

## **UNCONSCIOUS THOUGHT THEORY AND ITS DISCONTENTS: A CRITIQUE OF THE CRITIQUES**

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A review of Unconscious Thought Theory, its original empirical support, and the several methodological and empirical critiques that followed leads to the following conclusions: (1) the basic tenants of Unconscious Thought Theory are in harmony with recent research and theory on unconscious processes if not with the dated, “straw-man” version of the unconscious presented by its critics; (2) the several published “failures to replicate” are actually, on closer inspection, found to be a series of consistent replications of at least the equivalent quality of unconsciously made versus consciously made decisions; (3) the most recent research is showing superiority of unconsciously made decisions in more ecologically valid “real-life” judgmental situations (e.g., fairness assessments and cheater detection) for which natural selection has likely equipped us with unconsciously operating expertise, compared to the artificial situations studied by the decision theorists (which often involve numerical computations); and 4) going forward, all researchers should be open-minded about the potential contributions of both unconscious and conscious processes in complex decision making.

## **THE AUTOMATICITY OF THE HIGHER MENTAL PROCESSES: A BRIEF HISTORY**

Unconscious Thought Theory (UTT; Dijksterhuis & Nordgren, 2006) represents the latest and possibly last extension of automaticity within cognitive science. By *automaticity* I mean the direct environmental control over internal cognitive processes involved in perception, judgment, behavior, and goal pursuits. Of course, prior to the advent of cognitive psychology in the 1960s, experimental psychology as dominated by behaviorism held that all (mainly behavioral) responses to the environment were “automatic” in the sense of not requiring any conscious involvement to

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occur. However, Neisser's (1967) seminal treatise on cognitive psychology placed strict theoretical limits on the extent of automatic or environmental control over human thought and behavior. Only relatively crude processes of figural synthesis and pattern recognition were posited to occur automatically based on incoming informational input; responses (of any kind) back to the environment were placed under strategic, executive control processes. In this way, the dominant assumption of the field of psychology dramatically shifted from nearly absolute environmental control over human thought and behavior to very little direct control (see Bargh & Ferguson, 2000).

However, removing the environment (current stimuli) as the prime causal agent left a causal vacuum, which was filled quickly by the assumption of conscious, strategic (executive) control. Accordingly, beginning in the 1970s, the concept of automatic (i.e., not conscious) processing was first applied to early sensory and perceptual information processing stages such as categorization of inputs (Posner & Snyder, 1975) and attentional selection (Shiffrin & Schneider, 1977). Social psychologists invoked the concept of automaticity to understand social perceptual activity, such as the selective allocation of attention to individual group members based on their relative salience or distinctiveness within the group (Taylor & Fiske, 1978) and the use of a dichotic listening task to show that self-relevant information could still be processed when conscious attention was directed elsewhere (Bargh, 1982).

As automaticity research advanced, ever more complex forms of perceptual processing were found to not require conscious processing to occur. The activation of affective responses to a stimulus (i.e., "category-based affect," Fiske, 1982; see also Zajonc, 1980), and similarly the automatic activation of attitudes associated with environmental objects and events (Fazio, 1986), were shown to be preconscious effects directly caused by mere perception of the relevant environmental stimuli. The coding of social behaviors into trait-concept terms was another important step (e.g., Bargh & Thein, 1985; Winter & Uleman, 1984), which soon led to the discovery that stereotypes of minority groups (conceptualized as schematic organizations of various lower-level trait categories) also became activated upon the mere perception of features associated with those groups (e.g., Brewer, 1988; Devine, 1989).

As rich and complex as the forms of automatic processing demonstrated to this point (ca. 1990), overall these findings remained consistent with Neisser's (1967) original formulation. Demonstrations of direct effects of the current environment were limited to the initial preconscious analysis of that environment (including categorization of inputs into trait or stereotypic concepts), with responses to the environment, in the form of judgments and behavior, still under strategic or executive control. For example, while Devine (1989) provided evidence of the automatic activation of stereotypes during social perception, she also distinguished the activation from the *application* of the stereotype in impression formation and social judgment—the latter, but not the former stage was shown to be under strategic control of the individual. Earlier research on the importance of processing *goals* (Hamilton, Katz, & Leirer, 1980) had shown information processing consequences for the identical set of behavioral information were quite different as a function of the task instructions given to participants: those told to form an impression of the target person based on the behaviors formed more coherent and organized memory structures for it, and (as a consequence) actually remembered the behaviors

better than those told to memorize them (see also Anderson & Pichert, 1978; Srull & Wyer, 1986). Other “automatic” effects on social judgment, as in attributions of the causes of a target person’s behaviors, did not occur without the assigned task goal of forming an impression of the person (e.g., Gilbert & Hixon, 1991), leading to the concept of *goal-dependent automaticity* (as in other acquired skills such as driving and typing, for which the goal of driving or typing is necessary for the automated components of the skill to operate). Together, these studies showed that the particular goal held by the individual determined both how information was processed as well as what response was made to it, so that these responses were not under the exclusive control of the environmental information.

