A Theory of Unconscious Thought

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Abstract

We present a theory about human thought named the Unconscious Thought Theory (UTT). The theory is applicable to decision making, impression formation, attitude formation and change, problem solving, and creativity. It distinguishes between two modes of thought: unconscious and conscious. Unconscious thought and conscious thought have different characteristics and these different characteristics make each mode preferable under different circumstances. For instance, contrary to popular belief, decisions about simple issues can be better tackled by conscious thought, whereas decisions about complex matters can be better approached with unconscious thought. The relation between the theory and decision strategies, and between the theory and intuition, are discussed. We end by discussing caveats and future directions.

"One might almost believe that half of our thinking takes place unconsciously…I have familiarized myself with the factual data of a theoretical and practical problem; I do not think about it again, yet often a few days later the answer to the problem will come into my mind entirely from its own accord; the operation which has produced it, however, remains as much a mystery to me as that of an adding-machine: what has occurred is, again, unconscious rumination."

Arthur Schopenhauer

Imagine you are looking for a new house. You have accepted a new job and are preparing to move to a new city. The local broker elaborately informs you about several available houses and after an hour, you find yourself completely lost. The houses differ on so many different dimensions that it seems highly implausible that you would ever be able to make a sound choice. One house is bigger than the others, but also more expensive, and unfortunately your new job is that of a psychology professor and not of a CEO. Another house has a beautiful garden. Yet another is in a very quiet and attractive street. And the rickety old mansion the broker mentioned at the very end has three bathrooms, one of them with marble from Tuscany.

What to do, other than courageously confront the few unavoidable restless nights? One way to approach such a choice is by merely flipping a coin. All the houses are pretty nice anyway, and hey, who cares about Tuscan marble? Most of us would agree that this is a poor way to make such a choice. Instead, we should think. Some choices are better than others, and to increase the probability that you make a good choice, you should engage in thorough conscious thought. But does thorough conscious thought always pave the way to

sound decisions? Yet another way to approach such a problem is to take your time and to "sleep on it". Rather than thinking much consciously, you delegate the labor of thinking to the unconscious and at some point you intuitively "feel" what the best option is. Most would agree that this strategy makes more sense than flipping a coin but that it generally leads to poorer decisions than decisions made after thorough conscious thought. But is that true?

In recent research in our lab, we (e.g., Dijksterhuis, 2004a; Dijksterhuis, Bos, Schreers, Neimeyer & Wassenberg, 2005; Dijksterhuis & Meurs, 2005; Dijksterhuis & van Olden, 2005; Nordgren & Dijksterhuis, 2005) compared the quality of choices between alternatives under different conditions. In the experiments, some people were not given the opportunity to think at all before choosing between alternatives. Others were able to consciously think for a while before choosing, and yet others were distracted for a while before choosing and thus could only engage in so-called unconscious thought. For example, in the first experiment (Dijksterhuis, 2004a, Exp. 1), participants were given information about four hypothetical apartments in their home city, Amsterdam. Each apartment was described by 12 different aspects (e.g., Apt. A is rather sizable, Apt. C is in a nice area, Apt. D has a very unfriendly landlord) adding up to a total of 48 pieces of information. The information were presented in random order. One of the four apartments was made more desirable than the others (it had predominantly positive aspects), whereas a second one was made undesirable (it had predominantly negative aspects). The two remaining apartments were more neutral. After participants had read the rather daunting amount for information, they were asked to evaluate each individual apartment. This was done under one of three conditions. Participants either did it immediately after having read

the information; they were given three minutes to consciously think about it first; or, after they were told they would be quizzed about the apartments later, they were distracted for three minutes with a task preventing conscious thought (a 2-back task, see Jonides et al., 1997), thereby enabling only unconscious thought.

Now under which conditions did participants best assess the actual desirability of the different apartments? Our dependent measure was the difference in evaluation between the most and the least desirable apartments. Ironically, the unconscious thinkers performed significantly better than the conscious thinkers and the immediate choosers. In fact, for participants who had to choose immediately or who engaged in conscious thought, the task was too difficult in the sense that they did not, on average, indicate greater liking of the desirable apartment compared to the undesirable apartment. They did not, in other words, know which apartment was better. Only the unconscious thinkers reported the appropriate preference for the desirable apartment.

Since this first experiment, we have continued to investigate unconscious and conscious thought. In the current paper, we present a theory based on our own and other's empirical work. The theory is about thought, or more precisely, about the strengths and weaknesses of unconscious and conscious thought. It is, in principle, a theory that is applicable to all psychological phenomena that we associate with thought, such as choosing, decision making, attitude formation and attitude change, impression formation, diagnosticity, problem solving, and creativity. Moreover, our theory has transparent practical implications, in that it is easy to deduct from our theory whether unconscious thought or whether conscious thought will be more fruitful in many concrete situations.

In the remainder of this paper, the theory, named the Unconscious Thought Theory (UTT) is presented. UTT consists of six principles pertaining to unconscious and conscious thought based on what we and others have discovered. The first part of this paper presents these principles along with supporting empirical evidence. After that, we first discuss a counterintuitive hypothesis (and its empirical support) about the relation between thought and decision making derived from UTT. We then discuss some general characteristics of UTT by comparing it to related models and theories. Before we end, we discuss the relation between UTT and specific decision strategies and between UTT and intuition. We end with a discussion of caveats and future directions.

The Unconscious Thought Theory

The unconscious thought principle: There are two modes of thought. In addition to conscious thought, people also engage in unconscious thought. The two modes of thought have different characteristics, making them differentially applicable or differentially appropriate to use under different circumstances.

We define conscious thought as object-relevant or task-relevant cognitive or affective thought processes that ensue *while the object or task is the focus of one's conscious attention.* This rather complex definition simply describes what lay people would call thought. For instance, one consciously compares two holiday destinations (let's say Florida and Tuscany) and at some point thinks "Tuscany has fabulous food and wine". Unconscious thought refers to object-relevant or task-relevant cognitive or affective thought processes that ensue *while conscious attention is directed elsewhere.* For instance, one compares the same two holiday destinations and does not know what to decide. After

24 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 for Tuscany a day later is the result of unconscious thought (see also Dijksterhuis, 2004a).

In order to interpret the theory as we intend, it is very important to realize that *attention* is the key to distinguish between unconscious thought and conscious thought. Conscious thought is thought with attention, unconscious thought is thought without attention (or with attention directed elsewhere). However, this does not mean that conscious thought only comprises conscious processes. One could compare it to speech. Speech is conscious, but various unconscious processes (such as those responsible for choice of words or syntax) have to be active in order to speak. Likewise, conscious thought cannot ensue without unconscious processes being active at the same time.

The capacity principle: Conscious thought is constrained by the low capacity of consciousness. Unconscious thought does not have this constraint because the unconscious has a much higher capacity. It follows that conscious thought by necessity often only takes into account a subset of the information it should take into account.

Try to think (consciously!) about where to spend your next summer holiday, about the next paper you want to write, and about what to eat tonight. All at exactly the same time please.

As we know, we cannot do this. Conscious capacity is limited, and generally consciousness cannot do more than one thing at a time. Furthermore, conscious capacity is limited in that it can only temporarily "store" about 7 items (Miller, 1956). In the 1950's, various researchers tried to quantify the processing capacity of both consciousness itself

and of the human sensory system as whole, that is, for all unconscious processes and conscious processes combined. There is no need to discuss this literatute thoroughly (for brief reviews, see Dijksterhuis, Aarts & Smith, 2005; Norretranders, 1998; Wilson, 2002), but the bottom line is important. Depending on the context, consciousness can process between 10 and 60 bites per second. As an illustration, if you read you process about 45 bits per second, which corresponds to a fairly short sentence. The entire human system combined, however, was argued to be able to process about 11,200,000 bits. The visual system alone processess about 10 million bits per second. This interesting early research very clearly points out that conscious processing capacity is very low compared to the processing capacity of the entire human system[1].

