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Figs. S1 to S7

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On Making the Right Choice: The Deliberation-Without-Attention Effect

Ap Dijksterhuis,* Maarten W. Bos, Loran F. Nordgren, Rick B. van Baaren

Contrary to conventional wisdom, it is not always advantageous to engage in thorough conscious deliberation before choosing. On the basis of recent insights into the characteristics of conscious and unconscious thought, we tested the hypothesis that simple choices (such as between different towels or different sets of oven mitts) indeed produce better results after conscious thought, but that choices in complex matters (such as between different houses or different cars) should be left to unconscious thought. Named the "deliberation-without-attention" hypothesis, it was confirmed in four studies on consumer choice, both in the laboratory as well as among actual shoppers, that purchases of complex products were viewed more favorably when decisions had been made in the absence of attentive deliberation.

Common knowledge holds that thorough conscious thought leads to good decisions and satisfactory choices. Whether purchasing a new car, a desktop computer, or a pair of shoes, people generally believe that serious conscious deliberation increases the probability that they will make the "right" choice. This idea applies especially to choices between products that are complex, multifaceted, and expensive. Whereas most people are willing to buy a new set of towels without much thought, they are unlikely to buy a new car or outfit a new kitchen without deliberation.

A second pervasive idea is that the quality of a choice benefits from "sleeping on it." Rather than (or in addition to) thinking consciously, people usually feel that "unconscious thought" is useful for making sound decisions. Whereas conscious thought refers to thought or deliberation while conscious attention is directed at the problem at hand, unconscious thought can be defined as thought or deliberation in the absence of conscious attention directed at the problem (*1*). An example of unconscious thought is the following: One compares two holiday destinations (say the Costa Brava and Tuscany) and does not know what to decide. One puts the problem aside and after 48 hours of not thinking about it consciously, suddenly the thought "It's going to be Tuscany!" pops into consciousness. This thought itself is conscious, but the transition from indecision to a preference 2 days later is the result of unconscious thought, or of deliberation without attention.

The scientific literature has emphasized the benefits of conscious deliberation in decision making for hundreds of years (*2*, *3*). The idea that conscious deliberation is the ideal (if not always attainable) way to approach a decision forms the backbone of classic (*4*, *5*) as well as contemporary perspectives on decision making (*6*, *7*) and attitude formation (*8*, *9*). In contrast, the notion that unconscious thought is fruitful hardly developed beyond the status of "folk wisdom." It has been postulated or investigated by scientists infrequently [but see (*10*–*13*)]. The question addressed here is whether this view is justified. We hypothesize that it is not.

First, conscious thought does not always lead to sound choices. For example, participants who chose their favorite poster among a set of five after thorough contemplation showed less postchoice satisfaction than participants who only looked at them briefly (*14*, *15*). Furthermore, conscious deliberation can make multiple evaluations of the same object less consistent over time (*16*). Two reasons why conscious deliberation sometimes leads to poor judgments have been identified. First, consciousness has a low capacity (*17*, *18*), causing choosers to take into account only a subset of the relevant information when they decide (*13*, *19*). Second, conscious thought can lead to suboptimal weighting of the importance of attributes (*13*–*16*): We tend to inflate the importance of some attributes at the expense of others, leading to worse choices.

Conversely, unconscious thought, or thought without attention, can lead to good choices (*13*, *14*). In a recent experiment, participants read information about four apartments of different desirability (*20*). They were either asked to choose their favorite immediately, or given the opportunity to choose after a period of conscious thought, or distracted for some time

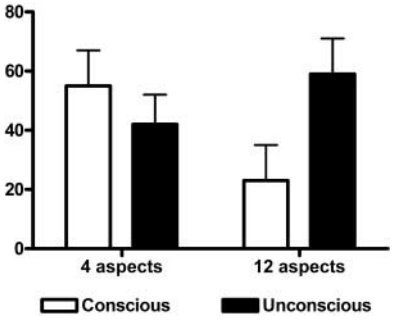

Fig. 1. Percentage of participants who chose the most desirable car as a function of complexity of decision and of mode of thought (n = 18 to 22 in each condition). Error bars represent the standard error.