As far as direct environmental control over thought and behavior were concerned, it appeared that a limit or asymptote had been reached. Direct effects not requiring conscious or executive involvement were limited to the initial perceptual analysis of the environment (as rich as this analysis was proving to be), with the products of this analysis serving as the starting points for subsequent executive and strategic processes. (This is not to say that all initial perceptual analysis was automatic in nature, as the active goal could have selective and transformational influences on initial perceptual activity.) But there remained one yet-untested possibility for direct environmental effects to extend beyond perceptual analysis to the higher mental processes of judgment, behavior, and goal pursuit: if executive or goal pursuits themselves could be triggered automatically by features of the environment. If this were possible, then the reach of environmental effects would be greatly extended. The mere perception of features of the environment could directly cause judgments to be made, behaviors to be enacted, and goals to be pursued, all without any conscious involvement.

Bargh and Gollwitzer (1994) set out to examine the possibility that goal pursuits (executive processes) themselves could be put into motion directly and automatically by relevant environmental stimuli. One way in which this could be possible would be if goal pursuits were represented mentally in the same way as are other concepts known to be “prime-able” (e.g., stereotypes); that is, capable of passive automatic activation by available features of the current situation (Bargh, 1990). And so we attempted to prime the higher mental processes of goal pursuit and social behavior using the same priming methods (e.g., scrambled sentence test; Srull & Wyer, 1979) as had been used successfully to prime trait concepts and stereotypes in the social perception research. The only real difference was that our dependent measures focused on the behavior of the participant, instead of his or her impressions of a target person.

This behavior priming research showed that priming a trait concept or stereotype not only influences social judgments, it also directly activates behavioral tendencies to act in line with the primed content (e.g., Bargh, Chen, & Burrows, 1996; Dijksterhuis & Van Knippenberg, 1998). Participants primed with rudeness were significantly more likely to interrupt a conversation compared to those primed with politeness; those primed with a stereotype containing the trait of hostility subsequently displayed greater hostility themselves. But while these studies were successful in demonstrating that social behavior could be instigated directly by environmental stimuli—a breakthrough in its own right regarding the guiding question of the extent of environmental control over the higher mental processes—they did not show conclusively that any goals or motives were involved in producing the behaviors. There were other demonstrations of behavior priming based on imi-

tation or mimicry of the physical behavior of others in situations in which there was no motivation to do so (Chartrand & Bargh, 1999), and direct perception-to-behavior effects were being demonstrated in primates based on the discovery of the mirror-neuron system (Rizzolatti & Arbib, 1998).

In order to demonstrate that goals themselves could be directly activated by environmental features, we (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001) primed some of the standard motivations studied in classic conscious goal pursuit research, such as *achievement*, *cooperation*, and *impression formation*, instead of trait terms. We also tested for the presence of the phenomenal qualities of conscious goal pursuit activity as first outlined by Lewin (1935) and later by Bandura (1977)—persistence toward the goal in the face of obstacles, resumption of interrupted goal pursuits, and self-evaluation following the pursuit attempt. Our research was successful on both counts: not only did the goal-priming produce the same behavioral and judgmental outcomes as did explicit, conscious instructions to pursue the given goal, the automatically operating goal manifested the same phenomenal qualities as previously obtained in conscious motivation research. Participants primed with the achievement goal outperformed the control group on the assigned task but in addition, unlike the control groups in each case, they: (1) overcame obstacles to high task performance, (2) resumed an interrupted task (Bargh et al., 2001), and (3) spontaneously self-evaluated following the pursuit attempt (producing elevated mood after success and depressed mood after failure, with concomitant changes in subsequent goal strength; Bongers, Dijksterhuis, & Spears, 2009; Chartrand & Bargh, 2002).

Subsequent research has confirmed the existence of unconscious motivational processes and their high degree of similarity to conscious operation of the same goal, and has advanced our knowledge as to how unconscious goal pursuit operates (see Dijksterhuis & Aarts, 2010, for a review). In several studies, Aarts, Custers, and their colleagues (Aarts, Custers, & Marien, 2008; Custers & Aarts, 2010) have shown that subliminal evaluative conditioning, as through associating positive (versus negative) affective stimuli with the goal representation under study, moderates goal strength (the tendency to pursue one goal instead of another) in an entirely unconscious fashion. Pessiglione et al. (2007) conducted a functional magnetic resonance imaging (fMRI) investigation to show that response incentives (monetary rewards) had the same effect on response strength when presented subliminally as when presented supraliminally; moreover, the same brain region was reactive to the incentive information regardless of whether the individual was consciously aware of it or not. And McCulloch, Ferguson, Kawada, and Bargh (2007) primed the impression formation goal in a series of experiments to show that not only did it produce the same impressions as in a conscious impression formation condition (see Chartrand & Bargh, 1996), it did so through the same information processing stages (e.g., encoding of behaviors into trait concepts, greater attention to impression-inconsistent information) as documented in much of the prior research on conscious impression formation—further evidence that conscious and unconscious goal pursuit make use of the same underlying motivational system.

By the start of the twenty-first century then, the operation of unconscious processes had been demonstrated in a variety of human higher mental processes, from social judgment to social behavior to complex goal pursuits extended over time. Dijksterhuis and Nordgren (2006) took the further step to extend the domain of unconscious influences to what might be considered the last bastion of

conscious processing, that of judgment and decision making (JDM). Historically, as Lassiter, Lindberg, Gonzalez-Vallejo, Bellezza, and Phillips (2009, p. 601) noted, this research domain has followed in the Cartesian tradition that reasoning and judgment are an exclusively conscious activity, though conscious short-cuts such as heuristics might be used under time pressure. Hence, unlike most other research areas in psychological science, the concept of unconscious processes had made little headway in the JDM research domain prior to the emergence of UTT.