The fact that decision makers have to deal with limited capacity has long been recognized by decision theorists (e.g., Bettman, Luce & Payne, 1998; Kahneman, 2003; Simon, 1955; Tversky & Kahneman, 1974). Wilson and Schooler (1991) explicitly argued that the low capacity of consciousness can lead to poor decisions or choices. In their experiments participants evaluated objects, such as different college courses or jams. Under some conditions, participants were merely asked to evaluate the different objects without much thought or effort. In other conditions, participants were pressed to carefully analyze the reasons for their evaluations and to write down their thoughts and reasons. In other words, they engaged in thorough conscious thought. As it turned out, this did not help them. Compared to people who thought less, conscious thinkers made less accurate evaluations. Importantly, in line with the capacity principle, additional evidence showed why conscious thought was maladaptive: Conscious thought led people to focus on a limited number of attributes at the expense of taking into account other relevant attributes.

It may be noted that the start of our research on unconscious thought was elicited by the findings of Wilson and colleagues (1991), combined with the realization that the unconscious does not suffer from low capacity. Our second experiment (Dijksterhuis, 2004a, Exp. 2) provides further evidence for the capacity principle. Again, participants were presented with a lot of information about 4 hypothetical apartments. This time, rather than rating each apartment, participants were asked to choose the best one. As before, they were either given no time to think at all, or a few minutes time to think consciously, or a few minutes time during which they were distracted and could only think unconsciously. We constructed the stimulus materials in such a way that one apartment was more desirable than the three others. As expected, unconscious thinkers more often chose the appropriate apartment (59%) that conscious thinkers (47%) or immediate choosers (36%). Importantly, participants were asked an additional, dichotomous question about how participants reached their choice. They were asked whether they had based their choice on a more holistic judgment, or merely on one or two specific attributes. Forty-two percent of the immediate choosers said they made a holistic judgment. This percentage was higher for unconscious thinkers (56%), and, in line with the capacity principle, lower for conscious thinkers (27%). That is, the majority of the conscious thinkers indicated that they based their decisions on only one or two attributes. Correlations between whether people made a holistic choice and whether they made the right choice confirmed that a holistic judgment more often led to the selection of the most desirable apartment. In sum, this experiment supports the idea that consciousness by necessity only uses a subset of the available information, and that this comes at the expense of the quality of a choice or decision[2].

The" bottom-up versus top-down" principle: The unconscious works "bottom-up" or aschematically, whereas consciousness works "top-down" or schematically.

Bettman, Luce and Payne (1998, p. 188) use a nice metaphor to characterize the development of preferences: "…consumer preference formation may be more like architecture, building some defensible set of values, rather than like archaeology, uncovering values that are already there". Although this metaphor does not perfectly match our conception of conscious and unconscious thought as described by the top-down versus bottom-up principle, the gist is certainly the same. In these terms, conscious thought is more like an architect, whereas unconscious thought behaves more like an archaeologist. For this principle, we discuss conscious thought and unconscious thought separately.

Conscious thought is guided by expectancies and schemas.

In formulating the top-down versus bottom-up principle, we borrowed from Sloman (1996) who convincingly argued that strategic thought processes are inherently hierarchical, whereas automatic processes are not. In addition, social cognition research on stereotyping shows that people use more stereotypes (or schemas in general) under circumstances of constrained processing capacity (e.g., Bodenhausen, 1988; Dijksterhuis & van Knippenberg, 1995; Fiske & Neuberg, 1990; Gilbert & Hixon, 1991; Macrae, Hewstone & Griffiths, 1993). Whereas this work shows that limited processing capacity during *encoding* of information leads to more schema use, we propose this is also true for thought processes that occur after encoding. This led us to formulate and test the hypothesis that people stereotype more during impression formation when they think consciously

compared to when they think unconsciously. After all, it is consciousness that suffers from limited capacity[3].

Some may find this idea ironic. We generally associate stereotyping with automaticity and with the unconscious. However, the top-down versus bottom-up principle can easily be reconciled with this traditional idea. Indeed, stereotypes are activated automatically (i.e., unconsciously) and we are usually not consciously aware that we apply them (Bargh, 1994; Devine, 1989). In fact, in the presence of a goal not to stereotype, we can often suppress stereotype application (e.g., Devine, Monteith, Zuwerink & Elliot, 1991; Macrae, Bodenhausen, Milne & Jetten, 1994; Monteith, Sherman & Devine, 1998; see also Wegner, 1994; we will discuss this more elaborately later). However, the top-down versus bottom-up principle entails the ironic idea that despite the fact that stereotypes are activated automatically, they are applied *while we consciously think* about a person or a group.

Dijksterhuis and Bos (2005) tested the hypothesis that conscious thought leads to more stereotyping in several experiments. In most experiments, a person memory paradigm was used (see e.g., Srull & Wyer, 1989; Stangor & McMillan, 1992). Participants were asked to form an impression of a target person. First, they were given a stereotypical expectation ("you are now going to read information about Mr. Hamoudi, a Morroccan man"), after which they read more detailed behavioral information. Some of this information was congruent with the activated stereotype, whereas other information was incongruent. Later on, the impression formed of the target person was assessed and memory for information about the target person was probed. Some participants were requested to consciously think about their impression of the target person before engaging in judgment and recall, whereas others were distracted and engaged in unconscious

thought. Our findings clearly demonstrated that conscious thinkers applied stereotypes. They judged the target person in a more stereotypical manner, and their recall was biased in that they recalled more stereotype-congruent than stereotype-incongruent behavioral descriptions. Unconscious thinkers did not demonstrate stereotyping. Their judgments were more neutral and they recalled more stereotype-incongruent than stereotype-congruent behavioral descriptions. This pattern was found in various experiments in which we also found that conscious thinkers recalled less information overall than unconscious thinkers. Additional experiments corroborated the idea that conscious thought works top-down: Conscious thought leads people to concentrate on the stereotype and the stereotype-congruent information, thereby making the stereotype-incongruent information less accessible and harder to recall (see also Dijksterhuis & van Knippenberg, 1996).

Other work supporting the top-down versus bottom-up principle is work on "predecisional distortion" (see e.g., Carlson & Russo, 2001; Simon, Pham, Le & Holyoak, 2001). Predecisional distortion is a phenomenologically subtle effect that can have profound (negative) consequences. When one consciously forms a judgment on the basis of a lot of information, such as when one has to decide whether a defendant is guilty or not, the appropriate strategy is to wait to make a decision until all available information is processed and integrated. This, however, is often not how it works. Instead, people often quickly form a "prejudgment" and this works as an expectancy biasing the interpretation of information processed later. This effect has been shown a number of times, and even occurs when people are warned not to make such a prejudgment (Carlson & Russo, 2001). Predecisional distortion is a very convincing example of the schematic way conscious thought works. In our own stereotyping work just discussed, participants were told that the

target person was a member of a stereotyped group. In other words, participants *were given* a schema. Work on predecisional distortion shows that even in the absence of a given expectancy, during conscious thought we quickly create our own to guide further thought.

Carlson and Russo (2001) compared predecisional distortion among students in a (hypothetical) legal case with predecisional distortion among people who would soon be jurors in a real case. Interestingly, the biasing effects of predecisional distortion among future jurors were twice as large as the effects among students. Carlson and Russo (2001) expain these results by pointing out that the future jurors were older and thus may have held more stable prior beliefs, and also suggesting that the students worked in a more analytic way thereby partially preventing distortion. We offer the (admittedly speculative) alternative that jurors, in anticipation of the real case, took the task more seriously and engaged in more conscious thought, leading to more distortion rather than less (see Brownstein, 2003; Davidson & Kiesler, 1964; for the relation between amount of deliberation and amount of predecisional bias).

The conclusions is that it is hard to avoid “jumping to conclusions” when one conscously thinks. It may feel as if one is processing information with the goal to make a decision, when what one really –unknowingly- is doing is process information with the goal to confirm an expectancy already made. Research on positive-test strategy has convincingly demonstrated how powerful such biased information processing strategies sometimes are (Klayman & Ha, 1987; Snyder & Swann, 1978).

Unconscious thought uses information in a (relatively) unbiased way and slowly integrates this into an objective summary judgment.

The available evidence thus far does not make it fully transparent what unconscious thought really is and how it works. Understanding the exact process by which unconscious thought forms a judgment will take time and additional experimenting (we return to this issue later). Nevertheless, some things have been discovered.

