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Think Different: The Merits of Unconscious Thought in Preference Development and Decision Making

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The role of unconscious and conscious thought in decision making was investigated in 5 experiments. Because of the low processing capacity of consciousness, conscious thought was hypothesized to be maladaptive when making complex decisions. Conversely, unconscious thought was expected to be highly effective. In Experiments 1–3, participants were presented with a complex decision problem in which they had to choose between various alternatives, each with multiple attributes. Some participants had to make a decision immediately after being presented with the options. In the conscious thought condition, participants could think about the decision for a few minutes. In the unconscious thought condition, participants were distracted for a few minutes and then indicated their decision. Throughout the experiments, unconscious thinkers made the best decisions. Additional evidence obtained in Experiments 4 and 5 suggests that unconscious thought leads to clearer, more polarized, and more integrated representations in memory.

> When making a decision of minor importance, I have always found it advantageous to consider all the pros and cons. In vital matters however . . . the decision should come from the unconscious, from somewhere within ourselves.
>
> —Sigmund Freud

A few years ago, I accepted my current job at the University of Amsterdam and shortly afterward started my quest for a place to live. My timing was awful. The housing market was incredibly tight. Apartments were very expensive and very hard to get. During those days, brokers adopted a procedure that was rather demanding for the blood pressure of buyers. A house on sale was widely advertised, and all potential buyers were invited to visit at the same time. The first person who made a bid (provided it was reasonable) would get the house. When I finally visited an apartment I thought I liked, I knew I had to make a bid quickly. Very quickly. Between the moment I first passed through the doorway of the apartment and the moment I essentially became the owner of the place, all of five minutes passed. As far as I remember, I had glanced at the bathroom for about three seconds before I committed myself to a mortgage of alarming proportions. I did not sleep much that night.

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The title of this article was inspired by the well-known "Think Different" Apple ad campaign.

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The problem is that it feels wrong to make such an important decision so quickly. It was not necessarily a bad decision—I can now say it was a good one—but it felt like it was poorly made. After all, psychologists, teachers, and parents have all taught us that we need to think hard before we make an important decision. Their advice is both well meant and intuitively compelling. However, whether thorough conscious thinking always leads to good decisions is not clear. Freud questioned it, as did his contemporary Whitehead (1911), who said, "It is a profoundly erroneous truism, repeated by all copybooks and by eminent people making speeches, that we should cultivate the habit of thinking about what we're doing. The precise opposite is the case" (p. 143; also quoted in Bargh, 1997, p. 10, and in Claxton, 1997, p. 15).

It is interesting that these same parents also advised us to take our time when faced with an important decision by telling us to "sleep on it." This suggests another approach to making a decision. Here, people intuitively sense that letting the unconscious mull over the problem may lead to better decisions. However, whether what we may call "unconscious thought" contributes to good decisions is also not clear. Some recent treatments of the unconscious have been optimistic about its powers (Bargh & Chartrand, 1999; Claxton, 1997; Wegner & Smart, 1997; Wilson, 2002), but it has become so fashionable to view the unconscious as a relatively stupid system that many people will surely not expect unconscious thought to be beneficial at all.

The phrase "unconscious thought" may raise eyebrows. In the present context, conscious thought and unconscious thought are defined in the following way. *Conscious thought* refers to the cognitive and/or affective task-relevant processes one is consciously aware of while attending to a task. For instance, one may compare two holiday destinations and consciously think, "The Spanish coast is cheap but I do not want to go there because it is way too crowded." *Unconscious thought*, on the other hand, refers to cognitive and/or affective task-relevant processes that take place outside conscious awareness. One may compare two holiday destinations and not know which one to choose. Subsequently, one

does not consciously attend to the problem for a few days, and suddenly the thought, "It's going to be Tuscany!" pops into mind. This thought itself is conscious, but the transition from indecision to a preference a few days later is the result of unconscious thought.

In this article, conscious and unconscious thought are pitted against each other to answer the question, "Who is the better decision maker of the two?" This question is investigated with complex decision problems. When choosing between jobs, between houses, between different holiday destinations, between roommates, people are faced with various alternatives, each characterized by many pros and cons. Making sound decisions requires integration of large amounts of information into impressions and a comparison between these impressions to arrive at a preference. To do this, two things are needed. One needs enough processing capacity to deal with large amounts of information, and one needs skills sophisticated enough to integrate information in a meaningful and accurate way.

Processing Capacity

A little introspection reveals that the processing capacity of consciousness is limited. People are not able to concentrate consciously on two different things simultaneously. About a half a century ago, researchers started to try to quantify the processing capacity of consciousness and the unconscious. Miller (1956) demonstrated that the maximum amount of information that can be kept under conscious scrutiny at any given time is about seven units. That is not a lot. Others who investigated the processing capacity of consciousness also drew rather sobering conclusions. Consciousness can process about 40–60 bits per second (for brief reviews of this research, see Nørretranders, 1998; Wilson, 2002). Take reading, for example. Each letter of the alphabet requires about 5 bits. This means that a random letter string of eight letters (*noahlief*) contains 40 bits. However, in real language, letters are not random (e.g., *zzzgh* never appears in English), so a real eight-letter word has far less than 40 bits. Taking this into account, when people read, they process about 45 bits per second, equivalent to a fairly short sentence. Although the number of bits consciousness can process is dependent on both the task and the experience (a skilled reader can process more bits while reading than a child who is still mastering it), the processing capacity of consciousness is low.

In contrast, the processing capacity of the entire human system, or, in other words, of conscious and unconscious processes combined, is enormous. The capacity of the entire system is about 11,200,000 bits. The visual system alone can deal with 10 million bits per second. It follows that the unconscious does not have a capacity problem. If the unconscious is a modern computer, consciousness is nothing more than an old abacus.

The low capacity of consciousness suggests that it may not be up to the task of making complex decisions: The sheer amount of information involved may be too much for it to tackle. Take the example of choosing a graduate school. Different programs have different professors with different research interests, teaching evaluations, and reputations as advisors. Some programs have a higher status than others, but this status is not always perfectly correlated with the status of the university as a whole. Different schools are also located in different cities with their own pros and cons on several dimensions. The low capacity of consciousness will likely prevent it from taking all this information into account simultaneously, the consequence being that consciousness will only deal with a subset of information. This may come at the expense of the final decision.

Indeed, it has been shown that when people can devote only a limited amount of information processing capacity to making a decision (e.g., when they are under time pressure), normative, consciously driven processes can lead to worse decisions than more heuristic strategies (Payne, Bettman, & Johnson, 1988). This is because more elaborate, normative strategies only work well when all information is taken into account.

The work by Wilson, Schooler, and colleagues provides direct evidence for consciousness as a poor decision maker because of its limited capacity. Wilson and Schooler (1991; see also Schooler & Melcher, 1995; Schooler, Ohlsson, & Brooks, 1993; Wilson et al., 1993) had participants evaluate objects, such as different college courses. In one condition, participants were simply asked to evaluate the different objects. They most likely engaged in little conscious thought. In another condition, participants were pressed to carefully analyze the reasons for their evaluations before making them and to write down these reasons. They engaged in more thorough conscious thinking. This did not help them. In fact, they did a poorer job than participants who thought less. As expected, additional evidence indicated that conscious thought led people to focus on a limited number of attributes at the expense of taking into account other relevant attributes.

Other evidence comes from Pelham and Neter (1995). They asked participants to solve various problems. Some problems were transparent and easy to solve, whereas others were difficult to solve, and participants had to avoid pitfalls (they ran the risk of heuristics leading them astray). Some people were simply asked to solve the problems, whereas others were strongly motivated to solve the problems accurately. This increased motivation helped participants to be more accurate on the easy problems, but it hindered solving the complex problems. If one is willing to assume that the motivated participants engaged in more conscious thinking, the results support the notion of consciousness as a low-capacity system. Ironically, more conscious thought reduced the chance that people took crucial information into account.

The Skills to Think

Another important requirement for making a good decision is the integration of information in a meaningful way. Simply put, it is important to be able to "think." Are both consciousness and the unconscious able to associate, integrate, elaborate, weigh?

Consciousness may suffer from a power cut when too much pressure is put on its limited capacity, but as long as its capacity is enough to deal with a particular problem, it is likely to be a good thinker. For instance, consciousness can effectively moderate impressions that were initially made unconsciously (e.g., Gilbert, 1989). When we see someone shout, we come to the impression that this person is aggressive, but conscious intervention can alter this impression if warranted ("wait, he was provoked"). With decisions, such conscious interventions can be highly effective. Faced with the opportunity to buy an apartment with many wildly positive attributes and a single critical negative one (it is much too

expensive), consciousness will be good at quickly deciding against it.

