

## Unconscious Processes

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**Abstract**

Unconscious processes manifest themselves in two quite different ways. First, some processes are unconscious in the strict sense that they are executed automatically, in response to certain stimulus conditions. At least in principle automatic processes are unavailable to conscious introspection and are independent of conscious control. Second, some mental contents—percepts, memories, and the like—are unconscious in the sense that they are inaccessible to phenomenal awareness but nonetheless affect the person's ongoing experience, thought, and action. Solid evidence for this aspect of unconscious mental life is provided by dissociations between explicit (conscious) and implicit (unconscious) memory and perception. There is also mounting evidence for implicit learning and implicit thought, dissociated from their conscious counterparts, as well as explicit-implicit dissociations in the domains of emotion and motivation. The explicit-implicit distinction provides a vehicle for identifying some of the neural correlates of consciousness.

**Key Words:** automaticity, attentional blindness, implicit emotion, implicit learning, implicit memory, implicit motivation, implicit perception, implicit thought, inattentional blindness, priming

The unconscious mind was ostensibly discovered by Freud—though as Ellenberger (1970) makes clear, the idea had been expressed much earlier by Leibniz, Kant, and Helmholtz, among many others. After the dark age of functional behaviorism, the cognitive revolution in psychology promoted a resurgence of interest in both conscious and unconscious mental life (Kihlstrom, 1987, 1994). The new view of the unconscious, however, owes little to Freud.

**Consciousness, the Unconscious, and the Mental**

Let me first make the terms of the discussion clear: We are talking about unconscious *mental* life. There are many physical and biological processes that, in some sense, proceed unconsciously: the expansion of the universe, the orbiting of planets around the sun, evolution by natural selection, photosynthesis,

and the machinations of DNA. The biochemistry of brain activity, which in humans at least gives rise to consciousness, itself goes on unconsciously. Considerations such as this led some Romantic philosophers, such as Edward von Hartmann, to declare that the unconscious pervades the universe. But as Searle (1992) has argued, the term *unconscious* only makes sense when applied to mental activity, as a contrast to *consciousness*. There is little point in talking about something being *unconscious* if that same thing cannot also be conscious. This leads us to ask what the hallmark of mental life is.

Here we turn to another philosopher, Franz Brentano, who in fact taught Freud and happily included him in his “school.” Brentano argued (1874/1973) that *intentionality is the mark of the mental*: All mental states are intentional in nature, and only mental states are intentional. Put another way, mental states are representational: They are

always *about* something. We do not think, or feel, or desire in the abstract; rather we think, feel, or desire *something*. The nature of intentional states was further explicated by Bertrand Russell (1912, and elsewhere) in terms of *propositional attitudes*, which state a cognitive relation between a person and some proposition P. These attitudes come in various forms: namely, knowing, feeling, and wanting—Kant’s trilogy of mind (Hilgard, 1980)—or, more generically, *believing*. When I presented a version of this article at a conference at the University of Vienna, I *knew* that Vienna is the capital of Austria; I *believed* that it is a beautiful city; I *felt* honored to have been invited to speak there; and I *wanted* to make a good impression. All of these were conscious mental states. All of them were about something. And all of them represented my cognitive attitude toward that event.

Put in the standard language of cognitive psychology, mental representations take the form of percepts, memories, thoughts, images, and the like. In an experiment, subjects *perceive* words that *were* presented on a computer screen; they *remember* words that appeared on a list; they *learn* a new fact about the world; or they *think* about some problem they encounter in their environment. Usually, these representations are accessible to consciousness, in that the subjects are aware of what is on their minds. The question for us is whether these same representations can exist outside the scope of phenomenal awareness and nonetheless influence our ongoing experience, thought, and action.