In the experiments from our own lab discussed thus far, we always compared a condition where people consciously thought with a condition where people were distracted and we *assumed* this latter group engaged in unconscious thought. However, perhaps these people were merely distracted. Perhaps they did not engage in any thought at all. This alternative cannot explain why distracted people made better decisions than people who did not think at all (the immediate choosers), but maybe a little distraction helped to give people a "fresh look". Or maybe it simply helped to attenuate the biasing effects of primacy or recency effects. As argued before (Dijksterhuis, 2004a), demonstrating active unconscious thought entails showing that during distraction, the mental representation of the object one wants to evaluate or the objects one has to choose from changes. After all, that is what thinking does. Thinking about an object implies that the representation of that object in memory changes. If one for the first time thinks "Hey, Tuscany also has great food and wine," it is a sign that the representation of Tuscany has become more positive, in turn increasing the probability that Tuscany will be chosen as a holiday destination.

In one of our experiments (Dijksterhuis, 2004b), the straightforward hypothesis was tested that if people indeed think unconsciously, then longer unconscious thought should lead to even better decisions than brief unconscious thought. In this experiment, participants were again presented with a complex choice problem and read information about 3 hypothetical people in random order with the instruction to determine who they

would like most to have as a roommate. Each person was described by 12 different characteristics (e.g., Person A has a great sense of humor, Person C is rather messy), and one person was made desirable (by assigning more positive than negative characteristics), whereas another was made undesirable (by assigning more negative than positive characteristics). First, we replicated our previous finding that unconscious thinkers made better decisions than conscious thinkers or immediate choosers. Importantly however, participants who could think unconsciously for 7 minutes made even better decisions than participants who could only think unconsciously for 2 minutes.

Later, we did another choice experiment (Dijksterhuis, 2004a, Exp. 4) with a different dependent variable. Again, participants were confronted with the information about the three roommates. Afterwards, rather than probing their preference, participants did a recognition task. We ran a condition in which participants did this task immediately, a condition in which they first consciously thought, and a condition in which they first could think unconsciously. In the recognition task, participants were presented with the characteristics of the roommates, but this time without the specific roommate labels. Participants were asked to decide as quickly as possible to which roommate each characteristic belonged. Interestingly, the findings demonstrated that people's representations *polarized* under unconscious thought. The positive characteristics of the desirable roommate as well as the negative characteristics of the undesirable roommate were much more accessible (i.e., participants responded faster to them) than the negative characteristics of the desirable roommate and the positive characteristics of the undesirable roommate. This pattern was only obtained for unconscious thinkers and not for participants in the other conditions.

In a different paradigm, we obtained additional evidence for changed mental representations due to unconscious thought. Here, it was shown that unconscious thought leads to a *better organization* of information in memory. In the experiment (Dijksterhuis, 2004a, Exp. 5) participants were asked to form an impression of a hypothetical man (named Jeroen) on the basis of 18 behavioral descriptions presented in random order. Six of the descriptions implied that Jeroen was intelligent, six others that Jeroen was idealistic, and six others that Jeroen was extraverted. Importantly, participants were not told that the behavioral descriptions represented three underlying trait constructs. Either immediately, after conscious thought, or after unconscious thought, participants were asked to recall as much information about Jeroen as possible. Of interest to us was whether participants' recall was clustered around the three implied traits. Did people recall the information in an organized order (e.g., first all the intelligent behaviors, then the idealistic ones, and so on) or merely in random order? As it turned out, only the unconscious thinkers showed a certain degree of clustering. They organized their representation of Jeroen over time. Participants in the other two conditions did not.

Recently, we (Dijksterhuis & de Vries, 2005) used the same paradigm to obtain evidence for the goal-directedness of unconscious thought. In all earlier experiments unconscious thinkers had always been told, before they engaged in the distraction task, that later they would be probed about the object(s) they just processed information about (apartments, roommates, Jeroen, etc.). What would happen if one told them before the distraction task that they would *not* answer questions about the object(s)? That is, is unconscious thought an active, goal-directed process, or merely a residual process of earlier conscious processing of information? Our experiment clearly supported the former idea.

Only unconscious thinkers who knew they would be probed showed enhanced memory organization (and better recall). People who were instructed that they would not be probed about the choice problem before they were distracted demonstrated no clustering at all.

To recapitulate, we know that as a result of unconscious thought people's mental representation of the relevant object(s) become(s) more polarized and better organized, thereby helping them to make better decisions.

The weighting principle: The unconscious naturally weights the relative importance of various attributes. Conscious thought often leads to suboptimal weighting because it disturbs this natural process.

Up to now, in the experiments from our own lab that we have discussed, the quality of a choice or decision was judged from a normative perspective. A certain apartment had more positive than negative attributes, and hence it was desirable. However, people have idiosyncratic preferences and perhaps the apartment that we labeled as "the desirable one" was not the best one for each individual participant. Perhaps some people do not like Tuscany, because they do not care about food or wine. They want a beach. In essence, the quality of a decision is subjective. And perhaps conscious thought is better than unconscious thought at arriving at a subjectively optimal judgment. Some have argued (after conference presentations about our work) that conscious thought may be better at weighting the subjective importance of various attributes than unconscious thought. We argue that the opposite is true, that unconscious thought is better at weighting.

In one of our experiments (Dijksterhuis, 2004, Exp. 3) we examined the relation between idiosyncracies and conscious and unconscious thought. Participants were, as in

some experiments discussed previously, presented with information about 3 potential roommates. Each roommate was described with 12 aspects. The dimensions used for the aspects were the same for the three roommates (e.g., humor, neatness, friendliness) but the roommates differed in how they scored on these dimensions (e.g., one was very friendly, one was moderately friendly, one was rather unfriendly). Participants gave their attitudes towards each of the three roommates either immediately after reading the information, or after conscious thought, or after unconscious thought. However, about 45 minutes earlier, participants had rated how important the various dimensions in the stimulus materials were for them when choosing a new roommate (e.g., "How important is it for you for your roommate to be neat?"). By correlating attitudes with idiosyncratic preferences, we determined how well participants evaluated the three roommates according to their own individual standards or preferences. Differences between conditions were not statistically significant, but if anything, conscious thinkers did not do better than the others. In fact, they did the worst, whereas unconscious thinkers were the best.

Wilson and colleagues (e.g., Wilson & Schooler, 1991; Wilson et al., 1993; see also Levine, Halbertstadt & Goldstone, 1996) have argued that conscious contemplation disturbs natural weighting schemes. Wilson et al. (1993) did an experiment in which they compared the post-choice satisfaction of people who chose from five different art posters. Some participants were merely asked to choose, whereas others were asked to carefully scrutinize the reasons for their preference. When post-choice satisfaction was assessed a few weeks later, the expectations of the experimenters were confirmed. People who engaged in thorough conscious thought were less happy with their choice. Wilson and colleagues (1993, p. 332) attributed this to suboptimal weighing: "…Introspection…can

change an optimal weighing scheme into a suboptimal one. When people analyze reasons, they might focus on those attributes of the attitude object that seem like plausible causes of the evaluations but were not weighted heavily before". It should be noted that participants in this experiment did not just think consciously, but actually had to list their thoughts. However, we argue that suboptimal weighting generally occurs with normal conscious thought. Conscious thought leads people to put disproportionate weight on attributes that are accessible, plausible and easy to verbalize (see also Schooler, Ohlsson & Brooks, 1993), and therefore too little weight on other attributes.

Recently, we (Dijksterhuis & van Olden, 2005) replicated and extended this experiment. Participants chose a poster (out of 5) to take home under one of three different conditions. They either chose after looking at the posters briefly, after looking at them and then thinking about them for nine minutes, or after a nine-minute distraction task following a brief look. That is, people either chose immediately, after conscious thought, or after unconscious thought. Participants took their chosen poster home and were called a few weeks later to find out how they felt about their choice. As expected, participants who thought unconsciously were happier with their poster than participants in the other two conditions. In addition, when asked for what amount of money they would be willing to sell their poster, they indicated a sum twice as high as conscious thinkers.