The question is whether the unconscious is a good thinker. If it can devote a relatively small part of its enormous processing capacity to thought, it can potentially be very useful. However, a vast processing capacity does not necessarily imply useful work. If you shut down your computer, it cannot do anything. Or, to stick to the computer metaphor, some computers are incredibly powerful but do only one simple thing, like sorting mail by zip code. So what can the unconscious contribute to making decisions?

An area where people have devoted time and effort to investigating the fruits of the unconscious is the domain of creativity. Researchers have long recognized the importance of *incubation*, the process whereby a problem is consciously ignored for a while, after which the unconscious offers a solution. The amount of anecdotal evidence for incubation is enormous. Nobel laureates and famous artists often refer to this process as the true key to insight (see, e.g., Gardner, 1993; Ghiselin, 1952). George Spencer Brown has famously said about Sir Isaac Newton that

> to arrive at the simplest truth, as Newton knew and practiced, requires years of contemplation. Not activity. Not reasoning. Not calculating. Not busy behavior of any kind. Not reading. Not talking. Not making an effort. Not thinking. Simply bearing in mind what it is that one needs to know. (Quoted in Claxton, 1997, p. 58)

Many of us recognize processes of incubation in ourselves. We think about a paper we want to write and mull over the order in which we are going to develop our argument in the introduction. We put things to rest for a while and then suddenly, "BING," we feel we know it.

Strong as the anecdotal evidence may be, for a long time proof of incubation was notoriously hard to establish in a research lab (e.g., Olton, 1979). In addition, the empirical evidence for incubation available these days (e.g., Schooler & Melcher, 1995; Smith, 1995) is usually not explained by unconscious thought. Instead, incubation is seen as fruitful because one is distracted from the problem at hand. Not thinking about a problem for a while may lead people to forget wrong heuristics or inappropriate strategies in general. Distraction, then, allows people to give the problem a fresh look. The distinction between distraction, whereby the role of the unconscious is passive, and true active, unconscious thought, is discussed in the introduction to Experiments 4 and 5 below.

Whereas the conclusions that can be drawn from the literature on incubation are rather sobering regarding unconscious thought, recent evidence by Betsch, Plessner, Schwieren, and Gütig (2001) shows that the unconscious can integrate large amounts of information. Betsch et al.'s participants looked at ads shown on a computer screen. They were asked to carefully look at the ads because their memory for the ads would be probed. At the same time, the numerical increases and decreases of five hypothetical shares were shown. Participants were presented with 75 units of information, all only briefly presented on the computer screen. Afterward, they were asked specific questions about each of five shares, such as what the average money returns were. They were clueless. However, when they were only asked to give their attitudes, they somehow knew what the best and worst shares were. Participants had developed a gut feeling toward the shares, indicating that they had integrated the information. If participants had failed to take into account even a small portion of the 75 units of information, this would have been impossible.

Other evidence for unconscious thought processes comes from research by Bowers, Regehr, Balthazard, and Parker (1990). Their participants were asked to identify words while from time to time they were given a hint, such as an associated word. After each hint, they were pressed to guess. When people solve such problems, they "feel" as if they suddenly know the answer. Indeed, the answer suddenly pops up in consciousness ("*red . . . bowl . . . fresh* . . . of course, they mean *fruit*!"). However, people's successive guesses indicated that the process is not quite as sudden if seen from the perspective of the unconscious. Successive guesses converged, and the unconscious seemed to be closing in on the right answer quite a while before the answer was accessible to consciousness. Related findings come from research on tip-of-the-tongue phenomena. Yaniv and Meyer (1987) offered participants definitions of rare words they could not recall but felt they knew. In a lexical decision task, the target tip-of-the-tongue words were highly accessible. Although the words were inaccessible to consciousness, the unconscious had found and activated them.

To summarize, there is enough evidence to at least assume that the unconscious continues to think about pressing matters in the absence of any conscious attention.

Overview of Experiments

Two hypotheses were tested in the current research. First, when making complex decisions, a brief period of unconscious thought will lead to a better decision relative to conditions under which unconscious thought is prevented. Second, when making complex decisions, conscious thought is inferior relative to unconscious thought. The first three experiments directly tested these two hypotheses. The fourth and fifth experiments were designed to shed light on the nature of unconscious thought.

In the first three experiments, the same paradigm was used. Participants were presented with information about various alternatives (apartments in Experiments 1 and 2, roommates in Experiment 3). Alternatives were described by both positive and negative attributes, and one was made rather desirable and another one rather undesirable. Hence, the quality of the decision is judged from a normative perspective. In the experiments, filler alternatives were included in order to increase the complexity of the decision problem. These fillers were constructed to be neutral.

Participants indicated their preference either directly, by choosing an alternative (Experiment 2), or indirectly, by indicating their evaluation of each alternative (Experiments 1 and 3). In Experiments 1 and 3, the dependent variable was the difference in attitude toward the desirable and the undesirable alternatives. There are two reasons for this choice. First, when choosing between alternatives, recognizing the best alternative is obviously important. However, recognizing and rejecting a particularly unattractive alternative is in many cases just as important. The second reason is practical. A difference score between two opposite attitudes provides more statistical power than a single attitude score.

In all experiments, there were three conditions. Some participants were provided with the relevant information and had to decide (or evaluate) immediately afterward. This condition is the immediate decision condition. Participants in the conscious thought condition were given a few minutes to think about the

information before they decided. Finally, participants in the unconscious thought condition were distracted for a few minutes before they decided, thereby enabling them to think unconsciously while at the same time preventing conscious thought. The immediate decision condition can be seen as a baseline where little or no thought takes place after participants read the information about the various alternatives. The unconscious thought condition is devised in such a way as to prevent conscious thought. The first hypothesis, that unconscious thought helps to make decisions, should lead to better performance in the unconscious thought condition relative to the immediate decision condition.

The conscious thought condition is a little more complex because it is not purely a conscious thought condition. Making people think consciously does not stop them from thinking unconsciously. The second hypothesis about the relative inferiority of conscious thought should not necessarily lead to worse performance under conscious thought conditions than under immediate decision conditions, because the former group benefits from unconscious thought. Instead, the second hypothesis implies that the conscious thought condition should show inferior performance relative to the unconscious thought condition.

Experiment 1

Method

Participants and design. Sixty-three undergraduate students (48 women and 15 men) from the University of Amsterdam were randomly assigned to one of three conditions: an immediate decision condition, a conscious thought condition, and an unconscious thought condition. They either received course credits or money (€5; approximately US$6) for their participation.

Procedure and materials. The experiment was the last in a longer session with various unrelated experiments. Participants worked in separate cubicles. The experiment was described as an experiment on decision making. Participants were told that they would be presented with information about four hypothetical apartments in Amsterdam (labeled Apartments 1–4). All apartments were described by positive (e.g., "a very nice area") and negative (e.g., "rather noisy") attributes. Participants were asked to form an impression of the apartments, and they were told that they would be asked to choose one of the apartments at a later stage.

Information was then presented about the four apartments. Each apartment was described by 12 attributes, for a total of 48 pieces of information. These 48 attributes were presented in random order. Each attribute was presented for 4 s in the center of the screen, automatically followed by the next attribute. It is important to note that Apartment 2 was the most attractive apartment, with 8 positive (e.g., "Apartment 2 is in the city center") and 4 negative (e.g., "Apartment 2 has an unfriendly landlord") attributes. Apartment 4 was the worst apartment, with 4 positive and 8 negative attributes. Apartments 1 and 3 were of medium attractiveness, with 6 positive and 6 negative attributes. The last two apartments can be seen as fillers, used so participants were presented with a large amount of information.

The stimulus information was assembled as follows. A large number of attributes were pretested, and all extremely negative or extremely positive attributes were excluded. When students were asked which attributes they found important, two stood out: size of the apartment and cost. These dimensions were used with care in that items were phrased to make them not too extreme (e.g., "Apartment 2 is fairly large" rather than "Apartment 2 is enormous"). No attributes were used more than once, although some attribute dimensions were used twice (e.g., one was in a nice area, another in a troublesome area).

After participants read all the information, they were randomly allocated to one of three conditions. In the immediate decision condition, they were immediately asked to give their attitude toward each of the four apartments. The questions were phrased "How would you judge Apartment . . . ?" Participants were asked to indicate their answer on a 10-point scale ranging from 1 (*extremely negative*) to 10 (*extremely positive*). All participants rated the apartments in numerical order, starting with Apartment 1.