It is not surprising, therefore, that many JDM researchers have openly resisted the idea that unconscious thought processes might operate in judgment and decision making, and have raised many objections to UTT since its publication. These criticisms have been based on theoretical (i.e., on the power and capabilities of unconscious thought), methodological, as well as empirical (i.e., "failure" to replicate) grounds. The validity of these criticisms will be examined following a brief outline of the UTT paradigm and the conclusions (and advice) drawn from it.

## THE UNCONSCIOUS THOUGHT THEORY PARADIGM

The basic structure of a UTT experiment is to first present participants with a judgment task in which they are to choose the best option from among alternatives varying on several relevant dimensions. For example, in choosing which new car to buy, relevant dimensions might be gas mileage, reliability, safety, resale value, and so on, with the various options strong on some features and weaker on others. Importantly, the judgment-relevant information is given to participants explicitly (consciously) and the goal to choose the best alternative is also given consciously. These are not studies on unconscious goal pursuit per se, therefore, but on the possible role of subsequent unconscious thought in producing the best judgment. The options are experimentally created such that there is an objectively best (and worst) one.

The critical manipulation comes after the information acquisition stage. In the baseline condition participants are asked for an immediate judgment. The conscious thought condition provides participants with a period of time to consider the alternatives and choose the best one. The unconscious thought condition gives participants the same amount of time but distracts conscious attention with a secondary task (solving anagrams or an *n*-back task), following which they provide their choice. This is known as the "deliberation-without-attention" condition (Dijksterhuis, Bos, Nordgren, & Van Baaren, 2006). The standard dependent variable in UTT studies is the quality of the decision as measured by the difference in the participant's desirability ratings of the objectively best versus the worst alternatives.

Dijksterhuis and colleagues varied whether the judgment task was simple or complex (i.e., multiple relevant features to consider; alternatives varying on each of these features). Unconscious thought was posited to be better for complex judgments, and conscious thought to be better for simple choices. According to UTT (Dijksterhuis & Nordgren, 2006), unconscious processing should be superior to conscious processing in the case of complex decisions for several reasons: (1) unconscious processing has far greater processing capacity (parallel instead of serial processing), (2) conscious processing is constrained by an attentional bottleneck (e.g., Miller, 1956), (3) unconscious processing produces more accurate and reliable

weighting of features because conscious weighting is moved around by temporary contextual influences such as the relative accessibility of some features over others, and (4) the limited focus of conscious thought causes it to weight dimensions currently under the attentional spotlight more than other dimensions (another temporary accessibility effect), producing polarization effects (Wilson & Schooler, 1991).

Across several studies, Dijksterhuis and colleagues consistently found that the unconscious thought condition produced the best choices for complex decisions, superior to the conscious deliberation and the immediate judgment conditions. Conscious thought was found to be better for simple choices. Based on these findings, they offered prescriptive advice to the effect that when making a complex decision, the best strategy would be to consciously encode all of the relevant information and then let the unconscious do the deliberative work.

## CRITICISMS OF UNCONSCIOUS THOUGHT THEORY

### THEORETICAL OBJECTIONS

*Unconscious Processes Do Not Exist, and Even If They Did, They Are Too Stupid to Produce Good Decisions.* Some of the objections to UTT are objections to the existence of unconscious processes themselves, such as in Waroquier, Marchiori, Klein, and Cleeremans' (2009) use of scare quotes to refer to them: "we found no support for the superiority of 'unconscious thought' in complex decision-making" (p. 609). In their analysis of the UTT paradigm, they argue that only conscious thought processes are operating, with the unconscious thought condition (distraction of conscious attention) merely restraining conscious thought, not enabling "unconscious thought" (p. 603). Indeed, they argue that this is true of all such studies involving distraction or cognitive load, as in the considerable research on dual process models of social cognition (Chaiken & Trope, 1999). Waroquier et al. claim that the processes that operate under distraction or load are not unconscious processes, but short-cut conscious processes such as heuristic rules and other shortcuts. Other critics of UTT (e.g., Payne, Samper, Bettman, & Luce, 2008) have similarly argued that the UTT paradigm produces poor performance of conscious thought rather than superior unconscious thought, consistent with their overarching position that only conscious forms of thought are involved in judgment and decision making.

Gonzalez-Vallejo, Lassiter, Bellezza, and Lindberg (2008) claimed to have "critically examined the six [UTT] principles ... in light of the extant scholarship on unconscious processes, memory, attention, and social cognition," and concluded that "the portrait of the unconscious that has emerged is one that is quite limited in terms of the complexity of cognitive tasks it is capable of performing (cf. Greenwald, 1992)" (p. 282). However, their review of "extant scholarship" is highly dated, citing theoretical statements from the 1970s, 1980s, and no later than 1992, when the highly relevant social cognition research on unconscious motivation commenced.<sup>1</sup> Their review does not even mention unconscious goal pursuit, which is the main

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1. In stark contrast to Gonzalez-Vallejo et al.'s (2008) outdated take on unconscious processes are Dijksterhuis and colleagues' own comprehensive and up-to-date reviews, such as in the 2010 *Handbook of Social Psychology* and *Annual Review of Psychology* chapters, making their criticism of UTT scholarship somewhat ironic.

mechanism underlying UTT effects (Bos, Dijksterhuis, & Van Baaren, 2008; Strick, Dijksterhuis, & Van Baaren, 2010; see also Dijksterhuis & Aarts, 2010).