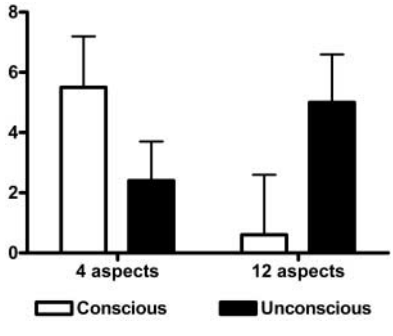

Fig. 2. Difference in attitude (on a scale of –25 to +25) toward the desirable and undesirable car as a function of complexity of decision and of mode of thought (n = 12 to 14 in each condition). Error bars represent the standard error.

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before they chose. In the third of these conditions, participants could only engage in unconscious deliberation: They knew they would have to choose later, but the distraction task prevented them from devoting conscious attention to the choice. Interestingly, unconscious thinkers made better decisions than conscious thinkers or than immediate choosers (*13*, *14*).

Recently, we formulated the Unconscious Thought Theory (UTT) (*21*) about the strengths and weaknesses of conscious thought and unconscious thought, that is, of deliberation with and without attention. Two characteristics of conscious and unconscious thought are important in the current context. First, conscious thought is rule-based and very precise (*22*, *23*). Unconscious thought can conform to rules in that it detects recurring patterns, as the literature on implicit learning shows (*24*). However, in order to actively follow strict rules, conscious attention is necessary. For example, one cannot do arithmetic without conscious attention. This capacity to follow rules makes conscious thought more precise in decision making, because it can strictly follow self-generated rules such as not exceeding a maximum price. Second, as alluded to earlier, conscious thought suffers from the low capacity of consciousness, making it less suitable for very complex issues. Unconscious thought does not suffer from low capacity. Indeed, it has been shown that during unconscious thought, large amounts of information can be integrated into an evaluative summary judgment (*13*).

These characteristics of conscious and unconscious thought led us to postulate the "deliberation-without-attention" hypothesis, on the relation between mode of thought or deliberation (conscious versus unconscious) and the complexity and quality of choice. Complexity is defined as the amount of information a choice involves. A choice between objects for which one or two attributes are important (such as oven mitts or toothpaste) is simple, whereas a choice between objects for which many attributes are important (cars or houses) is complex. Conscious thought is hypothesized, due to its precision, to lead to good choices in simple matters. However, because of its low capacity, conscious thought leads to progressively worse choices with more complex issues. Unconscious thought (i.e., deliberation without attention) is expected, because of its relative lack of precision, to lead to choices of lower quality. However, the quality of choice does not deteriorate with increased complexity, allowing unconscious thought to lead to better choices than conscious thought under complex circumstances, this latter idea being the kernel of the deliberation-without-attention hypothesis. Quality of choice was operationalized both normatively (studies 1 and 2) as well as subjectively (as postchoice satisfaction, in studies 3 and 4).

Study 1. Participants were subjected to a 2 (mode of thought: conscious versus unconscious) × 2 (complexity of choice problem: simple versus complex) factorial design (*25*). All participants read information about four hypothetical cars. Depending on the condition, each car was characterized by 4 attributes (simple) or by 12 attributes (complex). The attributes were either positive or negative. One car was characterized by 75% positive attributes, two by 50% positive attributes, and one by 25% positive attributes (supporting online text). After reading the information about the four cars, participants were assigned either to a conscious thought condition or to an unconscious thought condition. In the conscious thought condition, participants were asked to think about the cars for 4 min before they chose their favorite car. In the unconscious thought condition, participants were distracted for 4 min (they solved anagrams) and were told that after the period of distraction they would be asked to choose the best car.

The percentages of participants who chose the best car are shown in Fig. 1. The crucial two-way interaction supporting the deliberation-without-attention hypothesis was significant [$F(1,76) = 4.85$, $P < 0.04$]. Unconscious thinkers fared relatively well and showed no differences between conditions ($F < 1$, not significant). Conscious thinkers generally made the proper choice under simple conditions, but performed poorly under complex circumstances [$F(1,40) = 4.95$, $P < 0.04$].