In the conscious thought condition, participants were first asked to "very carefully think about what you think of each of the four apartments."[1] They were given 3 min. During this time, the computer screen was blank except for a clock indicating how much time they had left. After 3 min, participants answered the attitude questions.

In the unconscious thought condition, participants performed a distractor task aimed at preventing conscious thought: the *n*-back task (e.g., Jonides et al., 1997). In this task, participants are presented with a series of digits, and for each digit they have to decide whether it matches the digit that preceded it by *n* places. Here participants completed a 2-back task. This demanding task affects executive functioning quite severely and can therefore be expected to successfully eliminate conscious thought. Participants performed the 2-back task for 3 min (including a 20-s instruction screen). A number between 1 and 9 appeared on the screen every second, and participants had to indicate a match by pressing the space bar. After 3 min, they were asked to complete the attitude questions. In general, participants did well on the *n*-back task, except for 3 participants who erred on over 10% of the trials. These participants were not taken into account in further analyses. After completing the attitude questions, all participants were debriefed, thanked, and dismissed.

Results

It was first confirmed that overall, the attractive apartment was judged as more attractive than the unattractive apartment. Indeed, the overall attitude toward the attractive apartment was higher ($M = 6.18$) than the attitude toward the unattractive apartment ($M = 5.38$), with the attitude toward the two fillers falling in between (Ms = 5.74 and 5.69).

The measure of interest is how well participants could differentiate between the attractive apartment and the unattractive apartment. Hence, difference scores were calculated by subtracting the attitude toward the unattractive apartment from the attitude toward the attractive apartment. Both participants in the immediate decision condition ($M = 0.47$, $SD = 1.71$) and in the conscious thought condition ($M = 0.44$, $SD = 1.48$) performed poorly. Their scores did not significantly differ from zero (ts < 1.15), indicating no clear preference for the attractive apartment. Participants in the unconscious thought condition did better ($M = 1.23$, $SD = 2.05$). Their score was higher than zero, $t(21) = 2.75$, $p < .02$.

It was expected that unconscious thought would outperform participants in the immediate decision condition. The second hypothesis was that conscious thought would be maladaptive, which should lead to underperformance of conscious thinkers relative to unconscious thinkers. It became clear after an inspection of the cell means that female and male participants may have responded differentially to our manipulation, so this factor was included in the analyses. A 3 (experimental condition) × 2 (sex of participant) analysis of variance (ANOVA) yielded a significant effect of condition, $F(2, 54) = 3.40$, $p < .05$, and a nonsignificant two-way interaction, $F(2, 54) = 2.79$, $p < .08$. The three conditions were compared via three separate ANOVAs. As expected, a comparison

[1] Original instructions were in Dutch.

between the immediate decision condition and the conscious thought condition did not yield any significant results. Participants in the unconscious thought condition performed better than participants in the immediate decision condition, $F(1, 37) = 4.96$, $p < .04$. This effect was qualified by a two-way interaction of equal magnitude, $F(1, 37) = 4.96$, $p < .04$, showing that male participants were especially sensitive to our manipulation. They scored very poorly in the immediate decision condition ($M = -1.00$, $SD = 2.16$) and exceptionally well in the unconscious thought condition ($M = 2.00$, $SD = 1.83$). This difference was absent for female participants (both Ms = 0.87). Finally, a comparison between the conscious and unconscious thought conditions showed the predicted main effect of condition. Participants in the unconscious thought condition outperformed those in the conscious thought condition, although this effect was not significant, $F(1, 37) = 3.47$, $p < .08$. No other effects were significant (Fs < 1).

To summarize, participants who could only engage in unconscious thought were able to differentiate between the attractive apartment and the unattractive apartment, whereas participants who either were allowed to think consciously or were not allowed to think at all could not, thereby supporting the two hypotheses.

Experiment 2

Experiment 2 served various purposes. One goal was to replicate the effects of Experiment 1. However, rather than asking participants to evaluate each apartment separately, they were now asked to choose one of the apartments. In addition, it is shown above that conscious thought can be maladaptive because of the low capacity of consciousness. Therefore, consciousness is not able to deal with a large amount of information and must resort to focusing on a limited subset. In concrete terms, when choosing between four apartments, each described with 12 attributes, consciousness would not be able to take all the information into account and would, by necessity, focus on only a few attributes. Unconscious thought, however, was expected not to suffer from capacity problems. It should therefore be easier for unconscious thought to form a more global judgment based on all (or almost all) information. This possibility was investigated by asking participants, after they chose an apartment, to indicate whether their choice was based on a global impression or on only one or two specific attributes.

The paradigm changed a little from Experiment 1, in which the decision-making task was very taxing, because participants in two out of three conditions could not discriminate between the best and worst apartments. One reason for this experienced difficulty is that the information about the apartments was presented in random order. It was decided to present the information in Experiment 2 about each apartment individually in a fixed order.

Method

Participants and design. Ninety-four undergraduate students (80 women and 14 men) from the University of Amsterdam were randomly assigned to one of three conditions: an immediate decision condition, a conscious thought condition, and an unconscious thought condition. They either received course credits or money (€5) for their participation.

Procedure and materials. Participants were seated in a cubicle. The experiment was described as an experiment on decision making. Participants were told that they would be presented with information about four hypothetical apartments in Amsterdam (called Apartments 1–4). All apartments were described by both positive and negative attributes. They were asked to form an impression of the four apartments, and they were told that they would be asked to choose one of the apartments at a later stage.

Information was then presented about the four apartments. Each apartment was described by 15 attributes, for a total of 60 pieces of information. As opposed to Experiment 1, the attributes were not presented in random order. Participants were first given the 15 attributes describing Apartment 1. All 15 attributes appeared at once and were presented as a list. After 12 s, the list for Apartment 2 appeared to the right of the list for Apartment 1. Again after 12 s, a third list describing Apartment 3 was added, and after a further 12 s, the list for Apartment 4 was added. The four lists remained on the screen for another 12 s, after which all the information disappeared. Apartment 3 was the most attractive apartment, with 8 positive, 4 negative, and 3 neutral attributes. Because participants were asked to choose an apartment rather than indicating their attitude toward each apartment, no particularly unattractive apartment was included. The three remaining apartments (i.e., Apartments 1, 2, and 4) were all characterized by 5 positive, 6 negative, and 4 neutral attributes.

After participants read all the information, they were randomly allocated to one of three conditions. The conditions were the same as in Experiment 1.

Afterward, participants answered two questions. They were first asked, "If you had to choose one of the apartments, which one would you choose?" They indicated their answer by typing the corresponding number. The second question pertained to the way they reached their choice. They were asked, "Is your choice based on a more global judgment, or is your choice based on only one or two specific attributes?" Participants answered by clicking on one of two boxes, labeled "global" and "specific." After completing the attitude questions, participants were debriefed and dismissed.

Results

Because of the extremely low number of male participants (only 3 in the unconscious thought condition), sex of participant was not included in the analyses. The percentages of participants choosing the attractive apartment were compared. As expected, participants in the unconscious thought condition most often made the right choice (59.3%). Participants in the conscious thought condition and the immediate decision condition did not perform as well (47.1% and 36.4% made correct choices, respectively). Chi-square tests demonstrated that the goal to make the decision problem easier was successful. In all conditions, participants performed better than chance, all χ^2s$(92, N = 93) > 5.19$, ps $< .03$. Furthermore, the difference between the unconscious thought condition and the immediate decision condition was significant, $\chi^2(59, N = 60) = 3.13$, $p < .04$, one-tailed.

The way participants reached their choice differed between conditions. In the immediate decision condition, 42.4% of the participants indicated they made a global judgment. This percentage was lower for participants in the conscious thought condition (26.5%) and higher in the unconscious thought condition (55.6%). These latter two percentages differed significantly, $\chi^2(60, N = 61) = 6.69$, $p < .01$, one-tailed. The way participants reached their choice was related to its quality. Across participants, the correlation between the answers on the two questions was .22 ($p < .04$). Participants who made global judgments more often chose the attractive apartment.

Experiment 3

Experiment 3 was designed to replicate the finding of superior unconscious thought with different stimulus materials. In Experi-

ments 1 and 2, apartments were chosen as objects in the hope that students would find them both relevant and, to some extent, appealing. In Experiment 3, however, potential roommates were used as objects. This is as relevant, but possibly more appealing, than apartments because participants would be thinking about people.