As a rhetorical device, much is made by Gonzalez-Vallejo et al. (2008) of social psychologist Daryl Bem's (1972) statements concerning unconscious processes; for example, that invoking unconscious processes is "the next retreat into invisibility" and could lead to an "epistemological abyss." However, given the very little that was known in 1972 as to the role of unconscious influences in cognitive psychology, it is hard to understand the emphasis placed on these remarks of Bem. They are reminiscent of William James' (1890) famous statement that the unconscious is a "tumbling ground for whimsies" (a position quickly overturned by James' own student, Joseph Jastrow [1906], in his treatise on the subconscious).

Such statements by James and Bem were reactions to the lack of objective methods to study unconscious influences at the time of their writings. They were right to caution against positing unconscious forces when there was no accountability in doing so (i.e., the existence of reliable methods to verify such claims). But one must be very careful when citing with approval theoretical statements from 40 or 120 years ago, because it is a historical fallacy to equate the current absence of methods to study a phenomenon with the absence of the phenomenon itself. Proponents of the role of conscious thought in decision making would do well to remember that John Watson, B. F. Skinner, and the behaviorists argued similarly, in the (then) current absence of reliable methods to study conscious thought (introspection being the demonstrably unreliable method at the time), that conscious thought itself did not exist, or if it did, it was epiphenomenal (see Bargh & Ferguson, 2000).

Certainly, methods were eventually developed to reliably and objectively track internal cognitive processes, undermining and soon overthrowing behaviorism as the dominant paradigm in experimental psychology (see Neisser, 1967). Similarly, since the time of Bem's writing, considerable progress in methodology has greatly expanded our knowledge of unconscious influences, especially as they impact the higher mental processes (Bargh & Ferguson, 2000; see also reviews in Bargh, 2007).

The fallback theoretical position here is that even if unconscious processes do operate in judgment and decision making, they are hardly sophisticated enough to produce decisions, let alone decisions superior to those produced by conscious thought. On this point Gonzalez-Vallejo et al. (2008, p. 282) as well as Lassiter et al. (2009, p. 674) cite Greenwald (1992) in order to argue that the consensus view on the unconscious is that it cannot handle the complexity of processing needed for superior unconscious effects. Two points to make here: first, as above, whatever the consensus view was in 1992 regarding unconscious processing capabilities, it is irrelevant to the facts of the matter. For example, in 1950 we could have cited the consensus view in experimental psychology that consciousness was an epiphenomenon—but would that make the claim correct?

Second and more importantly, the Greenwald paper cited by these authors appeared in a 1992 special issue of the *American Psychologist* in which cognitive psychologists at that time concluded that the unconscious was actually quite "dumb" (see Loftus & Klinger, 1992). But this conclusion was based on the (still operative) definition of the *unconscious* in cognitive psychology as what happens when subliminal-strength stimuli are presented (see Bargh & Morsella, 2008). This equating of unconscious processes with the processing of subliminal strength stimuli suffers from a major logical problem: it conflates the strength of a stimulus with the

supposed mental system that is processing it. Subliminal strength stimuli are by necessity weak (otherwise they would be supraliminal and available to conscious awareness), and since the advent of psychophysics 150 years ago we have known that weak stimuli produce weaker effects on responses than do strong stimuli.

By extrapolation, supraliminal (conscious, by this unfortunate operational definition) strength stimuli provoke “smarter” processing than do subliminal (unconscious) strength stimuli, but I hope it is clear that this has nothing to do with the relative sophistication of unconscious versus conscious processing. As outlined elsewhere (Bargh & Morsella, 2008), the traditional definition of the *unconscious*, as used by both Darwin and Freud, was in terms of unintentional processes, not whether the triggering stimuli are subliminal or not. Indeed, from an evolutionary perspective the subliminal definition makes no sense at all, because unconscious processes existed before the advent of consciousness (Deacon, 1997; Dennett, 1991; Donald, 1991), and evolved in a physical world of supraliminal not subliminal stimuli.

The evolving mind was built incrementally, with small but adaptively important changes to existing systems and circuits (Allman, 2000; Dennett, 1991), and making use of existing “good tricks” if at all possible (see Anderson, 2010, for a review of the accumulating evidence of this neural re-use). Certainly purposive, goal pursuit systems existed in human evolutionary history prior to the advent of conscious modes of thought, as purposive goal-driven behavior characterizes all organisms (Mayr, 1976); even single cell paramecia have approach and withdrawal reactions to stimuli. Thus, conscious modes of goal pursuit made use of existing unconscious modes. The observed high similarity among the outcomes and processing stages, as well as the phenomenal qualities of conscious versus unconscious goal pursuit (Bargh, Gollwitzer, & Oettingen, 2010; Dijksterhuis & Aarts, 2010), is consistent with this argument.