An interesting question is whether conscious thinkers choose poorly because they are indecisive, or because they have a (strong) preference for the wrong alternative. Right after we asked participants to choose, they were also asked to give their attitude towards each individual poster. By subtracting the average attitude of the four non-chosen posters from the attitude towards the chosen one, we calculated the strength of their preference. As

it turned out, conscious thinkers actually had the strongest preference, whereas unconscious thinkers were relatively indecisive. However, correlations between the attitude towards the chosen poster and later satisfaction revealed that for immediate choosers and for unconscious thinkers, attitudes predicted later satisfaction. For conscious thinkers they did not. In other words, conscious thinkers had a preference that was both relatively strong and wrong.

There is also research on how *consistently* people weight attributes. Levine, Halberstadt and Goldstone (1996) had participants evaluate a large number of faces that varied along 6 dimensions (such as the shape of the nose). Participants either merely evaluated these faces, or they had to think about the reasons for their evaluations before doing so. Of interest to the experimenters was the way people used and weighted the six dimensions to evaluate the faces. The data clearly demonstrated that conscious thought made weighting more varied and inconsistent.

Recently, we (Nordgren & Dijksterhuis, 2005) extended these effects. In our experiments, we used a variety of judgments including the attractiveness of Chinese ideograms and the extraversion of people on the basis of their faces. In all experiments participants judged the exact same stimuli twice, sometimes after a 45 minute delay, in other cases after weeks. Importantly, some participants were asked to judge quickly, whereas others were asked to engage in thorough conscious thought. People who engaged in thorough conscious thought showed always more inconsistency. Quick “gut” judgments were clearly more consistent over time than judgments that were made after conscious reasoning. In addition, conscious reasoning did not lead to better judgments. In one experiment, participants repeatedly judged the quality of various pieces of art. We included

both what is considered good art (from MOMA, the Museum of Modern Art in New York) and bad art (from MOBA, the Museum of Bad Art in Boston). Conscious thinkers were again less consistent over time but not more accurate.

In sum, the work by Wilson and colleagues (e.g., 1993) and by Dijksterhuis and van Olden (2005) demonstrates poor weighting by consciousness. The work by Levine and colleagues (1996) and by Nordgren and Dijksterhuis (2005) goes a step further. By demonstrating that people weight inconsistently over time, they display what we may call "decisional noise". By poor and inconsistent weighting conscious thought introduces noise causing evaluations, judgments or choices *of the exact same stimuli* to become inconsistent over time. It is likely (but not tested yet) that such decisional noise increases as a function of the complexity of the task.

Before we move on, it should be noted that our assumption of better unconscious weighting does not hold in very extreme cases, as we shall discuss under the next principle ("the rule principle"). Imagine the case where one attribute by necessity has to overshadow all the others (such as the beautiful apartment that is way above budget) One could argue that this is a matter of appropriate weighting in that this attribute should get maximum weight, thereby clearly pushing the decision ("I can't take this apartment"). However, we feel such a decision problem is better characterized as rule-based, with a maximum sum of money as a rule. In such cases, as we will propose next, the rule principle dictates that conscious thought is better.

The rule principle: Conscious thought can follow strict rules and is precise. Unconscious thought gives rough estimates.

What is 13 x 14? Providing you refrain from using a calculator, you can only answer this question after a brief period of conscious thought. It cannot be answered by unconscious thought. You could be asked “what is 13 x 14?”, then distract yourself for two weeks (we recommend going to Tuscany for a holiday), and you would still not know the answer unless you have spent some conscious effort on the arithmetic problem.

The key to understanding why the unconscious cannot do arithmetic is that it cannot follow rules. In his book on consciousness, the unconscious, and creativity, Claxton (1997) has made the argument that the distinction between rule-based and associative thinking largely maps on to the distinction between consciousness and the unconscious. During conscious thought we can deal with logical problems that require precision and the strict following of rules, whereas during unconscious thought we cannot.

Importantly, this does not mean that unconscious thought does not conform to rules. Sloman (1996) distinguished between following rules and merely conforming to them, and this distinction is very important here. An example of conforming to rules (but not actively following them) is the fact that an apple conforms to gravity by falling down rather than up. The literature on implicit learning (e.g., Lewicki, Hill & Czyzewska, 1992) shows that the unconscious is very good in detecting recurring patterns, even if these are highly complicated. However, in such cases one is conforming to rules, rather than following (or using) rules actively, such as in arithmetic.

Research by Betsch and colleagues (Betsch, Plessner, Schwieren & Gutig, 2001) demonstrates that unconscious thought can give rough (but accurate) estimates on the basis of numbers, without the ability to engage in real arithmetic. That is, the unconscious can deal with numbers to some extent, but not by doing arithmatic. Participants in their

experiments were asked to carefully look at various ads shown on a computer screen. At the same time, the numerical increases and decreases of five hypothetical shares were shown. Participants were presented with 75 units of information about the shares, all only briefly presented on the computer screen. Afterwards, participants were asked specific questions about each of five shares, such as what the average money returns were. Not surprisingly, participants were not even remotely able to answer such specific questions. However, when they were merely asked to give their attitudes, they somehow knew what the best and worst shares were. Participants had developed a rough "gut feeling" towards the shares, indicating that they had unconsciously integrated the numerical information. If participants would have failed to take into account even a small portion of the 75 units of information, this would have been impossible. On the other hand, if participants would have engaged in arithmetic, they would have been able to answer the specific questions (e.g., about average return) with more accuracy.

Other recent research that shows the inability to follow rules by the unconscious is reported by Deutsch, Gawronski and Strack (2005). They consciously and unconsciously primed participants with affectively laden terms that sometimes included negations. Concretely, they primed participants both with terms ("bad") and with negations with a similar meaning ("not good"). As it turned out, negations could not be processed correctly unconsciously. When unconsciously primed, a stimulus such as "not good" was interpreted as "good". This does not mean that unconscious thought cannot deal with negations once they are properly encoded. In many of our experiments (e.g., Dijksterhuis, 2004a) we used negations such as "Apartment A is not very expensive" and unconscious thought can deal well with such statements. However, we need to be consciously aware *while we encode* the

information for the first time. If we are not aware during encoding, we can not follow what we may call the “negation rule”.

The implications of the rule principle obviously go beyond arithmetic and negation. From the perspective of someone who has to form an impression or who has to choose between three apartments, the fact that conscious thought can follow rules is important, as it also applies to rules that we generate ourselves in the context of a decision process. One can be confronted with a house or apartment with many fabulous attributes, but if it exceeds a self-generated rule (it is way above budget) consciousness will quickly decide against it (see also Dijksterhuis, 2004a). The same goes for decisions for which one aspect is absolutely crucial, such as when one wants an apartment and insists on a balcony, or judge a job candidate who has to be fluent in both English and German. Finally, it also applies to purchases of mundane things for which some “rules” are rather obvious. One does not want a shirt with a hole in it or with very sloppy stitching on the hems. This requires a certain degree of detailed precision and therefore conscious thought.

To conclude, the ability to follow rules allows for *precision* in the context of a decision. As argued above, if we want to use a very strict rule or criterion on a single dimension, we need conscious thought. For unconscious thought, an apartment that costs 595 Euros a month is virtually the same as an apartment that costs 605 Euros. For conscious thought, they are judged entirely differently if we have set our own rule that an apartment may not cost more than 600 Euros.

The convergence versus divergence principle: Conscious thought and memory search is focused and convergent. Unconscious thought is more divergent.

The convergence versus divergence principle is more relevant for creativity than for choices or decisions. Creativity has long been associated with incubation, the idea that unconscious activity continues if conscious attention is directed elsewhere. Nobel laureates and famous artists, when asked to introspect on the process leading to their discoveries or creations, often emphasize the important role of incubation (Ghiselin, 1952). Some necessary conscious activity notwithstanding, it is, in most people's view, the unconscious that produces truly creative or unique thoughts. It seems that creative insight results from a process whereby some initial conscious thought is followed by a period during which the problem is put to rest, consciously at least. After this period without conscious thought, a solution or idea presents itself.