In the first two experiments, quality of judgment was evaluated from a normative perspective. One apartment was better than another because it was characterized by more positive attributes and fewer negative attributes. However, people differ as to which attributes they find most important. Some people may be willing to live in a very small apartment as long as it is in the city center, whereas others need more space and prefer to move to the suburbs. Likewise, it is easier for most people to list the appealing aspects of a holiday in Tuscany (great cities and towns, lots of art, a beautiful countryside, great food, good wine, etc.) than a holiday on a Spanish *costa* (one can swim and choose between dozens of bars each night to get a drink). Still, many people prefer the Spanish *costas* because they are not interested in the highlights of Tuscany. In other words, to reach a sound decision people should give different attributes different, idiosyncratic weights.

One may argue that this weighing of attributes of unequal importance is a task at which consciousness excels. Although intuitively logical, this remains to be seen. There are two separate assumptions behind this idea: (a) Consciousness is good at weighing attributes, and (b) the unconscious is not very good at it. There is reason to disagree with both.

First, is consciousness good at assigning appropriate weights to attributes? When the decision problem is simple, consciousness is indeed likely to be good. As argued in the introduction, if one is faced with an apartment with many wildly positive attributes and a single critical negative one (it is much too expensive), consciousness will likely be good at quickly deciding against it. However, when the situation is much more complex, the low capacity of consciousness should obstruct this weighing process. What if one finds three attributes very important, four attributes moderately important, four attributes rather unimportant, and two attributes not important at all?

A telling example comes from work by Wilson et al. (1993). Participants were presented with five posters and asked to choose one to take home. Later, they were called and asked how satisfied they were with their choice—a wonderful measure of whether they made the right decision from a subjective point of view. Before choosing, some participants thought about the posters for a little while, whereas others were asked to carefully analyze the pros and cons of each poster. It turned out that people who carefully analyzed were less satisfied than people who merely thought about them. That is, people who pressed consciousness to carefully weigh the various attributes made relatively poor decisions. Wilson and colleagues (see, e.g., Wilson, Dunn, Kraft, & Lisle, 1989) explained these and other findings by claiming that too much conscious reasoning increases the weight that people attach to reasons that are very accessible and easy to verbalize. These reasons are not always the ones that should receive more weight. In essence, conscious reasoning leads to a weighing process, but the weights are wrong.

Levine, Halberstadt, and Goldstone (1996) obtained evidence further supporting this claim. In their work, participants were presented with 60 faces that differed on a number of dimensions. They were asked to indicate their liking for each face, either after receiving the instruction to merely rate each face or after being instructed to carefully think about the reasons for their liking. As one might expect, people's weighing of the different dimensions in determining their liking of the faces was more variable after thinking. However, they were also decidedly more inconsistent. In light of these findings, it is not appropriate to conclude that conscious thought is necessarily good at weighing the importance of attributes.

The second widely held assumption is that the unconscious is not good at weighing different attributes. However, intuitive as this assumption is, there is no evidence that the unconscious is not able to deal with subtleties such as weighing the importance of attributes. Conversely, there are reasons to believe it can. The evidence by Betsch et al. (2001) discussed above strongly suggests that the unconscious can weigh information. In addition, there is more general evidence that the unconscious can deal with many subtle processes quite well—indeed, often better than consciousness can. The unconscious can sense minor differences between stimuli that consciousness cannot (Dijksterhuis & Aarts, 2003; Marcel, 1983; Pierce & Jastrow, 1884). The unconscious can develop preferences for people and objects, whereas consciousness is not even aware of these people or objects, as shown by research on mere exposure (e.g., Kunst-Wilson & Zajonc, 1980) and subliminal evaluative conditioning (Dijksterhuis, 2004; Krosnick, Betz, Jussim, & Lynn, 1992). The unconscious can master wildly difficult tasks that consciousness cannot master at all, even if pressed (e.g., Hassin & Bargh, 2003; Lewicki, Hill, & Czyzewska, 1992). The unconscious can "decide" to behave more intelligently without any conscious mediation (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001; Dijksterhuis & van Knippenberg, 1998). Finally, recent research has shown that the unconscious can force a person to behave intelligently when consciousness is trying to obstruct this (Wegner, Fuller, & Sparrow, 2003).

In Experiment 3, people's decisions were investigated from both a normative perspective (as in Experiments 1 and 2) and a subjective perspective. The information about the alternatives was again presented in random order, as in Experiment 1. However, to avoid making the task too difficult, only one filler alternative was presented, rather than two as in Experiment 1.

Method

Participants and design. One hundred forty-five undergraduate students (107 women and 38 men) from the University of Amsterdam participated in the experiment. They were randomly assigned to one of three conditions: an immediate decision condition, a conscious thought condition, and an unconscious thought condition. They either received course credits or money (€10; approximately US$12) for their participation.

Procedure and materials. The experiment was the last experiment in a longer session with multiple, unrelated experiments. Participants worked in separate cubicles. The experiment was announced as an experiment on decision making. Participants were asked to imagine they would have to find a roommate to share an apartment with (it is very common for Amsterdam undergraduates to have one or more roommates). They were told they would be presented with information about three hypothetical roommates that were all described by various positive and negative attributes. They were asked to form an impression of the three roommates and to choose between the roommates at a later stage.

Each roommate was described with 12 attributes, for a total of 36 pieces of information. These 36 attributes were presented in random order. Each

attribute was presented for 2 s in the center of the screen, followed, after a 0.5-s pause, by the next attribute. Roommate A was the most attractive person, with 8 positive and 4 negative attributes, whereas Roommate C was the least attractive, with 4 positive and 8 negative attributes. Roommate B was of medium attractiveness, with 6 positive and 6 negative attributes. All roommates were described on the same 12 dimensions (e.g., how friendly, how neat). Roommate A and C were exact opposites. On the 8 dimensions where Roommate A was described as positive (e.g., "has fun friends," "is neat"), Roommate C was described as negative (e.g., "has annoying friends," "is very messy"), and vice versa. Roommate B partly overlapped with both of them. The choice for the attributes used was based on pilot testing aimed at assessing which attributes people find important. Only attributes that students indicated were at least moderately important were used—at least 4.6 on a 7-point scale ranging from 1 (*extremely unimportant*) to 7 (*extremely important*)—but they were phrased in ways that made them not too extreme.

After participants read all information, they were randomly allocated to one of three conditions. In the immediate decision condition, they were immediately asked to give their attitude toward each of the three roommates. Participants were asked to indicate their answers on 9-point scales ranging from 1 (*extremely negative*) to 9 (*extremely positive*). All participants answered the questions in the same order, starting with Roommate A and ending with Roommate C.

The conditions were the same as in Experiments 1 and 2, except that the time people were given to think (in the conscious thought condition) or the time people were distracted (in the unconscious thought condition) was now 4 min. In the unconscious thought condition, participants were distracted with an anagram task. They were presented with one anagram at a time (e.g., *ecipbs*); the next anagram appeared after participants had solved the anagram (*biceps*), or after 45 s had passed. The task was interrupted after 4 min, and participants were then asked to complete the attitude questions.

After a filler task that lasted about 4 min, all participants were asked to indicate how important they found various attributes of people when trying to find a roommate. They were asked to indicate the importance of each of the 12 dimensions used in the experiment (e.g., "How important is it for you that a roommate is neat?"). Participants indicated their answers on 7-point scales ranging from 1 (*very unimportant*) to 7 (*very important*). The 12 questions were presented in random order.

Results

It was first confirmed that the desirable roommate was judged to be more positive than the undesirable roommate. Indeed, the overall attitude toward the desirable roommate was higher (M = 6.85) than that toward the undesirable (M = 4.20), with the attitude toward the filler roommate falling in between (M = 5.45).

Difference scores were computed by subtracting the attitude toward the least attractive roommate from the attitude toward the most attractive one. As expected, participants in the unconscious thought condition scored highest (M = 3.15, SD = 1.92). Participants in the immediate decision condition scored lowest (M = 2.08, SD = 1.80), with the participants in the conscious thought condition falling in between (M = 2.72, SD = 1.60). These scores were reliably higher than zero, as confirmed by t tests, all ts(50, 47, 45) > 7, ps $< .01$, indicating that in all conditions participants preferred the attractive roommate.