It is thus models of judgment and decision making that posit exclusively conscious processes that are out of step, not only with the emerging research on unconscious influences, including unconscious goal pursuit, but with the findings and principles of evolutionary biology. As Lassiter et al. (2009, p. 601) noted, UTT “flies in the face of the Cartesian tradition that would have people ponder and think the problem through with great care.” It certainly does. Descartes, one would do well to remember, believed in a *created* conscious mind, not an *evolved* one; prior to Darwin it was believed that the way things were today were the way they always were from the dawn of time. To Descartes (and for those who continue to follow his tradition), the human mind was created as (exclusively) conscious in the first place, and did not spring from originally unconscious sources.

*All Goal Pursuits Are Conscious.* Another criticism made of UTT is that all judgments in the UTT paradigm are made on-line during information acquisition (see Hastie & Park, 1986), before the distraction or conscious thought period takes place. Under this criticism, there is no “unconscious processing” during the distraction task; rather, participants after finishing the distraction (deliberation-without-attention) task are said to merely retrieve the judgment they had already made on-line while they were being exposed to the relevant information (Gonzalez-Vallejo et al., 2008; Lassiter et al., 2009; Lerouge, 2009).

The evidence offered in support of this criticism comes from study designs that implicitly or explicitly assume that all goal pursuits are conscious. In these studies



a different goal (e.g., memorization) is given to the participants in the unconscious thought (distraction) condition, and because the judgment outcomes are different from the “choose the best option” unconscious thought condition, the researchers conclude that conscious thought must be guiding processing instead. In other words, if processing in the unconscious thought condition varies by goals, then this must be due to conscious and not unconscious processing, because goal pursuit can only be conscious.

This objection clearly depends on the rejection (or ignorance) of the notion of unconscious goal pursuit. According to Waroquier et al. (2009, p. 602), “contrary to previous work ... unconscious thought is described as a complex, time consuming, and goal-dependent mechanism.” Similarly, Gonzalez-Vallejo et al. (2008, p. 293) refer to the “myths of the unconscious regarding creative incubation” because all other alternatives (i.e., active and conscious work during the distraction task) “cannot be ruled out” (p. 291). Incubation effects (Ghiselin, 1952; Yaniv & Meyer, 1987) refer to the common experience highly related to the basic UTT paradigm in which one initially tries to solve a problem consciously but cannot, only to have the answer pop into one’s head later on, when one’s conscious mind has moved on to entirely different matters.

These researchers built on a classic finding of Hamilton et al. (1980) that behavioral information about a target person is processed differently if participants are first given an impression formation versus a memorization goal for the information (see Gonzalez-Vallejo et al., 2008, p. 288). Lassiter et al. (2009), for example, showed that the UTT effect in the “form impression of cars” study (Dijksterhuis et al., 2006) is reversed if, instead of being told to form impression, participants are told to memorize the information instead. They argued that this showed the Dijksterhuis and Van Olden effect is not due to unconscious thought but to an on-line judgment formed before the distraction period took place.

However, what such findings actually show is that UTT effects on judgments are due to unconscious goal pursuit. Not mentioned in these articles is one of the first studies on unconscious goal pursuit, by Chartrand and Bargh (1996), which successfully replicated the Hamilton et al. (1980) findings, but with goal-priming instead of explicit instructions. All participants in the Chartrand-Bargh (1996) study were given the same explicit (conscious) instruction (read the behaviors as they are presented, as the experimenter will ask you questions about them later). But in one condition some participants were primed with the goal of impression formation (using the standard scrambled sentence test manipulation) while other participants were primed with the goal of memorization. The priming manipulations produced the same pattern of results as in the original Hamilton et al. (1980) study—superior memory for the behaviors in the impression-formation condition, and also more organized memory structures (organized in terms of the four categories of behaviors presented: athletic, intelligent, sociable, and religious), compared to the memorization condition.

Therefore, changing the processing goal in the unconscious thought condition of the UTT paradigm says nothing about whether the judgment was made on-line during information acquisition or not; it just puts a different unconscious goal in operation. It is not surprising then that the judgmental outcomes in these studies are better in the impression-formation condition than in the memorization condition (i.e., they are replicating Chartrand & Bargh’s findings).

It is relevant that in a further study, Chartrand and Bargh (1996, Study 2) showed that the unconsciously operating impression formation goal produced a greater separation or distinction in evaluations of a mainly honest versus mainly dishonest person than did the unconscious memorization goal condition. The evaluative separation of alternatives is the same dependent measure used in the basic “deliberation without attention” paradigm (Dijksterhuis & Nordgren, 2006; Bos et al., 2008) to demonstrate the superior quality of unconscious thought in decision making.

In recent theoretical and empirical papers, Dijksterhuis and colleagues have explicitly endorsed unconscious goal pursuit as the mechanism underlying UTT effects. Dijksterhuis and Aarts (2010, p. 475; see also Bargh, 2005, 2006) address the question of how goal-directed attention to, and transformation of, relevant information can occur outside of conscious awareness. They review neurophysiological evidence that goals can be subliminally primed (Lau & Passingham, 2007); that goal strength can be subliminally primed (Pessiglione et al., 2007; see above) and that implicit learning, evaluative conditioning, and unconscious thought are all goal-dependent processes, requiring some attention, but do not need conscious guidance.

