then given an n-back task for distraction. In the n-back task, participants see numbers on the computer screen for one second, with half a second between the numbers. If the number they see is the same number as the number n places before, they are supposed to press the spacebar. In the present experiment a 2-back task was used. The 2-back task is not very difficult to perform, but does require a lot of conscious attention, thereby disabling conscious thought about any other information (Jonides, et al., 1997).

Afterwards, all participants were given 20-point attitude scales, asking them to rate the cars and the roommates (e.g. “to what extent did you think Roommate 1 was a good roommate?”, ranging from ‘not at all’ to ‘very much so’).

### *Results and Discussion*

To assess how well participants were able to distinguish between the best and the worst alternative for both the cars and the roommates, attitude difference scores were created by subtracting the attitude score for the worst car from the attitude score for the best car and by subtracting the attitude score for the worst roommate from the attitude score for the best roommate. To test the hypothesis that giving participants the goal to think about one topic and not the other leads to differential unconscious thought, we compared the difference scores between conditions using a 2 (Condition: goal to think

about cars vs. goal to think about roommates) x 2 (Difference score: cars vs. roommates) analysis of variance.

The predicted interaction was significant,  $F(1, 136) = 4.12, p < .05, \eta_p^2 = .03$ . Participants were better able to distinguish between the best and the worst alternative for the materials they were asked to think about than for the materials they were not asked to think about. Indeed, the effect of condition on the difference score for the roommates was significant,  $F(1, 136) = 4.64, p < .05, \eta_p^2 = .03$ . Participants who were given the goal to think unconsciously about the roommates showed a higher difference score for the roommates ( $M=7.94, SD=4.87$ ) than participants who were given the goal to think unconsciously about the cars ( $M=5.97, SD=5.87$ ). Participants who were given the goal to think unconsciously about the cars did not show a significantly higher difference score for the cars ( $M=3.00, SD=5.91$ ) than participants who were given a goal to think about the roommates ( $M=2.81, SD=6.39$ ),  $F(1,136) < 1, ns$ . Still, the significant two-way interaction allows for the conclusion that unconscious thought is not just goal-dependent, but also capable of obeying goals that are quite specific.

We also obtained a main effect of materials,  $F(1, 136) = 57.71, p < .01, \eta_p^2 = .30$ . Participants were better able to distinguish the quality of the roommates than to distinguish the quality of the cars. This effect, unimportant for our hypothesis, may have been caused by the fact that the attractive and the unattractive roommates indeed differed more than the attractive and the unattractive cars. Another reason may be that the information that was presented about the cars was less interesting for participants than the information that was presented about the potential roommates.

#### *General discussion*

The results of the four experiments demonstrated that unconscious thought is a goal-dependent process. Without the goal to process the information for a later purpose, unconscious thought does not occur. Giving participants the goal to think unconsciously prior to a distraction task improved their performance on attitude formation (Experiment 1a) and on information integration (Experiment 2). Furthermore, giving participants a specific goal to think about some information and not others was obeyed by unconscious thought (Experiment 3).

Our findings have various implications. Theoretically, the findings are important as they support the idea that unconscious thought is an active thought process. The alternative idea, that participants in our work simply benefit from set-shifting (or, a “fresh look”) because of a period of distraction is refuted by the current data. Participants in our mere distraction conditions could just as well have engaged in set-shifting, but they did not benefit from it. They consistently underperformed relative to participants in the unconscious thought conditions.

The current findings are also relevant from a practical perspective, because they show that unconscious thought can be applied strategically. We can benefit from the powerful and high capacity unconscious thought at will, by actively deciding to delegate thinking to the unconscious. The question is to what extent we can do this. How flexible is unconscious thought? Our last experiment suggests a remarkable degree of flexibility in that people can decide to unconsciously think about some things and not others.

Other questions remain though. What if one processes information about a number of houses, and only then hears that the objective is to choose a house for one’s grandmother who cannot negotiate stairs anymore? This requires a certain degree of goal-flexibility. And what about goal strength? Is unconscious thought more effective for

things that are extremely important than for things that are moderately important?

Finally, and this is important with respect to ecological validity: How and when do we implement the goal to unconsciously think in real life, that is, when there are no convenient instructions provided by experimenters? The bottom-line is that the current findings open up a host of new questions related to the potential flexibility and sophistication of unconscious thought.

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