A 3 (experimental condition) $\times$ 2 (sex of participant) ANOVA revealed a main effect of condition, $F(2, 133) = 4.69$, $p < .02$, and a nonsignificant two-way interaction, $F(2, 133) = 2.34$, $p < .13$. Participants in the unconscious thought condition did better than participants in the immediate decision condition, $F(1, 88) = 8.07$, $p < .01$, and than participants in the conscious thought condition, $F(1, 84) = 4.60$, $p < .04$. The comparison between the unconscious thought condition and the conscious thought condition also revealed a significant two-way interaction, $F(1, 84) = 4.03$, $p < .05$. Male participants performed poorly in the conscious thought condition (M = 1.56) and very well in the unconscious thought condition (M = 3.44), whereas this difference was almost absent for female participants (Ms = 3.00 and 3.06, respectively). The conscious thought condition and the immediate decision condition did not differ from each other, $F(1, 94) = 0.55$, but the comparison did reveal a main effect of sex of participant, $F(1, 94) = 6.42$, $p < .02$. Female participants (M = 2.69) outperformed male participants (M = 1.65).

In all experiments so far, preferences were evaluated from a normative perspective. In this experiment, ratings people gave about the importance of the 12 dimensions used to describe the three roommates were used to look at subjective preferences. For each participant, the scores on the 8 dimensions on which the attractive roommate was described as positive and the unattractive roommate was described as negative were added. The scores on the 4 dimensions on which the attractive roommate was described as negative and the unattractive roommate was described as positive were then subtracted. The higher the resulting score, the more favorable a participant should be about the attractive roommate and the more unfavorable a participant should be about the unattractive roommate. The scores were correlated with the difference score of the attitudes toward the attractive roommate and the unattractive roommate. The higher the correlation, the better the participant's preference is from a subjective perspective. That is, the higher the correlation, the more a participant chose the one he or she should have chosen according to his or her own weighing of the attributes. The correlation in the immediate decision condition was significant, $r(51) = .39$, $p < .005$. The correlation in the conscious condition was nonsignificant, $r(47) = .21$, $p < .17$, whereas the correlation in the unconscious thought condition was the largest of the three, $r(41) = .48$, $p < .002$. On the basis of these data, there is no reason to assume that conscious thought helps to make better decisions from a subjective point of view, nor is there any reason to assume that unconscious thought hampers this process. The data point in the opposite direction, although it should be noted that the correlations do not differ from each other significantly. The comparison between the unconscious and conscious thought conditions failed to reach significance ($p = .16$).[2]

What Is Unconscious Thought? Experiments 4 and 5

The first three experiments show that participants in the unconscious thought condition generally outperform participants in the remaining two conditions. However, it is not yet clear what exactly happens during the unconscious thought period. Experiments 4 and 5 were designed to shed more light on this process.

A number of different processes can take place during distraction. One should distinguish between processes whereby the role of the unconscious is passive and a process whereby the uncon-

[2] Another reason for being careful is that the ratings of importance of dimensions were administered after rather than before people gave their attitudes toward the different roommates.

scious engages in active thought. Most findings in the domain of incubation are explained by processes whereby the role of the unconscious is passive.

Schooler and Melcher (1995) reviewed findings showing that distraction can lead to the change of a "mental set." Here, the role of the unconscious is proposed to be passive. People often approach a problem with wrong cues, wrong heuristics, and/or wrong information. Following a period of distraction, wrong approaches become less accessible or are forgotten altogether. The effects of distraction on a change of mental set can be either fairly strong (such as when one tries to solve a chess problem and initially gets truly fixed in thinking along a wrong path) or relatively subtle (such as when distraction merely attenuates the biasing influence of primacy or recency effects). One could lump these processes together under the umbrella of the fresh look explanation: Putting a problem aside for a while allows for a fresh, unbiased new start.

These effects notwithstanding, here it is proposed that the unconscious also actively thinks. In the first three experiments, participants in the unconscious thought conditions were better able to distinguish an attractive alternative from an unattractive alternative. A reasonable assumption is that the superior judgments of the unconscious thinkers were based on their representations of the various alternatives in memory. These participants were distracted for a while, and when they were asked to judge the various alternatives, they must have relied on the representations they retrieved from memory. Because their judgments were better than the judgments made by participants in the other conditions, their representations were also somehow "better" (or at least different). Their representations must have changed during distraction.

The hypothesis that representations change over time is akin to the idea that people engage in thought. The term *to think* is derived from the Latin verb *cogitare*, which literally means "to shake together" (Koestler, 1964). This meaning reflects the process of unconscious thought proposed here quite well. If people are presented with a lot of information in a relatively short period of time, the resulting representation in memory is likely to be disorganized. Individual pieces of information still have to be associated and integrated. Unconscious thought, it is proposed, does exactly this. That is, unconscious thought is expected to turn an initial, disorganized set of information into a clearer and more integrated representation of information in memory. It is quite possible that the representations can change in various ways. Given the results of the experiments above, it is likely that unconscious thought leads to representations that become more *polarized*—that is, the representations of moderately positive alternatives become more dominated by positive aspects, whereas the representations of negative alternatives become more negative over time. A second possibility is that unconscious thought, by a process of continued associative activity, results in a more organized representation. It could lead to greater *clustering*, where pieces of information that load on the same dimension or pertain to the same aspect become clustered.

Experiments 4 and 5 were designed to test the hypothesis that people engage in active unconscious thought and to shed light on the nature of this process. Experiment 4 was designed to test the polarization hypothesis, and Experiment 5 was designed to test the clustering hypothesis. In Experiment 4, the same paradigm was used as in Experiment 3, but rather than measuring people's attitudes toward the different alternatives, recognition of the various aspects was assessed. This was done to test the hypothesis of greater polarization. Is it true that unconscious thought leads to better judgment because representations become more polarized? This should mean that positive aspects of the attractive alternative and negative aspects of the unattractive alternative should come to dominate the representation. Both accuracy and speed of recognition were assessed to answer these questions. Accuracy is indicative of availability of information. Polarization may lead to relatively accurate recognition of positive aspects of the attractive alternative and negative aspects of the unattractive alternative. Speed is indicative of the accessibility of information. Polarization may lead to higher accessibility of positive aspects of the attractive alternative and negative aspects of the unattractive alternative relative to other information.

Experiment 5 was designed to test the clustering hypothesis. Is it true that unconscious thought leads to better organization in memory whereby information is more meaningfully clustered? The paradigm differs from the one used in Experiment 3. Participants were given behavioral information about a person. In this information, three trait dimensions were "hidden." Some information suggested that the stimulus person was intelligent, some that the person was extroverted, and some that the person was politically left-wing. If the unconscious is a better integrator of information, unconscious thought should lead participants to organize their memory more along these three trait dimensions than participants in the remaining two conditions.

Experiment 4

Method

Participants and design. One hundred fourteen undergraduate students (88 women and 26 men) from the University of Amsterdam participated in the experiment. They were randomly assigned to one of three conditions: an immediate decision condition, a conscious thought condition, and an unconscious thought condition. They either received course credits or money (€10; approximately US$12) for their participation.

Procedure and materials. Experiment 4 was exactly the same as Experiment 3, with one exception. Rather than measuring attitudes, we assessed recognition. After participants read the information about the roommates (in the immediate condition), or after either thinking for 4 min (in the conscious thought condition) or after being distracted for 4 min (in the unconscious thought condition), they were presented with a recognition task. One by one, in random order, all 36 aspects of the roommates were presented to them again. This time the aspects were presented without roommate labels. Participants' task was to quickly decide whether an aspect belonged to Roommate A, B, or C by pressing a corresponding button.

Results

No effects or even trends of sex of participants were obtained (all Fs $< .43$), so this factor was not further investigated.

Recognition accuracy. First, the proportion of correct recognition of positive and negative aspects for the three roommates were calculated separately. These proportions were subjected to a 3 (condition: immediate vs. conscious thought vs. unconscious thought) between-subjects $\times$ 3 (roommate: attractive vs. unattractive vs. neutral filler) $\times$ 2 (valence of aspect: positive vs. negative) within-subjects ANOVA. A main effect of condition was found, $F(2, 111) = 5.29$, $p < .01$, indicating that participants in the

immediate condition had higher proportions of correct recognition. This is not surprising, because these participants did not pause between information acquisition and recognition. More interesting, this main effect was qualified by a two-way interaction of Condition × Roommate, $F(2, 111) = 2.91$, $p < .03$. Superior recognition in the immediate condition accurately recognized information of all roommates, whereas participants in the other conditions showed impaired recognition of information of the neutral filler roommate. It seems that both conscious and unconscious thinkers focused on the attractive and unattractive roommate and "forgot" the irrelevant filler.