### Automaticity and Unconscious Processing

It is important to frame the question in this way because in contemporary psychology the most popular construal of unconscious mental life is in terms of *automaticity* (e.g., Hassin, Uleman, & Bargh, 2005; see also Chapter 11, “Automaticity”). According to this view, some mental processes occur outside the scope of conscious awareness and control. These processes are inevitably evoked by the appearance of certain stimuli, are incorrigibly executed once set in motion, consume *little* or no cognitive resources, and do not interfere with conscious mental activities. Automatic processes, as exemplified by the Stroop color-word effect (MacLeod, 1991), are unconscious in the strict sense that they are not available to phenomenal awareness under any circumstances and can be known only by inference. The distinction between automatic and controlled processes is not without its problems (Moors & DeHouwer, 2006), but it has become widely

accepted within psychology, and lately a rather large industry has developed around its application in social psychology (Kihlstrom, 2008).

The notion of unconscious, automatic processing has its roots in Helmholtz’s (1866/1968) idea that unconscious inferences are critical for conscious perception. For Helmholtz, the retinal image was insufficient to support visual perception, requiring the perceiver, in Bruner’s (1973) words, to go “beyond the information given” by the proximal stimulus to make assumptions and inferences about the form, location, and movement of the distal stimulus. We are not consciously aware of making these inferences, but they are simply necessary for conscious perception to occur. Helmholtz’s arguments were, of course, strenuously denied by Gibson’s (1979) idea that we perceive the world directly, without any need for inferences, conscious or *unconscious*.

This article is not the place to settle that debate (see Chapter 7, “Perception and Attention”), and for present purposes let us simply stipulate that Helmholtz was onto something. But the fact that some mental processes can occur unconsciously says nothing about whether the mental representations on which they operate, and which they in turn generate, can be unconscious. Certainly automatic processes can act on what Freud would have called *preconscious* representations, before focal attention (cathexis) is directed to them. But the representations that they generate are generally thought to be consciously accessible. I may not know how unconscious inferences automatically generate the moon illusion (Kaufman & Rock, 1962; Rock & Kaufman, 1962), but I am certainly aware of the moon when I look at it, and I am aware that the moon looks larger on the horizon than it does at zenith. So the question remains: Can we have mental representations—percepts, memories, thoughts, bits of knowledge—which are themselves unconscious, yet influence our experience, thought, and action nonetheless? Can we see the moon without consciously being aware of it?

### The Cognitive Unconscious

Evidence for unconscious mental *contents*, which influence experience, thought, and action outside of phenomenal awareness, comes mostly from the cognitive domain of perception and memory. It is possible that unconscious percepts and memories are subject *to only* unconscious, automatic processing: It seems unlikely that we could engage in conscious, deliberate, controlled processing of mental contents of which we were unaware. But, in principle, it

seems appropriate to discuss unconscious cognitive contents separately from the unconscious processes that might operate on (and generate) them (e.g., Nisbett & Wilson, 1977).

Granted, the process-content distinction is not always easy to make (e.g., White, 1980). It is clear enough in the classical multistage information-processing models of cognition, which distinguished between information-storage structures (which, after all, held informational content), and the control processes, which passed informational content from structure to structure, transforming it along the way (e.g., Atkinson & Shiffrin, 1968). And it is also clear enough in “symbolic” cognitive architectures based on a distinction between procedural and declarative knowledge (Anderson, 1983). But even in “connectionist” architectures (e.g., Rumelhart & McClelland, 1986), “content” can be identified with the layers of a neural network, network, and “process” with the weights of the connections between the nodes that comprise these layers, and which get from the input layer to the output layer. The input layer may or may not be represented in consciousness (think of Leibnitz’s *petites perceptions*), but once a connectionist network settles into a relaxed state, the stable state of the output layer—whether it represents the past tense of a verb or the perspective of a Necker cube—is presumably available to conscious awareness.

The process-content distinction is blurred somewhat by the existence of “intermediate” products of information processing. Connectionist architectures, for example, interpose one or more “hidden” layers between the input and output layers, and the characterization of them as “hidden” might suggest that they are phenomenally unconscious. But that is not the meaning of “unconscious” intended in this chapter. The question to be addressed is whether we can sensibly ask whether the percepts, memories, and thoughts that would be represented by the output layer, normally in consciousness, can be inaccessible to phenomenal awareness yet nonetheless influence the person’s ongoing experience, thought, and action.