Study 2. For the second study we made one change (*25*). Rather than asking for a choice, we asked participants about their attitudes toward each of the four cars. As the dependent variable, we used the difference in attitude toward the best car and the worst car. Again, conscious thinkers were better able to differentiate the quality of the cars under simple conditions, whereas unconscious thinkers were better able to differentiate the quality of the cars under complex conditions [$F(1,47) = 5.63$, $P < 0.03$]. The means are shown in Fig. 2.

Study 3. In a pilot study, undergraduate students were asked how many aspects of a product they would take into account in the purchase of 40 different products. In this way, we obtained an average "complexity score" for 40 different products (supporting online text).

For the actual study, other students were presented with this list of 40 products. From the list, they were asked to choose a product that they had recently purchased and were asked the following questions: Which product did you purchase? Did you know the product before you went on the shopping trip? How much did you think about the product between seeing it for the first time and buying it? How satisfied are you with the product?

To test our hypothesis, we distinguished participants who thought (either consciously or unconsciously) about their purchase from impulse buyers who did not think much at all. Hence, participants who indicated that they bought a product they had never come across before the shopping trip were not included, leaving only participants who knew the product beforehand ($n = 49$).

It is impossible to know whether people are engaged in unconscious thought by asking them, so strictly speaking, we can only test the relationship between conscious thought,

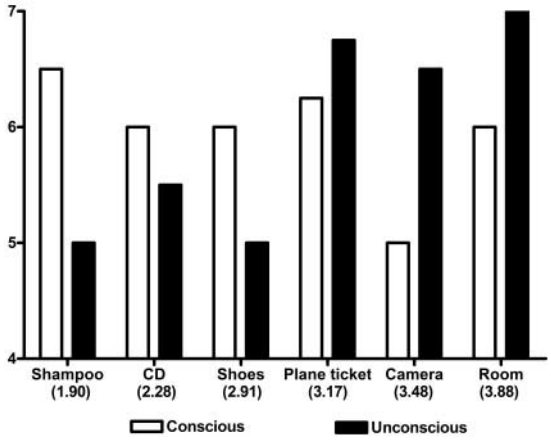

Fig. 3. The relation between mode of thought and postchoice satisfaction (on a scale of 1 to 7) for the six products most frequently chosen in study 3. Higher bars indicate more satisfaction. The more complex the product (on a scale of 1 to 5), the further to the right it is shown. The complexity score is given in parentheses. Participants were divided into conscious and unconscious thinkers on the basis of a median-split for each product individually. Each bar represents between two and five participants.

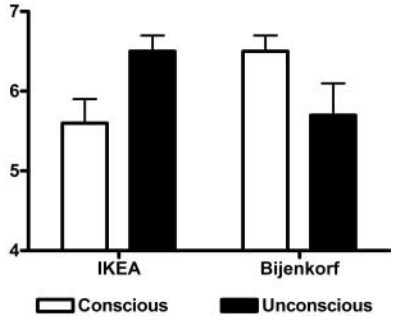

Fig. 4. Postchoice satisfaction of IKEA ($n = 27$) and Bijenkorf ($n = 27$) shoppers as a function of mode of thought. Error bars represent the standard error.

complexity, and quality. However, it follows from our definition of conscious and unconscious thought (according to which attention to the problem at hand is the crucial distinguishing factor) that they are at least partly dependent. At any one point in time, attention is either directed at the decision under consideration, or it is not; that is, at any particular point in time, either you are attending to buying a car, or you are not. The more you think about a decision consciously (that is, with attention), the less time remains to think about the same decision unconsciously (that is, without attention).