To investigate the possibility of a more polarized memory representation, the same analyses were done on the proportions of recognition for the attractive and unattractive roommate only. A 3 (condition: immediate vs. conscious thought vs. unconscious thought) between-subjects × 2 (roommate: attractive vs. unattractive) × 2 (valence of aspect: positive vs. negative) within-subjects ANOVA revealed a two-way interaction of Roommate × Valence of Aspect, $F(1, 111) = 63.37$, $p < .0001$, indicating that people polarized. Recognition of positive aspects of the attractive roommate and negative aspects of the unattractive roommate was superior to memory for negative aspects of the attractive roommate and positive aspects of the unattractive roommate. It was predicted that the unconscious thinkers especially would polarize, but the three-way interaction was not significant, $F(2, 111) = 2.23$, $p < .12$.

As can be seen in Figure 1, people generally polarized, and participants in the unconscious thought condition tended to do this to an even greater degree. Pairwise contrasts were calculated to compare recognition accuracy for positive and negative aspects for each roommate in each condition. Unconscious thinkers had better recognition for positive aspects of the attractive roommate than for negative aspects of the attractive roommate ($p < .001$), whereas the reverse was true for the unattractive roommate ($p < .003$). In both other conditions, one of the two contrasts failed to reach significance ($ps > .05$).

Recognition speed. In the analyses on speed of recognition, only data for aspects that were recognized accurately were used. The analyses performed on the speed data were the same as those on the accuracy data. They were first analyzed with a 3 (condition: immediate vs. conscious thought vs. unconscious thought) between-subjects × 3 (roommate: attractive vs. unattractive vs. neutral filler) × 2 (valence of aspect: positive vs. negative) within-subjects ANOVA. The only reliable effect was the two-way interaction of Condition × Roommate, $F(2, 111) = 3.10$, $p < .02$. Participants in the immediate condition recognized information about all three roommates with the same speed, whereas participants in the other two conditions showed slower recognition of information about the neutral roommate.

The same analysis was done on the speed of recognition for the attractive and unattractive roommates only. It revealed a two-way interaction of Roommate × Valence of Aspect, $F(1, 111) = 13.31$, $p < .001$, which indeed indicated that people polarized. Recognition of positive aspects of the attractive roommate and negative aspects of the unattractive roommate was clearly faster than recognition of negative aspects of the attractive roommate and positive aspects of the unattractive roommate. However, here the predicted three-way interaction was significant, $F(2, 111) = 4.19$, $p < .02$. As can be seen in Figure 2, evidence for polarization was only obtained for unconscious thinkers.

The evidence for polarization of representations in memory is fairly strong. Although the evidence based on recognition accuracy is suggestive, the evidence based on speed is unequivocal. There is one caveat. Throughout the presentation of this experiment, the term *recognition* was used even though it was essentially an allocation task. Participants did not have to recognize the aspects, but they were asked to determine (or recognize) the source (Roommate A, B, or C). Therefore, allocation biases played a role as well. Presented with a positive aspect, people may have allocated it to the roommate they thought to be the most positive ("Friendly? This must have been Roommate A, because I like him most"). However, an allocation bias is based on expectations ("I like A, so he must have this positive attribute"), and these expectations are based on underlying representations. So although pure recognition and allocation are different processes (one is mediated by expectations, whereas the other is not necessarily), effects in both reflect effects of the same underlying representation. If one wants to

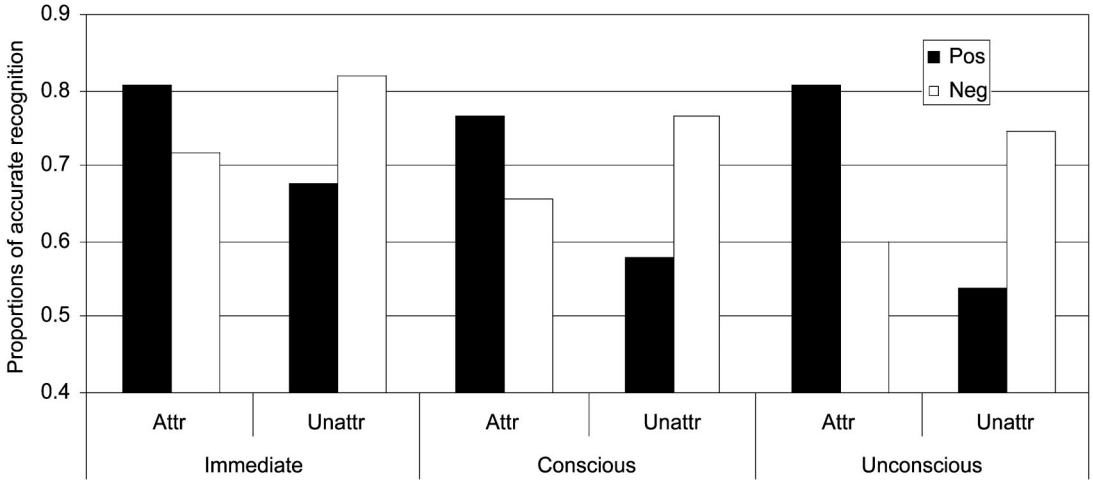

Figure 1. Experiment 4: Proportions of accurate recognition of positive (Pos) and negative (Neg) aspects of the attractive (Attr) and unattractive (Unattr) roommate per condition.

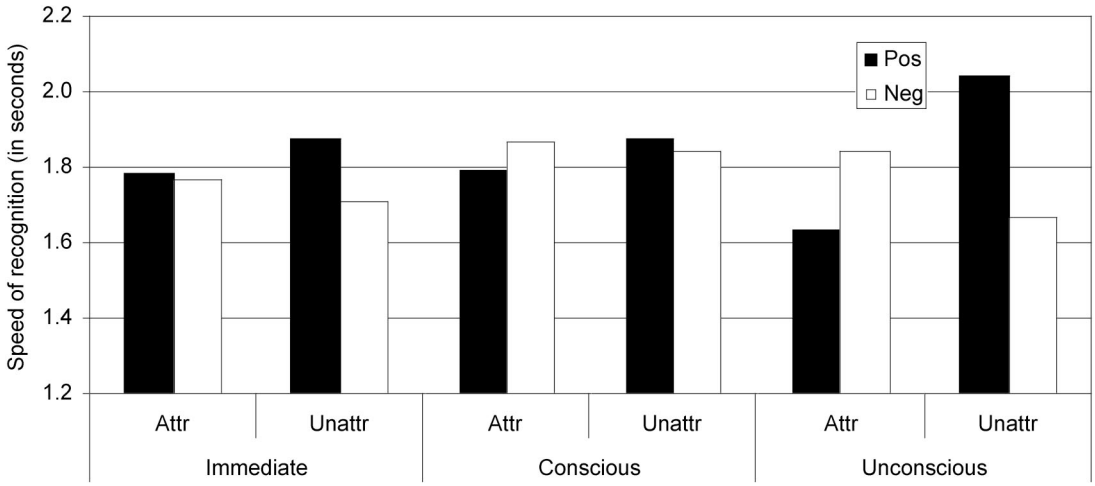

Figure 2. Experiment 4: Speed of recognition (in seconds) of positive (Pos) and negative (Neg) aspects of the attractive (Attr) and unattractive (Unattr) roommate per condition .

explain the differences between conditions with differences in allocation bias, one still has to first assume differences in underlying representation.

Experiment 5

Experiment 5 was designed to investigate whether unconscious thought leads to more integrated representations of information in memory. To test this, a paradigm was used that was used before by Hamilton, Katz, and Leirer (1980; see also Chartrand & Bargh, 1996). In their work, participants were presented with information about a stimulus person and instructions to either form an impression or to memorize the information. At a later stage, participants' recall was assessed. It is interesting to note that participants with an impression instruction recalled more information than people who were specifically asked to memorize the information. In addition, people with an impression instruction also showed a more integrated organization of information in memory, as assessed by the order of recall.[3]

The present experiment examined whether unconscious thought contributes to this improved organization of information in memory. As in Hamilton et al. (1980), participants were presented with behavioral information about a stimulus person. Each behavioral description was indicative of one of three trait concepts. Afterward, participants were either asked to recall the information immediately, after some conscious thought, or after unconscious thought. Our hypothesis was that unconscious thinkers would have the highest clustering scores, indicative of more integrative memory organization. The two different instructions (impression vs. memory) were included. These are not directly related to the current hypothesis; they were kept as a tribute to the original work.

Method

Participants and design. Sixty-nine undergraduate students (58 women and 11 men) from the University of Amsterdam participated in the experiment. They were randomly assigned to the cells of a 2 (instruction: impression vs. memory) × 3 (condition: immediate vs. conscious thought vs. unconscious thought) design. They either received course credits or money (€7; approximately US$9) for their participation.