### ***Implicit Memory***

The study of implicit memory represents a milestone in our understanding of unconscious mental life. We now know that amnesic patients can show priming effects, in which the presentation of a prime affects processing of a target presented later, even though they cannot consciously remember the prime. Priming effects exemplify what Schacter

(1987) has labeled *implicit memory*—the influence of a past event on subsequent experience, thought, or action, in the absence of conscious recollection of that event (see also Chapter 15, “Implicit Memory”).

An early demonstration of the dissociation between explicit and implicit memory in the amnesic syndrome was supplied by Warrington and Weiskrantz (1970). Their patients showed profound deficits in recalling or recognizing a previously studied list of words but normal levels of priming when completing word fragments or word stems. Graf and his colleagues confirmed spared priming in amnesia with stem completion when compared with an explicit memory task in which the same stems were used as cues for explicit recall (Graf, Squire, & Mandler, 1984). The best comparisons of explicit and implicit memory follow their model, equating explicit and implicit memory for the informational value of the cues supplied in the tests.

A great deal of subsequent research has shown that explicit (conscious) and implicit (unconscious) memory can be dissociated in a wide range of conditions, including the amnesic syndrome associated with damage to the medial temporal lobes or diencephalon, the anterograde and retrograde amnesias associated with electroconvulsive therapy for depression, the anterograde amnesias produced by both general anesthesia administered to surgical patients and conscious sedation in outpatient surgery, dementia, including Alzheimer’s disease, normal aging, posthypnotic amnesia, and the functional amnesias associated with dissociative disorders such as fugue and multiple personality. Explicit and implicit memory can also be dissociated in normal, neurologically intact, nonamnesic subjects under conditions where explicit memory is impaired by shallow encoding or long retention intervals.

Although the dissociation of explicit and implicit memory is well established, controversy persists concerning the nature of implicit memory itself. One very popular view holds that explicit and implicit memory are the product of separate memory systems in the brain. A variant on this view, which goes back at least as far as the work of Ewald Hering (of color vision fame) and Samuel Butler (author of *Erewhon*), holds that there are not multiple memory systems as such, but rather that there are multiple cognitive systems for perception, conceptual processing, and the like, which each have an ability to learn. A competing view assumes that there is only a single memory system, but that explicit and implicit memory are dissociated when one task (typically,

the implicit test) depends on “perceptually driven” processing, and the other (typically the explicit test) depends on “conceptually driven” processing. Another view, also assuming only a single memory system, is that implicit memory requires only the activation or preexisting knowledge stored in memory, while explicit memory requires, in addition, the elaboration and integration of activated knowledge structures. Yet another is that implicit memory is the product of automatic processing, while explicit memory is the product of controlled processing.

A major difficulty preventing resolution of this theoretical debate is that almost all research on implicit memory has involved repetition priming, and very little has involved semantic priming. Repetition priming, almost by definition, can be mediated by a perceptual representation system or by perceptually driven processing. Evidence that explicit memory extends to semantic processing would appear to contradict either approach. But so long as research on implicit memory is dominated by a single paradigm, repetition priming, theorists will not have to contend with this issue. The fact is that implicit memory does extend to semantic processing, and theories need to take this fact into account.

There is more at stake in this debate than understanding the nature of implicit memory: There is also the issue of the scope of unconscious mental life. According to Brentano’s doctrine of intentionality, unconscious mental life—like *conscious* mental life—has to be *about* something. An image-like perception-based representation, produced by perceptually driven processing and perhaps stored in a perceptual representation system, is “about” physical structure—what the stimulus sounds or looks like. It is “about” something, but it is not “about” very much. Repetition priming can tell us a lot about perceptual processing and about how perceptual structure is represented in memory. But an unconscious memory that is limited to perception-based representations of past events is simply not very interesting (one thinks of the Jerry Leiber-Mike Stoller song, “Is That All There Is?”). Ever since Freud (for better or worse), when people have talked about unconscious memory, they have been talking about memory that has *meaning* attached to it. Therefore, the important question for future research on implicit memory is to determine whether unconscious memories can represent—can “be about”—the meaning, significance, and implications of events, as well as their physical structure.