Although the anecdotal evidence for incubation is abundant, not much is known about the process. At first, effects of incubation were hard to find in the psychological laboratory (Olton, 1979). Later, some evidence was obtained (e.g., Schooler & Melcher, 1995; Smith & Blankenship, 1989), but the effects were generally not explained as involving true unconscious thought. In studies on incubation, participants were usually confronted with insight problems they had to solve. Some participants were then distracted for a while (starting the incubation process) and they were more likely to solve the problems relative to participants who were not distracted. However, such effects were explained by "set-shifting". Rather than assuming that the unconscious really thinks, it was assumed that distraction led to a change in mental "set", for instance due to forgetting. For example, sometimes you cannot solve a chess problem because you are stuck thinking in the wrong direction. A period of distraction would lead you to forget the wrong direction, and you later solve the problem due to having a "fresh look".

Although set-shifting can clearly contribute to creative thoughts or to problem solving, it is also a little dissatisfying to assume that it is the whole story. Surely Newton did not discover the explanation for gravity because of continuous set-shifting. We are not born with an inherent understanding of gravity, whereby the person who can best distract him- or herself is the one uncovering this deeply hidden explanation. Instead, the crucial thought itself must at some point be constructed, and for this to occur, one needs thought, not merely distraction. And in our view, it is more likely that this happens during unconscious thought than during conscious thought. As we state in the convergence versus divergence principle, if we generate thoughts or ideas, consciousness does this in a very focused and convergent way, whereas the unconscious is more divergent, increasing the probability of generating creative and unusual ideas. As we said earlier (Dijksterhuis & Meurs, 2005, p. 6), when we generate thoughts "... conscious thought stays firmly under the searchlight, (whereas) unconscious thought ventures out to the dark and dusty nooks and crannies of the mind".

Our ideas were tested in a number of experiments (Dijksterhuis & Meurs, 2005). In all experiments, we gave participants a certain task (e.g., generate new names for pasta, generate places starting with an "A") under different conditions. They either started to list them immediately upon the request, or they first thought consciously before listing the items, or they were distracted for a number of minutes. Although we generally obtained no differences between conditions in the number of items people generated, the nature of these items differed. For instance, in the experiment where we asked people to generate new names for pasta, we gave five examples, all ending with an "i". Whereas conscious thinkers used this cue and listed almost only names ending with an "i", unconscious thinkers listed

more names with other endings. In an experiment where we asked people to generate Dutch places (i.e., cities and villages) starting with an “A”, conscious thinkers listed highly accessible and obvious items (e.g., big cities such as Amsterdam), whereas unconscious thinkers listed more small villages. Finally, in a last experiment we asked people to “generate things one can do with a brick”. As expected, unconscious thinkers came up with ideas that were more unusual and creative.

The ironic complexity effect

One can derive various concrete hypotheses from the six principles of UTT. We formulated and tested one such hypothesis ourselves in a recent series of studies (Dijksterhuis, Bos, Scheers, Neimeyer & Wassenberg, 2005). It is a counterintuitive hypothesis that we labeled the ironic complexity hypothesis. The capacity principle dictates that conscious thought does not make good decisions under very complex circumstances. Some work discussed before (Dijksterhuis, 2004a) indeed showed this. When choosing between four apartments each described by 12 aspects, conscious thought broke down and the unconscious made much better decisions. However, the rule principle states that consciousness is precise and that it may well be good at choosing so long as its capacity is not strained. That is, conscious thought, due to its precision, may lead to better choices when there is a minimal amount of information involved. One could hypothesize that conscious thought is good when things are simple, and becomes worse as the complexity of the decision problem increases.

Alternatively, during unconscious thought, as dictated by the top-down versus bottom-up principle and the weighting principle, we slowly integrate huge amounts of information into relatively sound summary judgments in which the relative importance of

information is given (more or less) appropriate weights. In principle, this means that the quality of decisions made after unconscious thought is independent from the complexity of the problem. That is, we hypothesize that the quality of unconscious decisions is always fairly good.

Thus, according to UTT, the relation between quality of a decision, complexity of a decision problem, and mode of thought (conscious thought and unconscious thought) looks as depicted in Figure 1. It should be noted that in the present hypothesis, complexity is defined in terms of amount of information involved.

We tested the ironic complexity hypothesis in three studies. In the first experiment, participants read information about four hypothetical Japanese cars with the goal to choose the best one. One of the cars was more positive than the others. The amount of information the choice was based on differed. The problem was either relatively simple (each car was described by 4 aspects, for a total of 16 pieces of information), moderately difficult (8 aspects per car), or very difficult (12 aspects per car). Participants either indicated their choice after a few minutes of conscious thought, or after a few minutes of unconscious thought. The percentages of participants choosing the best car are depicted in Figure 2 and they fully support the complexity hypothesis. Conscious thinkers performed well under simple conditions, but progressively worse under more demanding circumstances. Unconscious thinkers showed a different pattern in that they often often chose the right car, more or less irrespective of condition.

In a second study, we tested the ironic complexity hypothesis in the context of actual consumer choices. First, we asked undergraduate participants how many aspects they would take into account if they bought certain products, thereby assessing the relative

complexity of various products. We asked for estimates regarding 40 different products, making sure we covered a wide range from highly complex to very simple (e.g., car, computer, couch, bed, shoes, dress, shirt, CD, vase, towel, umbrella, oven mitts). In a separate study, we gave other participants the same list of products and asked them to think about a recent occasion when they bought one of these items. We asked them what they specifically bought and how expensive it was. Subsequently, we asked whether they had seen the product before they went shopping. This question allowed us differentiate between people who engaged in conscious and/or unconscious thought and people who merely bought the product impulsively (or at least with very little thought). This latter group was not further analyzed. We then asked the people who had seen the product beforehand whether they had engaged in a lot of thought or not. Finally, we asked them how satisfied they were with what they bought.

We regressed various variables on satisfaction. Neither the amount of thought nor the number of aspects alone predicted satisfaction. However, the interaction of those two did significantly predict satisfaction. To explore this interaction we distinguished between complex products (i.e., products with many aspects such as a car, computer, camera, or couch), products of medium complexity (e.g., shirt, watch, skirt) and simple products (e.g., pot, alarm clock, vase, toothpaste). The more people thought consciously in the period between seeing a simple product for the first time and buying it, the more happy they were with it. Conversely, the more people thought consciously in the period between seeing a complex product for the first time and buying it, the *less* happy they were with it.

In a final study, we interviewed people outside two shops in Amsterdam, one where people predominantly buy complex products (IKEA, where people buy furniture) and one

where people predominantly buy simple products (the “Bijenkorf”, where people buy clothes or small accessories). People were asked what they bought, whether they had seen it before, and whether they had thought about it a lot before buying it. A few weeks later, we called them to ask how satisfied they were. As expected, IKEA buyers were generally more happy the less they had consciously thought about what to buy, whereas Bijenkorf buyers were more happy the more they had consciously thought. Again, the ironic complexity hypothesis was confirmed.

In the study where we asked undergraduate students about a recent purchase, we also found that the correlation between amount of conscious thought and the number of aspects of a certain product was .54 (note that both also correlate positively with the price of a product). The more complex a problem is (and the more expensive a purchase is), the more people consciously think before they act (see also Dijksterhuis, Smith, van Baaren & Wigboldus, 2005). This is intuitively logical, but the ironic complexity hypothesis shows that people should do the reverse. As decision makers, people are bad managers of their own minds. They behave like a conference organizer who asks the janitor to deliver the keynote address and the highly accomplished professor to fold up the chairs.

Some characteristics of the theory

It seems appropriate to discuss UTT against the background of other (dual-process) models and theories. This enables us to articulate some key characteristics of UTT in comparison with other models. Furthermore, it makes it easier to appreciate what is new about UTT.

In the 1980’s and early 1990’s, social psychologists formulated a number of dual-process models (Brewer, 1988; Chaiken, 1980; Fazio, 1990; Petty & Cacioppo, 1986; see

also Fiske & Neuberg, 1990 who formulated a continuum model rather than a dual-process model). In these models the central assumption was that there are two different routes one can take to arrive at a certain attitude or a certain person impression. What was particularly appealing about these models, is that they permitted a certain degree of individual choice. All these models had two routes, of which one was decidedly more effortful than the other, but if one had the motivation and the capacity to engage in the effortful route, one could generally do so. UTT reflects this relative freedom of choice. A starting point for our model is also that people can generally choose between conscious thought, unconscious thought, or no thought at all.