As a final blow to the argument that the on-line/off-line judgment distinction explains UTT effects, Strick et al. (2010) demonstrated that judgments made on-line predicted off-line judgments only in the immediate decision condition (which explicitly asked for an on-line judgment), not in the delayed conscious deliberation and unconscious deliberation conditions (which did not). This shows that the judgments given after the unconscious thought period were not the same as those made on-line and so were not merely a retrieval of earlier made judgments.

“*Incubation Is a Myth.*” Gonzalez-Vallejo et al. (2008) argued that “recent” research [they cite a single 1979 paper in this regard] shows that unconscious incubation effects are a myth, contra the numerous scientists and authors who have described intense personal incubation-like experiences. A common theme in these experiences is that a long sought-after solution to an intellectual problem suddenly appears in consciousness—“out of the blue”—such as for Einstein while shaving, or in a dream, such as Kekule’s fiery ring of snakes eating each other which gave him the molecular structure of benzene (Ghiselin, 1952).

Norman Mailer, one of our more famous contemporary authors, gives a compelling account of the role of unconscious goal pursuit or incubation in his book, *The Spooky Art* (2003):

Over the years, I’ve found one rule. It is the only one I give on those occasions when I talk about writing. It’s a simple rule. If you tell yourself you are going to be at your desk tomorrow, you are by that declaration asking your unconscious to prepare the material. You are, in effect, contracting to pick up such valuables at a given time. Count on me, you are saying to a few forces below: I will be there to write.... On the other hand, you can sometimes say to yourself, “I’m not going to work tomorrow,” and the unconscious may even by now be close enough in accord not to flood your mind with brilliant and all-too-perishable material. That is also important. Because in the course of going out and having the lively day and night you’re entitled to, you don’t want to keep having ideas about the book you’re on (pp. 142–143).

## EMPIRICAL OBJECTIONS

Judgment and decision-making researchers have reported several failures to replicate the basic UTT effects (Acker, 2008; Calvillo & Penaloza, 2009; Newell, Wong, Cheung, & Rakow, 2009; Payne et al., 2008; Thorsteinson & Withrow, 2009; Waroquier et al., 2009). While some of these studies were straight replication attempts, most made methodological changes in order to rule out what the researchers considered to be artifacts or other methods-related reasons for the superiority of unconscious over conscious thought as found in the UTT studies. But in nearly every study reported, the "failure to replicate" referred to the superiority of the unconscious over the conscious thought conditions, not to any findings of the superiority of conscious over unconscious thought. Across all of these reported studies, and across all of the modifications made to the basic UTT paradigm, the consistent finding was *equivalence* of judgment quality between the conscious and unconscious conditions. In other words, even for those researchers who (see above) disputed on theoretical grounds the very existence of unconscious thought processes, nearly every study conducted in response found that deliberating without conscious attention produced judgments that were *just as good* as those made with conscious deliberation.

Several of these replication attempts made what the authors considered important methodological or procedural changes to the basic UTT paradigm under the presumption that these changes would eliminate the superiority of unconscious deliberation. Payne et al. (2008), for example, argued that the unconscious cannot handle magnitude information very well (e.g., \$3 vs. \$14 cost of a choice option), and so added this information to the featural descriptions of the alternatives. They also did not attempt a straight replication of the Dijksterhuis et al. (2006) original paradigm but created their own new decisional situations, and they added a "self-paced conscious thought" condition in which participants in the conscious deliberation condition were given as much time as they wanted to make the decision, unlike the unconscious thought condition in which deliberation time was limited as in the original Dijksterhuis et al. study. Despite these several changes, the unconscious thought (distraction) condition did just as well as the conscious thought condition.

Acker (2008) conducted his own replication, as well as a meta-analysis of all available studies using the UTT paradigm. The meta-analysis found if anything a slight advantage to unconscious over conscious deliberation, with Acker (p. 302) concluding that "the meta-analytic review is not able to distinguish between the 3 alternative ways of decision-making at all."

Calvillo and Penaloza (2009) in their first study used a quite different distracter task than in the original paradigm; participants in the unconscious deliberation condition were given difficult problems to solve from an on-line IQ test. They also included a "dominant alternative" choice option that they argued was a key feature missing from the original UTT studies; this alternative was clearly better than the others on all judgment-relevant dimensions, and the authors argued that unconscious thought would be poor at distinguishing it from the others. Yet still, no difference in judgment quality was found among the immediate judgment, conscious deliberation, and unconscious thought conditions. In their Experiment 2A, they changed the distracter task back to one used in one of the original UTT stud-

ies (anagrams to solve), and again found no difference in judgment quality for the three conditions. Again in their Experiments 2B and 3, mode of thought made no difference to the quality of judgments. Calvillo and Penaloza concluded that “in all experiments people were no better after unconscious thought than after conscious thought” (p. 516).

Newell et al. (2009) first replicated the basic UTT effect using a relatively easy distracter task (solving simple four- to six-letter anagrams), and found no difference in the quality of judgments across the immediate conscious deliberation and unconscious deliberation conditions, though participants who were unconsciously deliberating chose the objectively best apartment more often (70%) than did those in the conscious thought condition (63%). Their Experiment 2 actually gave the conscious thought condition the advantage of a table of information to consult during deliberation that was not made available to the unconscious thought condition, arguing that doing so better approximated “the nature of conscious thinking that decision makers engage in when making a conscious choice” (p. 715). This may be the case but it renders the study irrelevant to a comparison of conscious versus unconscious thought under the same informational conditions. Finally, their third experiment was one of the very few reported that did obtain better quality judgments in the conscious than in the unconscious thought condition (replicating the Dijksterhuis et al., 2006, car study).