Procedure and materials. The experiment was the last experiment in a longer session with multiple, unrelated experiments. Participants worked in separate cubicles. The experiment was announced as an experiment on person perception. Participants were told they would be presented with information about a person named "Jeroen." They were told that they would have to read various behavioral descriptions about Jeroen. Half the participants were asked to form an impression of him, whereas the other half were asked to memorize the information.

Subsequently, 18 short sentences were presented one by one on the screen in random order. A sentence stayed on the screen for 5 s, with the next sentence appearing after a pause of 0.5 s. All sentences were pretested to load on one of three trait categories. Six of the sentences indicated intelligence, 6 others indicated extroversion, and the remaining 6 were indicative of Jeroen being politically left-wing.

After presentation of the sentences, participants in the immediate recall condition were given the recall task, during which they had 4 min to list as many of the behavioral descriptions as possible. Participants in the conscious thought condition were asked to think about Jeroen for 4 min prior to the recall task, whereas participants in the unconscious thought conditions were distracted for 4 min. The distractor task was the same as in Experiments 3 and 4.

Results

The number of descriptions recalled correctly was assessed using a gist criterion (Hamilton et al., 1980). The recall scores

[3] The reason for using this paradigm rather than the paradigms used in Experiments 1–4 is that the dimension that people can use to cluster should not be too obvious. Underlying trait constructs are excellent, but offering people information about three individuals named A, B, and C presumably leads to very strong—and intentional—clustering on the basis of these three individuals ("let's begin with listing what I remember of person A"). Adding a second, underlying dimension is a possibility, but this would require much more stimulus material. More stimulus material, however, leads to poorer relative recall, which in turn makes clustering scores less reliable.

were subjected to a 2 (instruction: impression vs. memory) × 3 (condition: immediate vs. conscious thought vs. unconscious thought) between-participants ANOVA. No significant effects emerged. The absence of an effect of instruction may have been caused by the fact that compared with the experiments by Hamilton et al. (1980) and Chartrand and Bargh (1996), our task was easy. People were given few behavioral descriptions, and overall recall was high (over 50%). However, the immediate decision condition comes closest to the procedure in the original Hamilton et al. (1980) studies. Under these conditions, participants in the impression set condition indeed recalled more information than participants who received a memory set. This difference was not significant, $F(1, 20) = 2.95$, $p < .11$.

To assess organization in memory, conditional recall probabilities were computed by looking at the order of recall. 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. The resulting probabilities are listed in Table 1. A 2 (instruction: impression vs. memory) × 3 (condition: immediate vs. conscious thought vs. unconscious thought) between-participants ANOVA revealed both predicted main effects. First, in keeping with Hamilton et al. (1980) and Chartrand and Bargh (1996), there was a main effect of instruction showing that participants with an impression instruction ($M = .44$, $SD = .13$) had higher clustering scores than participants with a memory instruction ($M = .35$, $SD = .14$), $F(1, 63) = 6.56$, $p < .02$. In addition, the predicted main effect of condition was obtained, $F(2, 63) = 4.32$, $p < .02$. Participants in the unconscious thought condition had higher clustering scores ($M = .46$, $SD = .11$) than participants in the conscious thought condition ($M = .37$, $SD = 18$), $F(1, 43) = 5.50$, $p < .03$, and than participants in the immediate recall condition ($M = .35$, $SD = .13$), $F(1, 42) = 9.58$, $p < .005$. These latter two conditions did not differ. It is interesting that recall in random order (without meaningful clustering) would lead to a clustering score of about .30. Only participants in the unconscious thought condition had scores considerably higher than .30. In sum, only unconscious thought led to more integrated representations in memory.

General Discussion

Unconscious thought improved the quality of decisions. When people were faced with complex decisions, a few minutes of distraction during which people could engage in unconscious thought—but not in conscious thought—led to superior decisions compared with circumstances under which people could not engage in unconscious thought or to circumstances under which people engaged in conscious thought. Moreover, a few minutes of conscious thought generally did not lead to better decisions compared with conditions where people did not consciously think. The relative inferiority of conscious thought was expected to be the consequence of the low processing capacity of consciousness. Some supporting evidence for this idea comes from Experiment 2. Here, conscious thinkers reported that their decisions were often based on a few specific relevant attributes, whereas unconscious thinkers reported forming a more global judgment based on much more information.

Table 1
Experiment 5: Clustering Scores as a Function of Condition

	Condition		
Instruction	Immediate	Conscious	Unconscious
Memory	.29	.35	.41
Impression	.42	.38	.52

Experiments 4 and 5 were designed to shed more light on the processes underlying unconscious thought. It was shown that unconscious thought led people to develop more polarized, clearer, and more integrated representations in memory, supporting the proposed process underlying superior unconscious decision making. It is interesting to note with respect to Experiment 5 that conscious thought almost completely prevented meaningful clustering. Clustering is an associative process, and it is likely that this process was disrupted because, as Wilson and others have shown (e.g., Wilson et al., 1989; Wilson & Schooler, 1991; see also Experiment 2 of the current article), conscious thought biases people toward paying a lot of attention to very few attributes at the expense of others. This may lead to meaningful associations between the few attributes that received attention, but it may hinder associative processes incorporating the other attributes.

One avenue for further research concerns the goal directedness of unconscious thought. In all experiments, participants were told that they had to decide between various alternatives before they engaged in unconscious thought. Would the unconscious have engaged in relevant thinking had it not been instructed to do so? This is likely not the case. The literature on creativity and incubation (e.g., Bowers et al., 1990; Smith & Blankenship, 1989) has suggested that unconscious thought can be goal directed. The quote about Newton in the introduction also points in this direction. He knew that he had to bear in mind what he needed to know. One could say that he gave his unconscious a clear goal. In addition, recent evidence has shown that goal activation and goal pursuit can be achieved unconsciously (Bargh et al., 2001; Chartrand & Bargh, 1996). This also implies that unconscious thought processes can be goal directed. However, this has not yet been shown.

A Note on Incubation

As said above, empirical evidence for incubation is limited. People often have failed to find it, and the little evidence available is hard to replicate (Olton, 1979). Furthermore, most effects that were obtained could be explained by processes whereby the role of the unconscious was passive. It is possible that the nature of the problems people had to solve was responsible for this state of affairs. Researchers used insight problems—the kind of problems where the solution to a problem is very specific and often counterintuitive, resulting in a "eureka" experience. This choice is understandable, because incubation is studied in the context of creativity, and creativity is often (but not always; see Weisberg, 1995) the consequence of such insights. However, the unconscious may not have been given a fair chance. Solving insight problems is often like trying to find a needle in a haystack, and the unconscious may need more time than the amount people are given in a lab experiment. The current research points to the possibility that

incubation can be obtained even within minutes if more mundane, analytical problems are used rather than insight problems.

Should We Stop Thinking? Some Potential Moderators

One may infer from the present work that it constitutes good news for people who dislike the hard labor of conscious thinking. The unconscious can be left to deal with making decisions while consciousness can be directed elsewhere, such as at fun things.

This conclusion is clearly too bold. First of all, the findings reported here should be placed in the context of the paradigm used. Both consciousness and the unconscious had to "work" within the confines of this paradigm. Perhaps the circumstances under which consciousness had to work diverged too strongly from how consciousness often deals with decision problems in real life. For one thing, consciousness (but also the unconscious) was only given a few minutes to think. Maybe it performs better with more time. In addition, conscious thought took place after participants had read the information. Maybe conscious thought would have led to better results if the information had been visually available during thought. Hence, it is important to pit conscious and unconscious thought against each other in different paradigms before bold conclusions can be drawn. For now, it is more interesting to speculate about when conscious versus unconscious thought may be more fruitful.

As to when one mode of thought may be better than the other, some educated hypotheses can be formulated. First, there are various reasons to propose the somewhat counterintuitive idea that the more complex a problem is, the less likely it becomes that conscious thought can contribute much. If a problem is complex, it by definition means that a lot of information has to be taken into account. Conscious thought is not very good at this. One could say that conscious thought is very focused but not very encompassing or inclusive. There are various (related) reasons for this. Consciousness has low capacity, and conscious reasoning biases the weights people attach to different pieces of information (e.g., Wilson et al., 1989). In addition, verbalizing information (an act of consciousness) makes these biases even worse, as the work on verbal overshadowing (Schooler et al., 1993) has demonstrated. If we are willing to assume that mundane decisions are often relatively simple, whereas vital matters are usually complex (which is not always the case), we may conclude that Freud was right: Use consciousness for relatively simple and mundane decisions, but refrain from using it too much for more complex matters.