However, UTT differs in other respects. As said before, most social psychological models made a distinction between an effortful and a relatively effortless route, whereby the effortful route generally led to more desirable outcomes (e.g., more stable attitudes, less stereotypical impressions). In addition, it was also generally believed that schemas were primarily applied when taking the effortless route. UTT, on the other hand, can be said to contain three routes: an effortless route without any thought at all, an unconscious route that takes time but is relatively effortless, and a conscious route that is effortful. UTT deviates from this general "effort is good" idea in that it does not predict conscious efforts to generally lead to better outcomes and that it does not maintain that effort is the way around using schemas.

Recently, models have been formulated that involve different systems rather than processing routes (Epstein, 1994; Kahneman, 2003; Sloman, 1996; Smith & deCoster, 1999; Strack and Deutsch's Reflective-Implusive model [2004] does both to some extent). Such models are especially informative as to the *processes* or even *modules* underlying

decisions (or human behavior in general). Our approach differs in that we do not assume separate systems. UTT describes the characteristics of two processes, rather than two systems or modules. Most models differentiate between a rule-based system and a more associative system, and although this distinction is highly relevant for UTT, there is no perfect match. That is, unconscious thought is not simply the working of the associative system and conscious thought that of the rule-based system. First, most "system models" assume that the two systems use different input (e.g., Sloman, 1996), whereas UTT regards both unconscious and conscious thought as able to work on most input. Furthermore, whereas most other models assume that schemas or heuristics are employed by the associative system, UTT holds that they are used primarily during conscious thought. Finally, some models hold that the associate system is passive and merely reproductive (Smith & de Coster, 1999), whereas UTT sees unconscious thought as an active, generative, and creative mode of thought.

Although UTT differs from existing models in various respects, the most valuable addition of this theory, we hope, is the idea of unconscious thought. It was known that one could choose between making a decision in an effortful way and a relatively effortless way. Simply stated, people can either think about things or not. UTT adds the idea that we think unconsciously.

UTT and decision strategies

Decision theorists have long recognized that people use different decision strategies under different circumstances. For example, under some circumstances people merely aim to satisfice (Simon, 1955). One needs a new bathroom towel, and rather than searching for ages to find the perfect towel, one simply looks and purchases the first towel one can find

that seems satisfactory. On other occasions, people want to choose the best possible alternative, and they engage in a lengthy and very careful weighting process in which the attributes of different options are weighted until people feel they have selected the absolute perfect alternative (some specific people in the process of buying shoes come to mind). Quite a number of different strategies have been identified, and it is interesting to try to map these different strategies onto unconscious and conscious thought. Do the different characteristics of conscious and unconscious thought make them differentially able to apply different strategies? Let us give a few examples.

The weighted adding strategy (*WADD*). This is a complex strategy in which a chooser first has to assess the importance of different attributes ("culture is important for a holiday destination"). In addition, each attribute level then receives a value ("Tuscany is excellent for culture"). Then each value has to be multiplied by the importance of the attribute dimension and the resulting scores for all attributes are summed to obtain a score for the attractiveness of a certain choice alternative. And of course, this has to be done for each alternative. This strategy is very sophisticated, and indeed about as good as it can get. However, it is also highly unrealistic to assume that people often engage in it.

In our view, conscious thought is not able to engage in WADD. First, WADD is most useful for complex problems, and, as the capacity principle states, conscious thought cannot deal well with complex problems. In addition, WADD requires that people more or less accurately weight the importance of attributes, and consciousness is not very good at weighting (as stated in the weighting principle).

Now what about unconscious thought? On the one hand, the rules of WADD are highly complex and strictly following these rules is impossible during unconscious thought

(the rule principle). On the other hand, the way unconscious thought deals with complex problems is probably rather similar to WADD: It slowly makes summary judgments based on appropriate weighting schemes. This means that although strictly speaking unconscious thought cannot do WADD, the results of unconscious thought processes are closer to what WADD would prescribe than the results obtained by conscious thought. In other words, if one faces a complex choice problem and really wants to apply WADD, unconscious thought is preferable over conscious thought.

The lexicographic strategy (*LEX*) is simple in comparison. Here, the choice alternative with the best value on the most important dimension is selected. If the size of your new house matters a great deal more to you than all other aspects, choose the largest house. This strategy follows one strict rule, making conscious thought rather than unconscious thought the preferred mode of thinking here. There is one catch in that consciousness has to able to correctly identify the most important dimension. But when that requirement is met, conscious thought is more suitable for LEX.

During satisficing (*SAT*), alternatives are considered sequentially. Attributes are compared to a predetermined standard and if a standard is not met, the choice alternatives will not be considered further. If a choice alternative meets the standards for all attributes, the alternative will be chosen. This strategy is not easy to map onto conscious and unconscious thought. First, SAT requires that one considers one option at a time. This rule is highly strict and can only be obeyed by conscious thought. That is, conscious thought can meet the first part of SAT (one thing at a time), whereas unconscious thought cannot. On the other hand, the second part of SAT entails that one can accurately judge whether something meets a predetermined standard. Conscious thought should be better at this than

unconscious thought, but there is again a catch. Successful SAT is dependent on setting the right standard. Consciousness can do this, provided the standard is rather easy to determine and indeed easy to "verbalize". It is very easy, for instance, to determine whether a purchase meets the standard "it should cost less that 100 Euros".

The implication is that for some decision strategies conscious thought is more appropriate than unconscious thought, whereas the reverse is true for other strategies. Generally, the relative applicability of both modes of thought is mostly a function of three of UTT's principles (the capacity principle, the weighting principle, and the rule principle). When a decision strategy warrants the careful and strict application of one specific rule (such as in LEX), use conscious thought. When matters become more complicated and weighting is called for (such as in WADD), use unconscious thought. In addition, when the amount of relevant information increases and strict single rule following ceases to be feasible (such as when buying a house), use unconscious thought.

UTT and intuition

Intuition is defined differently by different researchers, however, we choose to define intuition as a "gut feeling" based on (unconscious) past experience. Intuition, in other words, is that phenomenologically familiar feeling that something is right or wrong, or that A is better than B, whereby we are largely unaware where that feeling came from, or where it is based on. We will briefly discuss the implications of UTT for the understanding and appreciation of intuition, whereby we concede in advance that this discussion is speculative.

As Lieberman (2000, p. 109) observes, our culture is replete with cognitive maxims like "look before you leap" and "think before you act". Intuitions are distrusted and often

seen as flawed by definition. In general, people attach much more weight to thorough conscious thought than to intuition, perhaps in part because people want decisions to be based on verbalizable reasons rather than on a feeling. How would you react if you come home one day and your partner tells you she bought a $ 32,000 car? This in part depends on the explanation she provides. If she says she has thought about the car for quite a while, that the price is really low given all the assets, that the mileage is very good, and that it is the safest car in its price bracket, you will accept her decision more easily than if she merely says that she had seen the car a number of times recently and that she “felt” she really wanted it. The latter explanation may well lead to temporary turmoil in your relationship.

The question is whether such turmoil would be justified. In our view (see also Bruner, 1960; Lieberman, 2000), to judge the quality of an intuition or of a decision based on intuition, one needs to look at what took place before the intuition manifested itself. What, in other words, are these gut feelings based on? A major reason that people distrust intuition is the (often implicitly held) belief that intuitions are snap judgments that arrive in consciousness with little or no prior information processing. However, such a belief may not be justified. In many cases, intuitions may well be the result of extensive unconscious thought. Intuitions are the summary judgments the unconscious gives us when it is ready to decide. To go back to the car example, if you have repeatedly seen the car, perhaps read some information about it here and there, and heard others talk about it occasionally, the feeling that you really want the car is the summary judgment your unconscious gives you after having crunched the information for a while.

In cases in which intuition is based on extensive unconscious thought, it should not be distrusted. Let us briefly return to the different decision strategies discussed in the previous section. If one wants to buy a car according to one or two important criteria (e.g., mileage and safety), such as in LEX, it is indeed best to use consciousness. As argued before, such a decision based on a specific rule is impossible to make on the basis of unconscious thought. Alternatively, if one wants to decide on the basis of a more holistic judgment in which many criteria are taken into account, such as in WADD, use unconscious thought. At some point, that gut feeling or intuition will arrive, and this is your unconscious telling you what you should do. Do not distrust it. Instead, welcome it, as it is the best device you have to base your decision on.