Thorsteinson and Withrow (2009) also obtained no significant difference between the conscious and unconscious deliberation conditions in a replication of the Dijksterhuis (2004) apartment choice study, though their pattern of means did replicate those in the original study. Their Experiment 2 replicated the Dijksterhuis et al. (2006) car-choice study and again found no differences in judgment quality between the unconscious and conscious deliberation conditions.

Finally, Waroquier et al. (2009), after criticizing several aspects of the original paradigm as not providing a fair test of conscious versus unconscious deliberation, accordingly made several methodological changes to the paradigm; yet in two of their three studies, decision quality did not differ among the immediate, conscious, and unconscious conditions.

There are further replication attempts that *did* find superior judgments in the unconscious compared to the conscious deliberation condition, but in quite different judgment domains (guilt in a legal case, moral judgments; see next section) than those studied in the original UTT studies and the replications described above. Overall then one is struck by (1) the *similarity in outcome quality* of unconscious and conscious deliberation in complex decision making, even from researchers with clear antipathy to the basic idea of unconscious deliberation, and (2) by the robustness of this similarity across many procedural and methodological variations argued by these researchers to provide fairer tests of the comparison.

## FUTURE DIRECTIONS FOR U.T.T. RESEARCH

The remarkable similarity in judgment quality between the conscious and the unconscious deliberation conditions across these studies parallels other research findings of high similarity in the outcomes of conscious compared to unconscious goal pursuit. Overall, among the set of studies that did find differences in judgment quality, across all available published experiments, more found in favor of

unconscious than conscious deliberation—though with all of the variations in methods and procedures, and the relatively nascent state of UTT research, what this mainly suggests is that further research is needed in order to better specify the precise conditions that favor one form over the other.

In this future research, greater care should be taken with the choice of the distracter task in the unconscious deliberation condition. Across the many replication attempts there was considerable variation in the type of distracter task employed, from simple anagrams (which are unlikely to fully distract conscious attention from the judgment task, as acknowledged by Acker, 2008, p. 301) to the more difficult and attention-demanding  $n$ -back task (Jonides et al., 1997), to entirely non-standard attentional load tasks such as answering IQ-test items (as used by Calvillo & Penalosa, 2009; these likely activate other processing goals in addition to the focal judgment-task goal, such as achievement and self-presentation within the experimental situation).

Yet if the research goal is to provide an accurate assessment of the roles and relative efficacies of unconscious versus conscious deliberation in complex decision making, it is absolutely essential to make the two conditions as pure as possible: the distracter task should fully load conscious attention such that only unconscious processes can operate, and the distracter task should not put into motion other processing goals (such as self-presentation or achievement) that are not operating in the conscious deliberation condition. Indeed, on this point a study varying the  $n$  in the  $n$ -back distracter task would be most welcome; currently only the simplest 2-back task has been used, but the 3-back is more effortful than the 2-back, the 4-back more than the 3-back, and so on (Jonides et al., 1997). It would be interesting and germane to see if decision quality improves in the unconscious thought condition with decreases in available conscious attention through increases in  $n$ .

A second important moderator of whether conscious versus unconscious thought will produce the best decision is likely to be the amount of experience or expertise of the decision maker, as noted at the outset by Dijksterhuis and Nordgren (2006). But note here that expertise, if it is defined only in terms of amount of experience, does not guarantee that the process can operate efficiently and accurately without conscious attention. As concluded by Kahneman and Klein (2009), who started from opposite positions regarding the utility of intuition in executive decision making, expertise produces reliable intuitions only when there are stable relationships between environmental cues and subsequent events. They note further that not all experts operate in such stable environments—physicians and firefighters do, but financial analysts and political commentators do not. [Their conclusion is in harmony with the original research on the development of automaticity by Shiffrin and Schneider (1977), who found that thousands of trials of experience still did not produce automatic responses if there was not a reliable predictive relation between the stimulus set and the required response (i.e., their “varied mapping” conditions).] Thus, any future consideration of the moderating role of expertise must contemplate the predictive nature of the expert’s decision-relevant environment.

Related to the issue of the role of expertise is whether unconscious influences on decision making are limited to well-practiced judgmental domains. Dijksterhuis and Nordgren (2006) based UTT on the skill acquisition model of (acquired) unconscious processes, commonplace in models of motor skills and attention allocation (e.g., Shiffrin & Schneider, 1977), and were the first to apply it to *decision-ma-*

*king* skills. This leads to the question of whether extensive (conscious) experience in a domain is necessary for the development of unconscious decision-making capabilities; in other words, is habit formation or skill acquisition the only way that unconscious processes come into existence?