We regressed the amount of thought and the average number of aspects on postchoice satisfaction. As expected, thinking does not make people more satisfied, nor does complexity (t's < 1). However, the interaction of the two parameters significantly predicted postchoice satisfaction [$t(48) = 2.13$, $P < 0.04$]. Correlations were calculated between amount of thought and postchoice satisfaction for three categories of products: complex, medium, and simple. For products of medium complexity, no correlation was found [$r(18) = -0.03$]; for simple products, a positive correlation was found [$r(15) = 0.57$, $P < 0.03$]; and for complex products, a negative correlation was found [$r(16) = -0.56$, $P < 0.03$]. As expected, the more people thought consciously about simple products, the more satisfied they were with their purchase. Conversely, the more people thought consciously about complex products, the less satisfied they were with their purchase. Figure 3 depicts satisfaction as a function of mode of thought for the six most frequently chosen products (*26*).

Study 4. On the basis of the pilot study to study 3, two shops were selected: one where people generally buy complex products (IKEA, which sells mainly furniture) and one where people generally buy simple products (Bijenkorf, a department store like Macy's that sells clothes, clothing accessories, and kitchen accessories). At the exit, shoppers were asked the following questions: What did you buy? How expensive was it? Did you know the product before you went on the shopping trip? and How much did you think about the product between seeing it for the first time and buying it? A few weeks later, the shoppers were asked (over the phone) how satisfied they were with their purchases. As in study 3, participants who indicated that they bought a product they had never come across before the shopping trip were not included.

We divided participants ("thinkers") on the basis of a median-split procedure into those who engaged in much conscious thought (conscious thinkers) and those who engaged in little conscious thought (unconscious thinkers). As expected, conscious thinkers reported more postchoice satisfaction than unconscious thinkers for Bijenkorf products (simple products) [$F(1,25) = 6.52$, $P < 0.02$]. The opposite was true for the IKEA customers (complex products), in which case unconscious thinkers showed more postchoice satisfaction than conscious thinkers [$F(1,25) = 6.12$, $P < 0.02$] (Fig. 4).

In sum, in four studies we demonstrated the deliberation-without-attention effect. Conscious thinkers were better able to make the best choice among simple products, whereas unconscious thinkers were better able to make the best choice among complex products. Among people who knew the product they purchased before they went on a shopping trip, the amount of conscious thought was positively related to postchoice satisfaction for simple products and negatively related to postchoice satisfaction for complex products.

Our aim was to test the "deliberation-without-attention" hypothesis both in the laboratory and among shoppers. In that sense, it is important to view our set of studies as a whole rather than as a series of individual studies. Study 4 has unavoidable disadvantages such as that the IKEA and Bijenkorf samples may have differed (after all, different shops attract a different clientele), which naturally opens the potential for alternative explanations. Therefore, study 3 was done in order to "bridge" the laboratory studies with study 4. It has many of the assets of study 4 (real choices between real products with satisfaction as the dependent variable), except that all participants were students.

Although we investigated choices among consumer products in our studies, there is no a priori reason to assume that the deliberation-without-attention effect does not generalize to other types of choices—political, managerial, or otherwise. In such cases, it should benefit the individual to think consciously about simple matters and to delegate thinking about more complex matters to the unconscious.

References and Notes

1. It is important to note that attention to the problem at hand is the crucial distinction in our definitions of conscious and unconscious thought. Thinking about buying a new car while attention is directed at possible new cars is conscious thought. Thinking about buying a new car while attention is temporarily directed elsewhere is unconscious thought. This distinction does not mean that conscious thought only comprises conscious processes. One can compare it to speech. Speech is a conscious process (i.e., attention is directed at it while one speaks), but it is in part dependent on accompanying unconscious processes (such as processes responsible for syntax or word choice).
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20. Quality of decision was operationalized from a normative perspective. One of the choice options was made more desirable than the others because it had been assigned more positive aspects than the other apartments.
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22. The important distinction between following rules and merely conforming to them (and the need for conscious attention in the former) was made by S. A. Sloman (*29*).
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24. Unconscious thought is reminiscent of implicit learning, but there is an important difference. Implicit learning refers to aspects of a task that are learned while working on the task (and that are inaccessible to consciousness). Unconscious thought refers to thought processes that take place after the encoding of relevant information. A good example of this definition of unconscious thought is the groundbreaking work by Stickgold and colleagues on learning during sleep. See, e.g., (*30*, *31*).
25. Materials and methods are available as supporting material on *Science* Online.
26. We found a correlation between number of aspects and amount of thought ($r = 0.54$, $P < 0.001$): The more complex a product is, the more people think consciously when deciding to purchase it. Understandable as this may be, our analysis suggests that people should do the opposite, i.e., think unconsciously when deciding to purchase a complex product. The correlation between number of aspects and price was also significant ($r = 0.45$, $P < 0.001$): Expensive products were more complex than inexpensive ones.
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32. We thank E. Neimeijer, L. Schreers, and R. Wassenberg for help with conducting study 4. This research was supported by a grant from Nederlandse Organisatie voor Wetenschappelijk Onderzoek (016.025.030).