To clarify, we do not argue that intuitions are always right. Whether intuitions are good is dependent on various moderators. First, as just argued, they should be based on extensive unconscious thought. In addition, it is also important that the unconscious had access to all important information. An intuition telling you to buy a certain car without knowing the price, the mileage, and the safety rating, is not a very useful intuition. But the bottom line is that the feeling itself should not be distrusted. Recent research on the somatic marker hypothesis (Bechara, Damasio, Tranel & Damasio, 1997) tells us that we can develop accurate gut feelings before we are able to verbalize where this intuition is based on. Gladwell (2004), in his recent book *Blink*, discusses the example of some art experts who intuitively sensed that a *kouros* (a statue) bought by the Getty museum was a fake. The first few tests indicated that nothing was wrong and that the statue was genuine. The experts could not actually verbalize what was wrong, but somehow the statue led to

aversive feelings. They had that wonderful device telling them the statue was a fluke. Later testing indeed proved them right.

To conclude, in our view intuition is often the result of unconscious thought and it is often highly useful. How useful intuition is, however, depends on the extent of unconscious thought it is based on, and on whether the unconscious had access to the most important information. If you have a strong intuition telling you to date a certain person, or that car A is better than car B, you may ask yourself a few questions. The first is, did I give myself enough time to engage in unconscious thought? This is probably not only dependent on time, but also on experience. As the example by Gladwell shows, an expert can achieve much more with relatively brief unconscious thought than a novice. If you can draw the conclusion that you have thought enough unconsciously, ask the second question: Did I have all the important information; or are there additional things I really need to know first? If you also think you have all the information you need, go with your intuition. It likely is the best advice you will get[4].

Caveats and future directions

Before closing, we would like to discuss three important limitations of the theory as it currently stands. These issues warrant discussion and they provide interesting avenues for future research.

A first important issue is the role of encoding or acquisition of information. On the basis of UTT, one may draw the conclusion that conscious thought is often inferior to unconscious thought and that therefore people should refrain from too much conscious activity when they face important decisions. However, UTT pertains to thought processes that, as is always the case with thought, follow an initial phase of information acquisition.

We indeed argue that in many ways unconscious thought is superior to conscious thought, but this relative superiority of unconscious processes does not pertain to the earlier stage of information acquisition. The reverse is the case.

In the experiments UTT was based on, participants were always presented with information they encoded consciously. Generally speaking, decisions are of course likely to be best when they are based on information that is encoded thoroughly and consciously. A decision based on incomplete information or on information that is acquired hastily and sloppily will be poorer. It is possible that decisions will be poorer irrespective of whether the later thought process is conscious or unconscious. However, it is also possible that unconscious thought suffers more from poor encoding than conscious thought, which would lead to the dissappearance of the relative superiority of unconscious thought under such conditions. This is an issue that warrants further study.

The relative superiority of conscious encoding leads us to what we may call the "best of both worlds hypothesis": Complex decisions are best when the information is encoded thoroughly and consciously, and the later thought process is delegated to the unconscious. In concrete terms, when one wants to buy a new house, one should consciously acquire as much information as possible. One may consciously engage in listing the information, so that the information is processed very thoroughly. However, the next step, the weighting and integration of the information to arrive at a judgment, should then be left to the unconscious. In short, consciousness should be used to gather information, the unconscious to work on it.

Nice anecdotal evidence emphasizing this division of labor is given by Zajonc (1980). Zajonc describes a colleague who is in the process of deciding between two jobs.

She makes a list with the various attributes, and assigns both choice options pluses and minuses on the various attributes. During this process, she suddenly realizes that there are too many pluses appearing on the “wrong side”. According to UTT, what happened here is that the unconscious has already made an intuitive decision. The decision conscious thought is about to reach, however, is the opposite. According to UTT, one should give more weight to the unconscious intuitive feel than to the conscious plusses and minuses. According to UTT, lists with pluses and minuses may be used to get a better grasp of the relevant information, but not to consciously engage in the actual thought process (although the example shows that this assigning pluses and minuses may help to figure out whether the unconscious has already reached a decision). Instead, look at the list, then stop conscious thought for a while, then wait for the unconscious to deliver the decision in the shape of an intuitive feeling.

A second important issue is the role of intentions or goals. Conscious thought is goal-directed, and we have argued that unconscious thought is too (although more evidence for that would be welcome). However, in the experiments discussed people were always intending to make a good decision. This is an important goal, but also a very general one. It is not yet clear what happens under situations where goals are more specific or directional. What if you have to decide on the best apartment, not for you, but for your grandparents? Here, different attributes than one is used to, such as the absence of stairs, become important. It is not clear whether unconscious thought is good at making such decisions. More specific goals often imply more strict rules, and as we have argued, conscious thought is better in following rules.

Findings in the domain of stereotyping illustrate this. In our own experiments (Dijksterhuis & Bos, 2005) it was demonstrated that conscious thought can lead to more stereotypical impressions than unconscious thought. However, many researchers have shown that when people are given the more specific goal not to stereotype, they generally fare quite well (e.g., Devine, Monteith, Zuwerink & Elliot, 1991; Monteith, Sherman & Devine, 1998; although there are pitfalls, see Macrae, Bodenhausen, Milne & Jetten, 1994). In this work, the participants engaged in conscious thought, and it is not yet clear whether the unconscious would be at all sensitive to such goals. People do not have to be consciously aware of the goal not to stereotype in order for the goal to have an effect (e.g, Moskowitz, Gollwitzer, Wasel & Schaal, 1999), but whether the intended effect can be achieved by unconscious thought rather than by conscious thought remains to be tested.

Finally, it is necessary to shed more light on how unconscious thought works and when and how the unconscious transfers its information to consciousness. Up to now, we have discovered that unconscious thought leads to polarization and that with unconscious thought people are better able to organize information in memory. This, however, is no more than the tip of the iceberg of the processes involved that may later be uncovered. Is it best to conceive of unconscious thought as a computational process, slowly calculating what is best? Is it useful to conceive of unconscious thought in connectionist terms, slowly working to a state of equilibrium? And what is the role of affect? Is unconscious thought good at weighting the relative importance of information because it somehow better uses the “affective tone” of the information? Such questions, highly intriguing in our view, are impossible to answer yet.

And when does the unconscious deliver its solutions? In our experiments, the amount of time given to participants was fixed. This actually constitutes a suboptimal use of unconscious thought, as one can envision the endproduct of unconscious thought to be better under more natural circumstances where the unconscious chooses itself when to deliver its solution. But when does it do that? Jaynes (1976) has jokingly referred to a British physicist who talked about the three B's: bed, bath and bus. Quite a number of major scientific discoveries have been made in these unusual places. The unconscious at times indeed chooses odd moments to present its findings.

Have you ever had the following experience? You are planning to start writing your next article, and although you have some ideas about what to write in the Introduction, things are still a bit fuzzy. You still have to make decisions ("shall I first present the weighting principle, or shall I first talk about the rule principle?"). And then, at some point, you suddenly know exactly what to do. First this, then that, then X – with the Holland versus Germany soccer example (2-1), then Y, etc. Sometimes such bursts of inspiration come at awkward moments, such as when you are grocery shopping. You are not able to write things down while your unconscious is strongly pushing you to do so. All you can do is hurry home (forgetting the lettuce), desperately hoping you do not lose these "great" thoughts before you can write them down. And then, at home, you sit down and write, and in six minutes and thirty-three seconds you have basically shaped your Introduction. You still have to do the actual writing of course, but you know exactly how it will unfold. Such moments of inspiration are wonderful, and they are demonstrations of unconscious thought processes telling you they achieved a solution. But why did they deliver their creative

solutions when they did? At this time, we very poorly understand such processes. The determinants of when the unconscious presents its ideas remain in the dark.

Conclusions

We presented a theory about human thought, the core of which is the idea that we have two modes of thought, unconscious and conscious. Unconscious thought and conscious thought have different characteristics, making these modes more or less useful under different circumstances. UTT suggests that people often apply the two modes inappropriately. For instance, we tend to engage in a lot of conscious thought when we deal with complex problems, whereas we should engage more in unconscious thought.