The observation that on some occasions weighing the importance of attributes is easier than in other cases may also lead to a hypothesis. Sometimes weighing is easy or even unnecessary. When someone from the support staff comes to fix a software problem, all we care about is whether she is able to do the job properly in a reasonable amount of time. On the other hand, sometimes weighing attributes is mind-boggling, such as when choosing a doctoral program. When weighing is easy, one can make decisions by first comparing how well various alternatives "score" on the one or two attributes that matter. When weighing is hard, one could start out by forming global impressions of the different alternatives and then start to compare. It is likely that conscious thought is more proficient in the former case, whereas unconscious thought is better able to do the latter. If this is true, conscious thought may be fruitful when the decision problem is well laid out with few attributes that do allow for meaningful comparisons. If not, unconscious thought should be used to work on more global or holistic impressions first.

One should not infer from the present work that consciousness is rather stupid and the unconscious is smart. Rather than making such categorizations, it seems fruitful to more closely examine the strong and weak points of both systems (see Claxton, 1997; Kihlstrom, Barnhardt, & Tataryn, 1992). General claims such as "the unconscious is fast and consciousness is slow" or "the unconscious is stupid and consciousness is smart" do not make much sense. The unconscious automatically evaluates stimuli within milliseconds (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, Sanbonmatsu, Powell, & Kardes, 1986), but Newton, who contemplated for years, may not have agreed that the unconscious is fast. Likewise, in this article, much evidence has been described implying that the unconscious can be very smart, but when asked, "What is the square root of 625?" your unconscious is not going to solve it. You could be given a distractor task lasting for months, but this question can only be answered (assuming no calculator is used) after conscious work. Likewise, consciousness is neither always smart (as the current work shows) nor always very slow (it finds the square root of 625 in seconds). The bottom line is that both systems can be fast, slow, smart, or stupid. It all depends on what they are asked to do.

Nevertheless, the current work demonstrates one thing the unconscious is good at: making complex decisions. When faced with complex decisions such as where to work or where to live, do not think too much consciously. Instead, after a little initial conscious information acquisition, avoid thinking about it consciously. Take your time and let the unconscious deal with it.

References

Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer Jr. (Ed.), *Advances in social cognition* (Vol. 10, pp 1–61). Mahwah, NJ: Erlbaum.

Bargh, J. A., Chaiken, S., Govender, R., & Pratto, F. (1992). The generality of the automatic evaluation effect. *Journal of Personality and Social Psychology, 62,* 893–912.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist, 54,* 462–476.

Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81,* 1014–1027.

Betsch, T., Plessner, H., Schwieren, C., & Gütig, R. (2001). I like it but I don't know why: A value-account approach to implicit attitude formation. *Personality and Social Psychology Bulletin, 27,* 242–253.

Bowers, K. S., Regehr, G., Balthazard, C., & Parker, K. (1990). Intuition in the context of discovery. *Cognitive Psychology, 22,* 72–110.

Chartrand, T. L., & Bargh, J. A. (1996). Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology, 71,* 464–478.

Claxton, G. (1997). *Hare brain, tortoise mind: How intelligence increases when you think less*. New York: HarperCollins.

Dijksterhuis, A. (2004). I like myself but I don't know why: Enhancing implicit self-esteem by subliminal evaluative conditioning. *Journal of Personality and Social Psychology, 86,* 345–355.

Dijksterhuis, A., & Aarts, H. (2003). On wildebeests and humans: The preferential detection of negative stimuli. *Psychological Science, 14,* 14–18.

Dijksterhuis, A., & van Knippenberg, A. (1998). The relation between perception and behavior, or how to win a game of Trivial Pursuit. *Journal of Personality and Social Psychology, 74,* 865–877.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50,* 229–238.

Gardner, H. (1993). *Creating minds*. New York: Basic Books.

Ghiselin, B. (1952). *The creative process*. New York: New American Library.

Gilbert, D. T. (1989). Thinking lightly about others: Automatic components of the social inference process. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 189–211). New York: Guilford Press.

Hamilton, D. L., Katz, L. B., & Leirer, V. O. (1980). Organizational processes in impression formation. In R. Hastie, T. M. Ostrom, E. B. Ebbesen, R. S. Wyer Jr., D. L. Hamilton, & D. E. Carlston (Eds.), *Person memory: The cognitive basis of social perception* (pp. 121–153). Hillsdale, NJ: Erlbaum.

Hassin, R., & Bargh, J. A. (2003). *Implicit insight: The case for the on-line extraction of rules*. Manuscript under review.

Jonides, J., Schumacher, E. H., Smith, E. E., Lauber, E. J., Awh, E., Minoshima, S., & Koeppe, R. A. (1997). Verbal working memory load affects regional brain activation as measured by PET. *Journal of Cognitive Neuroscience, 9,* 462–475.

Kihlstrom, J. F., Barnhardt, T. M., & Tataryn, D. (1992). The psychological unconscious: Found, lost, and regained. *American Psychologist, 47,* 788–791.

Koestler, A. (1964). *The act of creation*. London: Penguin.

Krosnick, J. A., Betz, A. L., Jussim, L. J., & Lynn, A. R. (1992). Subliminal conditioning of attitudes. *Personality and Social Psychology Bulletin, 18,* 152–162.

Kunst-Wilson, W., & Zajonc, R. (1980, February 1). Affective discrimination of stimuli that cannot be recognized. *Science, 207,* 557–558.

Levine, G. M., Halberstadt, J. B., & Goldstone, R. L. (1996). Reasoning and the weighing of attributes in attitude judgments. *Journal of Personality and Social Psychology, 70,* 230–240.

Lewicki, P., Hill, T., & Czyzewska, M. (1992). Nonconscious acquisition of information. *American Psychologist, 47,* 796–801.

Marcel, A. J. (1983). Conscious and unconscious perception: An approach to the relations between phenomenal experience and perceptual processes. *Cognitive Psychology, 15,* 238–300.

Miller, G. A. (1956). Information theory. *Scientific American, 195,* 42–46.

Nørretranders, T. (1998). *The user illusion: Cutting consciousness down to size*. New York: Viking.

Olton, R. (1979). Experimental studies of incubation: Searching for the elusive. *Journal of Creative Behavior, 13,* 9–22.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 14,* 534–552.

Pelham, B. W., & Neter, E. (1995). The effect of motivation on judgment depends on the difficulty of the judgment. *Journal of Personality and Social Psychology, 68,* 581–594.

Pierce, C. S., & Jastrow, J. (1884). On small differences in sensation. *Memoirs of the National Academy of Science, 3,* 75–83.

Schooler, J. W., & Melcher, J. (1995). The ineffability of insight. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 97–134). Cambridge, MA: MIT Press.

Schooler, J. W., Ohlsson, S., & Brooks, K. (1993). Thoughts beyond words: When language overshadows insight. *Journal of Experimental Psychology: General, 122,* 166–183.

Smith, S. M. (1995). Fixation, incubation, and insight in memory and creative thinking. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 135–156). Cambridge, MA: MIT Press.

Smith, S. M., & Blankenship, S. E. (1989). Incubation effects. *Bulletin of the Psychonomic Society, 27,* 311–314.

Wegner, D. M., Fuller, V. A., & Sparrow, B. (2003). Clever hands: Uncontrolled intelligence in facilitated communication. *Journal of Personality and Social Psychology, 85,* 5–19.

Wegner, D. M., & Smart, L. (1997). Deep cognitive activation: A new approach to the unconscious. *Journal of Consulting and Clinical Psychology, 65,* 984–995.

Weisberg, R. W. (1995). Case studies of creative thinking: Reproduction versus restructuring in the real world. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 53–72). Cambridge, MA: MIT Press.

Whitehead, A. N. (1911). *An introduction to mathematics.* New York: Henry Holt.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Harvard University Press.

Wilson, T. D., Dunn, D. S., Kraft, D., & Lisle, D. J. (1989). Introspection, attitude change, and attitude–behavior consistency: The disruptive effects of explaining why we feel the way we do. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 123–205). Orlando, FL: Academic Press.

Wilson, T. D., Lisle, D., Schooler, J. W., Hodges, S. D., Klaaren, K. J., & LaFleur, S. J. (1993). Introspecting about reasons can reduce post-choice satisfaction. *Personality and Social Psychology Bulletin, 19,* 331–339.

Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology, 60,* 181–192.

Yaniv, I., & Meyer, D. E. (1987). Activation and metacognition of inaccessible stored information: Potential bases for incubation effects in problem solving. *Journal of Experimental Psychology: Learning, Memory and Cognition, 13,* 187–205.

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