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On Making the Right Choice: The Deliberation-Without-Attention Effect

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University of Amsterdam

Supporting Online Material

Materials and Methods

Study 1: Method

Participants and Design

Eighty undergraduate students of the University of Amsterdam were randomly assigned to the cells of a 2 (Mode of Thought: Conscious versus Unconscious) x 2 (Complexity: Simple versus Complex) between-participants design. They received course credits or 7 Euros in return.

Procedure and Materials

Participants read information about four hypothetical cars. Each car was either described by four attributes (simple condition), or by twelve attributes (complex). The attributes were either positive or negative. One car was characterized by 75% positive attributes, two by 50% positive attributes, and one by 25% positive attributes (see Appendix 1 for the materials). The attributes were presented one by one in random order on a computer screen. Each attribute was presented for 8 seconds. After reading the information about the four cars, participants were either assigned to a conscious thought condition, or to an unconscious thought condition. In the conscious thought condition, participants were asked to think about the cars carefully for four minutes. After that they chose the car they thought was best. In the unconscious thought condition, participants were distracted for four minutes and were told that after the period of distraction they

would be asked what the best car was. During the distraction period, participants solved anagrams.

The choice to choose a conscious thought (and unconscious thought) period of four minutes was based on earlier testing where participants were given different amounts of time to think and were asked whether the amount of time given was satisfactory. In experiments such as this, most people indicate that three to four minutes is enough.

Study 2: Method

Participants and Design

Fifty-nine undergraduate students of the University of Amsterdam were randomly assigned to the cells of a 2 (Mode of Thought: Conscious versus Unconscious) x 2 (Complexity: Simple versus Complex) between-participants design. They received course credits or 7 Euros in return.

Procedure and Materials

Study 2 was exactly the same as Study 1 with one exception. Rather than having participants choose their favorite car, participants gave their attitude towards each of the four individual cars. The attitudes towards the individual cars were measured by having participants click on a point on a line that was drawn between the poles “very negative” to “very positive”. The computer transformed the position into a score on a 50-point scale (from –25 [very negative] to +25 [very positive]). The attitudes towards the four cars were measured in random order.

Study 3: Method

Pilot

We asked 61 undergraduate students how many aspects they would take into account by the purchase of forty different products, ranging from complex to simple. Answers had to be indicated on a five-point scale with the following scale points:

1: 1 aspect

2: 2-3 aspects

3: 3-5 aspects

4: 5-8 aspects

5: 9 or more aspects

This way, we obtained an average "complexity score" for forty different products. A list of these scores is presented in Appendix 2.

Actual study

Ninety-three undergraduate students were presented with the list of forty products that were used in the pilot-study. They were asked to pick a product from the list that they recently purchased and were asked the following questions: Which products did you purchase? Did you know the product before you went on the shopping trip (either by seeing it, or through internet or TV ads)? How much did you think about the product between seeing it for the first time and buying it? How satisfied are you with the product? The last two questions were answered on a 7-point scale.