The answer emerging from recent research is *no*—there are now demonstrations of automatic judgmental processes in adults operating on entirely novel stimuli with which the person has no prior experience (Duckworth, Bargh, Garcia, & Chaiken, 2002); and also in young children who have not yet had the chance to acquire sufficient experience to have automated the process (Dunham, Baron, & Banaji, 2008). This research suggests that there are innate, evolved evaluative and judgmental procedures as well as goal pursuits (see Neuberg, Kenrick, Maner, & Schaller, 2004) that do not require extensive experience to develop and that begin to operate in infancy or early childhood. That innate evaluative mechanisms (Duckworth et al., 2002) might play a role in UTT effects was suggested by Queen and Hess (2010, p. 260), who hypothesized that unconscious deliberation will be better than conscious deliberation when automatic evaluative processes can operate to furnish an evaluative summary of all information presented.

Thus, another important moderator of when conscious versus unconscious thought produces the better decisions is likely to be the particular domain of judgment under study. A potentially fruitful new direction for UTT research would be to compare conscious and unconscious thought across judgment domains. Some domains were likely more critical to survival and adaptive fitness than others and so there might be greater innate expertise in those domains (our expertise being shaped by the forces of natural selection) than in others. Taking evolutionary considerations into account leads to the question: What are the ecological conditions, over evolutionary history, under which unconscious decision processes actually operated?

Ham and Van den Bos (2009, 2010a, 2010b) have shown in a series of studies that unconscious deliberation always produced better judgments than did conscious deliberation in three judgment domains not studied in the previous UTT research reviewed above: (1) –guilt judgments—participants were given a complex legal case and asked for judgments as to who was guilty (Ham & Van den Bos, 2010a); (2) utilitarian moral judgments—participants in the unconscious deliberation condition made more utilitarian moral judgments (approving harmful actions that produce the best consequences) than did the conscious condition (which was more prone to the emotional reactions provoked by the dilemma; see Greene, Somerville, Nystrom, Darley, & Cohen, 2001) in the standard trolley/footbridge paradigm (Ham & Van den Bos, 2010b); and (3) better fairness judgments—concerning complex job application procedures in the unconscious than in the conscious deliberation conditions (Ham & Van den Bos, 2009).

The most interesting thing about these demonstrations of the superiority of unconscious over conscious deliberation in new judgment domains is that they correspond to those particular social domains for which evolutionary theorists have hypothesized we possess innate processing mechanisms, such as cheater detection in social exchange settings (Cosmides & Tooby, 1992; Tooby & Cosmides, 1992) and the intuitive-prosecutor mindset (Tetlock, 2002). Moreover, recent developmental research (Olson & Shaw, *in press*) has shown even five-year-old children are quite sensitive and reactive to fairness information in social exchange scenarios. Thus, another probable moderator of when unconscious deliberation will produce su-

perior quality decisions than conscious deliberation will be whether the judgment domain was critical to survival and adaptation in our evolutionary past.

## CONCLUSION

The most important contribution of UTT theory to the judgment and decision-making domain is the core postulate that people think unconsciously as well as consciously. Even the research performed in defensive reaction to the introduction of this postulate, as reviewed above, has ended up supporting it: overall this research has shown little if any difference in quality between decisions made under the usual conscious deliberation conditions and those made unconsciously, when conscious attention is diverted elsewhere during the deliberation period. Various objections to the original paradigm have been raised and alterations to the paradigm made in order to rule out these objections, and yet still unconscious and conscious deliberations are found to produce highly similar judgmental outcomes.

The research has moved beyond the original, main-effect type of question as to whether conscious or unconscious thought always produces the better outcome. The second-generation of research is now well underway, with several important moderators of which type of thought is best for the circumstances being raised and discussed. What stands out to me is the robustness of the similarity in judgment outcomes produced by conscious deliberation on the one hand, and unconscious deliberation on the other hand, when conscious attention is diverted by a secondary task. This observed similarity is in harmony with research on human goal pursuit which also finds high similarity in the outcomes (as well as subprocesses and phenomenal qualities) of conscious versus unconscious goal pursuit, and is further evidence in support of current conceptualizations of unconscious decision making processes in terms of unconscious goal pursuit (Dijksterhuis & Aarts, 2010).

It is unfortunate but understandable that there remains such resistance to even the idea of unconscious processes operating in judgment and decision making among traditional JDM researchers, but from personal experience I can vouch that this was true of each and every previous research domain where the concept of automatic or unconscious processes was introduced. Especially when a broader evolutionary perspective is taken, the notion of unconscious influences is unproblematic, and not nearly as controversial as it was 20 or 30 years ago. The findings by UTT and other researchers of superior decisions made unconsciously rather than consciously, at least in some judgmental domains, are less surprising when it is remembered that unconscious systems producing adaptive behavioral responses to the environment (i.e., behavioral decisions) existed long before the relatively recent advent of conscious modes of thought. Thus, newer (i.e., conscious) mental processes built on or made use of preexisting (i.e., unconscious) processes, instead of emerging *de novo* as isolated and independent processes. There are domains in which conscious processes produce better decisions than unconscious processes, and those in which unconscious processes produce better decisions than conscious processes; it is not a matter of one processing mode being “dumb” and the other one superior in every way. Above all, nearly all higher mental processing is complex enough to be a combination and interaction of conscious and unconscious processes (Dijksterhuis & Aarts, 2010; Shiffrin, 1988), not one or the other in isolation, and so JDM researchers and theorists need to be intellectually open to both.

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