### ***Implicit Perception***

Just as implicit memory refers to the influence of past events that cannot be consciously remembered, so *implicit perception* refers to the influence of events in the current stimulus environment that cannot be consciously perceived (Kihlstrom, Barnhardt, & Tatarzyn, 1992). Explicit and implicit perception are dissociated in so-called subliminal perception, where priming effects occur even though the prime is presented at an intensity, or for a duration, that is below the threshold for conscious perception; or when the prime has been masked by another stimulus. Subliminal perception has been controversial almost since the first report of it in 1884 (Dixon, 1971, 1981). The alternative label of “implicit” perception avoids methodological controversies over the details of threshold-setting procedures and focuses the controversy on whether the stimulus is consciously perceptible (Cheesman & Merikle, 1984; Greenwald, Draine, & Abrams, 1996).

Dissociations between explicit and implicit perception can also be observed in other conditions, including blindsight associated with lesions to the striate cortex (Weiskrantz, 1986), visual neglect resulting from damage to the temporo-parietal area of the brain, prosopagnosia, hypnotic blindness and deafness, and the “hysterical” blindness and deafness observed in cases of conversion disorder (see Chapter 9, “Disorders of Attention”). In these cases, the stimuli in question are in no sense “subliminal,” although they are not represented in conscious awareness. This is also the case in experiments on “preattentive” or “preconscious” processing employing such paradigms as parafoveal vision and dichotic listening, inattention blindness (Mack & Rock, 1998), and various forms of attentional blindness (e.g., repetition blindness, the attentional blink, and change blindness). In these cases, too, the stimulus is in no sense subliminal, which is all the more reason to prefer *implicit perception* as the more appropriate umbrella term.

Subliminal perception effects are sometimes classified as instances of implicit memory, on the ground that the presentation of the prime occurs before the presentation of the target. But in subliminal perception, the stimulus-onset asynchrony is extremely brief, less than a second, with no intervening distraction, so that the prime is presented in what William James called “the specious present.” More important, in implicit memory the subject is aware of the prime when it is presented but subsequently forgets it; in implicit perception the subject ~~was~~ never aware of the prime at all. On

these grounds, priming by stimuli presented during general anesthesia is probably better counted as an instance of implicit perception.

The distinction between repetition and semantic priming, introduced in the discussion of implicit memory, is pertinent to implicit perception as well. The task of perception is not merely to form an internal mental representation of the physical structure of the stimulus—its form, location, and activity. As Bruner argued persuasively, every act of perception is an act of categorization. If so, then perception is not complete until the distal stimulus has been identified and categorized. Accordingly, at least since the work of Marcel (1983a, 1983b), the ultimate test of implicit perception has been semantic priming—evidence that the stimulus has been processed for meaning.

Evidence for semantic priming in implicit perception has sometimes been taken as justification for exaggerated claims for unconscious influence in advertising and psychotherapy (e.g., Packard, 1957) or magazine promotions of “subliminal” self-help tapes. In fact, the same research that indicates that implicit perception extends to semantic processing also indicates that semantic processing outside of awareness is analytically limited. For example, while the single word *doctor* may prime processing of the semantically related word *nurse*, it turns out to be difficult to process the meaning of even a two-word phrase presented outside of conscious awareness (Greenwald, 1992). Sleep learning does not appear to be possible, except to the extent that the subject stays awake (Simon & Emmons, 1955); and information processing during general anesthesia appears to be limited to repetition, but not semantic, priming (Kihlstrom & Cork, 2007). There is no good evidence for the efficacy of “subliminal” self-help tapes—nor, in some cases, any evidence that there is even any message on them, subliminal or otherwise (Moore, 2008).