Rational choice theory, the perspective that has dominated decision and consumer research for quite some time, proposes that "the consumer has ability or skill in computation that enables the calculation of which option will maximize his or her received value and selects accordingly" (Bettman, Luce & Payne, 1998, p. 187). It emphasizes that people can weight the relative importance of information and generally decide quite well. There is no denying that this approach has been highly successful in accounting for people's consumer choices (e.g., Bettman et al., 1998; Simonson, 2005). The irony, however, is that although the name of the approach includes the term "rational", the success may in part be due to the fact that consumers generally do not think that much consciously before they decide. Perhaps the relative success of rational choice theory is due to the fact that people think more often unconsciously than we currently appreciate. And perhaps if consumers would start to think more consciously, rational choice theory would lose rather than gain predictive power. After all, our unconscious is often much more "rational" than consciousness.

Notes

1. We concede it is a hazardous affair to quantify the processing capacity of consciousness and the entire human processing system. The numbers (e.g., 11.200.000 bits) should not be taken too literally as it is impossible to measure human processing capacity with the same precision, as, say, the distance between two cities. Still, even if the entire processing capacity of humans would turn out to be factor 10 lower, the discrepancy between conscious capacity and processing capacity of the entire system remains enormous. The bottom-line is that conscious processing capacity is only a fraction of the capacity of the entire human system.

2. It is easy to defend that it is generally better to take into account all relevant information rather than a subset. However, this is not always the case. Gladwell (2004) uses the example of emergency room doctors diagnosing chest pain. They do best when they only take into account four cues and ignore others. Of course, reliance on a subset of the information is only beneficial if one uses the appropriate subset. As we shall argue later (the weigthing principle), this is usually not what consciousness does.

3. One may think that this hypothesis is at odds with the finding that people stereotype more under cognitive load. However, the unconscious thought conditions in our work are fundamentally different from the conditions of limited capacity by the stereotyping researchers cited in this paragraph. In the stereotyping work participants consciously think, but under impoverished circumstances (under “load” or time-pressure, which reduces the already low processing capacity of consciousness even more). In our work, participants do not consciously think, nor do they try to. Their consciousness is directed elswhere. Hence,

they do not suffer from low conscious capacity, as consciousness is not even employed for the task at hand.

4. In his book *Blink*, Gladwell seems to conclude that intuitions are often very good. He does not make the distinction between intuitions that are the result of thorough unconscious thought and intuitions that are made very quickly. In our view, this distinction is crucial for predicting whether intuitions are good. As argued, intuitions based on thorough unconscious thought are usually good. For immediate decisions, this is not clear. Anecdotal evidence (see Gladwell, 2004) suggests two important moderators that may be tested in future research. First, immediate intuitions that were good were made by experts (perhaps they have so much knowledge that they can think unconsciously very quickly). Second, the judgments were always simple and indeed binary ("good" versus "bad", "real" versus "fake"). It is unlikely that when judgments are more complex ("which or these four apartments is best for my grandmother?") immediate intuitions are very good.

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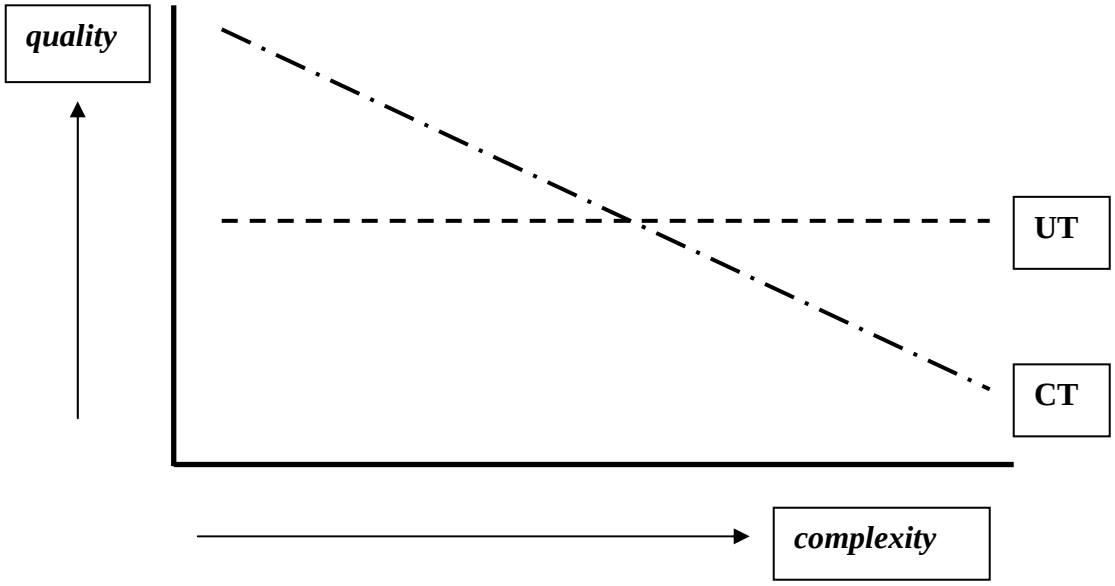
Figure captions

Figure 1. The relation between quality of decision, complexity of decision, and mode of thought as predicted by UTT (UT= unconscious thought; CT= conscious thought)

Figure 2. Percentage of participants who chose the right car as a function of complexity of decision and of mode of thought.


quality
UT
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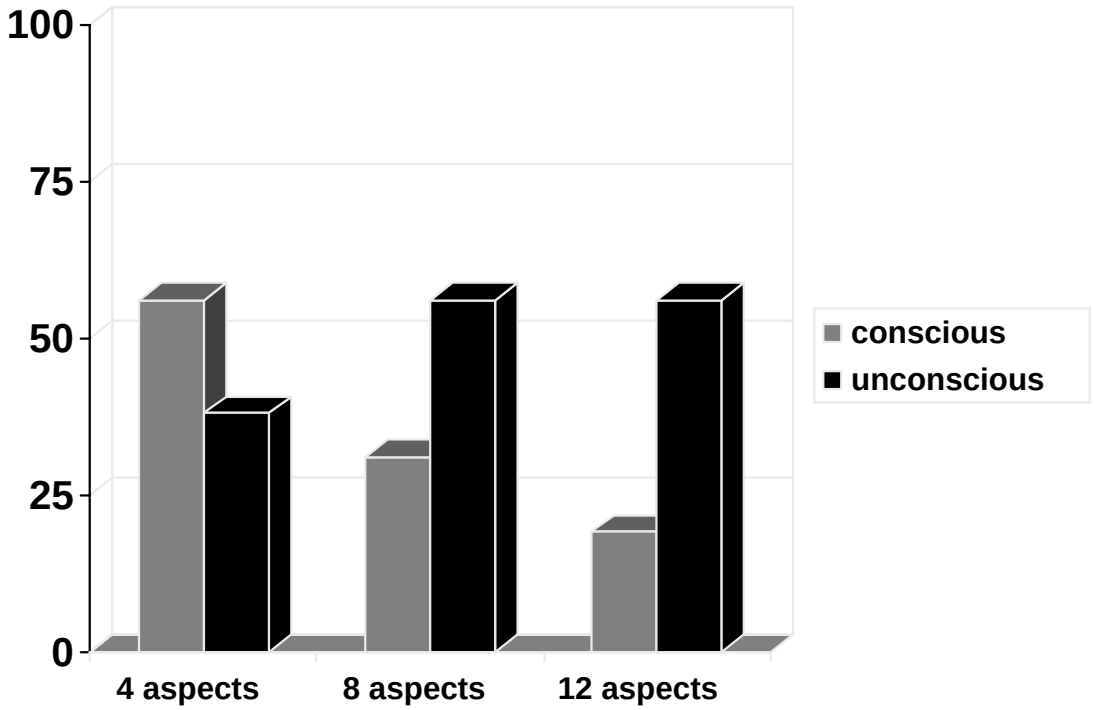
100
75
50
25
0
4 aspects
8 aspects
12 aspects
conscious
unconscious