Study 4: Method

On the basis of the pilot-study to Study 3, we selected two shops: One where people generally buy complex products (IKEA, where people mainly buy furniture), and

one where people generally buy simple products (“Bijenkorf”, a department store comparable to Macy’s where people buy clothes and small accessories). At the exit, shoppers were asked the following questions: What did you buy? How expensive was it? Did you know the product before you went on the shopping trip (either by seeing it, or through internet or TV ads)? Did you think about the product a lot between seeing it for the first time and buying it? The last question was answered on a 10-point scale. The interview ended with the request for a phone number so that people could be contacted later. A few weeks later, the shoppers were asked how satisfied they were with their purchase. This last question was answered on a 10-point scale. We were able to interview and later contact 46 IKEA shoppers and 69 Bijenkorf shoppers. As we only included participants who indicated that they bought a product they had come across before the shopping trip, the analyses are based on 27 IKEA shoppers and 27 Bijenkorf shoppers.

Before we performed our main analyses, we first confirmed that IKEA customers did indeed by products of more complexity than Bijenkorf customers. Based on the correlation between complexity and price in Study 3, one may expect IKEA purchases to be more expensive. Indeed, the average price of the IKEA products was 369 Euros (range 20 – 6000), whereas the average price in the Bijenkorf was 89 Euros (range 6 – 370).

Appendix 1: Materials used in studies 1 and 2. Note that in actual experiments, the information was presented in random order. In the simple conditions, a subset of the information was used. In the original study, the information was in Dutch.

The Hatsdun has good mileage
The Hatsdun has good handling
The Hatsdun has a large trunk
The Hatsdun is very new
The Hatsdun is available in many different colors
For the Hatsdun service is excellent
The Hatsdun has poor legroom
With the Hatsdun it is difficult to shift gears
The Hatsdun has cupholders
The Hatsdun has a sunroof
The Hatsdun is relatively good for the environment
The Hatsdun has a poor sound system
The Hatsdun is very new

The Kaiwa has good mileage
The Kaiwa has poor handling
The Kaiwa has a large trunk
The Kaiwa is available in many different colors
For the Kaiwa service is excellent
The Kaiwa has plenty of legroom
With the Kaiwa it is easy to shift gears
The Kaiwa has no cupholders
The Kaiwa has no sunroof
The Kaiwa is fairly good for the environment
The Kaiwa has a poor sound system
The Kaiwa is old

The Dasuka has poor mileage
The Dasuka has good handling
The Dasuka has a small trunk
The Dasuka is available in very few colors
For the Dasuka service is poor
The Dasuka has little legroom
With the Dasuka it is easy to shift gears
The Dasuka has cupholders
The Dasuka has a sunroof
The Dasuka is not very good for the environment
The Dasuka has a good sound system
The Dasuka is new

The Nabusi has poor mileage
The Nabusi has poor handling
The Nabusi has a small trunk
The Nabusi is available in many different colors
For the Nabusi service is poor
The Nabusi has plenty of legroom
With the Nabusi it is difficult to shift gears
The Nabusi has no cupholders
The Nabusi has a sunroof
The Nabusi is not very good for the environment
The Nabusi has a poor sound system
The Nabusi is old

Appendix 2: Complexity scores of forty different products

1. Car	4.03
2. Computer	3.93
3. Room*	3.88
4. Camera	3.49
5. Cell phone	3.38
6. CD player	3.28
7. Plane ticket	3.17
8. Bicycle	3.11
9. Couch	3.03
Winter coat	3.03
11. Bed	2.98
12. Closet	2.95
13. Desk	2.93
14. Shoes	2.91
15. Watch	2.82
16. Table	2.64
17. Chair	2.61
18. Book	2.56
19. Trousers	2.55
20. Dress	2.54
21. Curtains	2.52
22. Shirt	2.48
Skirt	2.48
24. DVD	2.44
25. Bedding	2.34
Lamp	2.34
27. CD	2.28
28. Mirror	2.26
29. Pot	2.25
30. Silverware	2.23
31. Glasses (drinking)	2.11
Alarm Clock	2.11
33. Vase	2.03
34. Shampoo	1.90
35. Detergent	1.83
36. Towel	1.79
37. Toothpaste	1.75
38. Oven mitts	1.66
39. Umbrella	1.64
40. Dishwashing brush	1.28

* This refers to renting rather than buying