Of course, statements about the analytic scope of implicit perception may have to take account of the processing demands of the experimental task. It stands to reason that unconscious percepts are ordinarily subject to automatic, but not controlled, processing. It would seem hard to consciously control the processing of a target of which one is not consciously aware. Presumably, many “perceptually driven” analyses of the physical features of a stimulus—enough to support repetition priming—are carried out automatically. The results of Marcel’s experiments, and others like them, suggest that simple “conceptually driven” analyses—enough to

support semantic priming of the “doctor-nurse” type—are also carried out automatically. But more complex semantic analyses, of the sort required to understand phrases and whole sentences, may require conscious, controlled processes that simply cannot be applied to percepts of which the subject is not consciously aware. For that matter, there may well be complex perceptual analyses that also require conscious, controlled processing, and that are necessarily denied to unconscious percepts.

On the other hand, it is important to remember that most automatic processes are not innate but have become automatized through extensive practice—think of Ericsson’s “10,000-hour” principle. It is entirely possible that even very complex semantic (or perceptual) analyses can be automatized if they are highly practiced. In a provocative experiment by Spelke, Hirst, and Neisser (1976), subjects were given extensive practice in taking dictation while simultaneously reading prose. ~~Initially~~, the subjects were able to do this successfully, taking accurate dictation and reading at normal speed with a high degree of comprehension—but they had little or no conscious recollection of the words that they had transcribed. At this stage, presumably, the dictated words were not subject to the kind of elaborate, semantic processing required to remember and categorize words. On later trials, however, they were able to recall the words ~~later~~, and to identify phonological and categorical relations within the dictated lists—even writing the category to which the words belonged as opposed to the words themselves. These investigators interpreted their results as indicating that attention is a skill that, with practice, can be deployed in several directions at once. But they also raise the possibility that the scope of implicit perception can include even extensive semantic processing—provided that the processing task has first been automatized through extensive practice.

### ***Implicit Learning***

Apparently, subjects can also learn unconsciously, in the sense that new knowledge acquired through experience can affect their ongoing behavior, even though the subjects are not aware of what they have learned. So, for example, Reber (1993) has shown that subjects can pick up on the “grammar” by which meaningless strings of letters have been arranged, permitting them to discriminate between grammatical and ungrammatical letter strings, even though they cannot articulate the grammar itself. Similar *implicit learning* effects have been observed in a number of different paradigms,

including categorization, the detection of covariation, sequence learning, and the control of complex systems (see Chapter 39, “Induction”).

Again, implicit learning effects are sometimes classified as instances of implicit memory, but there is a difference. Implicit memory is an unconscious expression of episodic memory: Subjects do not consciously remember some past event. But implicit learning covers semantic and procedural knowledge. Source amnesia, where subjects are aware of what they know but cannot remember where they have learned it, is a better example of implicit memory. By contrast, subjects in implicit learning remember their learning experiences quite well—they just are not consciously aware of what they have learned from them. For example, Reber’s subjects remember studying a list of letter strings but appear unaware of the grammatical rules that they abstracted from that experience. Accordingly, I prefer to reserve that term for unconscious episodic memory—memory for events embedded in a specific spatiotemporal context.

In contrast to implicit memory and implicit perception, implicit learning has not yet been established to the satisfaction of all interested parties (e.g., Shanks & St. John, 1994). Partly this is because, again in contrast to memory and perception, it is not easy to equate the informational value of the cues provided for the explicit and implicit tests. In the case of memory, for example, subjects can be asked to complete the stem *ash*\_\_\_ with an item from the study list (explicit memory), or with the first word that comes to mind (implicit memory). But in the case of artificial-grammar learning, for example, the typical implicit task asks subjects to make a grammaticality judgment, while the typical explicit task requires them to specify the grammar itself, in whole or in part. These instructions entail quite different cues. Moreover, it may be that subjects lack complete awareness of the grammar but have enough that they can make discriminations at levels above chance. These are not easy methodological problems to solve.

There is also a nontrivial question of just what is learned in implicit learning. Returning to the artificial-grammar paradigm, the implication of most theorizing is that subjects unconsciously acquire something like a Markov-process grammar, a piece of procedural knowledge, which guides their grammaticality judgments. An alternative view is that they acquire something like a prototype of a grammatical string—which would be a piece of declarative knowledge. Or, given that the usual cover task in

these experiments is to memorize the letter strings, they may base their grammaticality judgments on comparisons with exemplars remembered from the study phase. The format of the knowledge acquired in implicit learning experiments bears on the critical question of whether the learning is truly implicit. If subjects abstracted a prototype instead of inducing a rule but are subsequently asked to specify the rule, they may appear to be unaware of what they have learned, even though they are completely aware of the prototype—about which they have not been asked.

### *Implicit Thought*

An emerging area of research interest is *implicit thought*—where subjects are influenced by ideas that are not, themselves, properly construed as percepts or memories (Dorfman, Shames, & Kihlstrom, 1996; Kihlstrom, Shames, & Dorfman, 1996). For example, Bowers and his colleagues (Bowers, Regehr, Balthazard, & Parker, 1990) showed that subjects could discriminate between problems that were soluble and those that are not, even though they had not actually arrived at the solutions in question. Along the same lines, Shames (1994) found that the unconscious solution nevertheless primed subjects’ performance on a lexical-decision task. Similar effects have been observed in both neurological patients and intact subjects making risky choices (who may make the correct choice even though they do not consciously feel the anxiety that comes with the appreciation of risk) and also in studies of insight learning. Children who are learning to solve arithmetic problems show signs of shifting to a more efficient cognitive strategy before they are aware of having done so (Siegler, 2000). In each case, the source of the unconscious influence on task performance is neither a percept (i.e., a mental representation of some event in the current stimulus environment) nor a memory (i.e., a representation of some event in the past). Instead, it is something internally generated by the subject, albeit outside of conscious awareness: Call it a thought.

Bowers speculated that such “intimations” are related to the intuition phase of creative problem-solving, as described by Wallas (1921) and others (see Chapter 50, “Creativity”). In this view, the unconscious solution gathers strength during the incubation phase and emerges fully into consciousness as an insight (see Chapter 49, “Insight”). The subject feels that something is just over the horizon—an experience common among artists and mathematicians alike. The “heuristics and biases”

program in research on judgment and decision making (see Chapter 38, “Judgment Under Uncertainty”) has led some theorists to cast doubt on the utility of intuitions such as these (e.g., Metcalfe, 1986). And, more recently, “gut feelings” have been implicated in irrational (or, at least *nonrational*), emotion-based theories of moral reasoning (e.g., Haidt, 2001). But the work of Bowers and others on implicit thought suggests that intuitions can have a purely cognitive basis. While it is certainly possible to construct situations where intuitions can lead us astray (e.g., Jacoby, Kelley, Brown, & Jasechko, 1989), it is also possible that, in the course of everyday living, intuitions can be rational guides to appropriate choice.

### The Emotional and Motivational Unconscious

In addition to this evidence for the cognitive unconscious (Kihlstrom, 1987), there are also hints of unconscious emotion and motivation.

#### *The Conative Unconscious*

David McClelland and his colleagues, for example, claimed that procedures such as the Thematic Apperception Test assessed subjects’ unconscious motives, while personality questionnaires such as Jackson’s Personality Research Form assessed conscious motives (McClelland, Koestner, & Weinberger, 1989). Viewed from this perspective, the frequently lamented lack of substantial correlation between “projective” and “objective” assessments of motive dispositions suggests a dissociation between explicit and implicit motivation (Schultheiss, 2008; Schultheiss & Pang, 2007). In implicit motivation, the subject’s experience, thought, and action are affected by a motive (or goal), in the absence of conscious awareness of that motive.

The very notion of unconscious motivation threatens to send us into Freudian territory (Shevrin, 1992), but most contemporary research on unconscious motivation shies away from the primitive sexual and aggressive instincts of classical psychodynamic theory and focuses on more benign, if not mundane, needs for achievement, power, intimacy, and the like. There is good evidence that explicit and implicit motives are elicited by different kinds of stimuli and predict performance on different types of tasks. Taken with the low correlations between “objective” and “projective” motive measures, such findings support the proposition that explicit and implicit motives are, indeed, dissociable.

The definition of implicit motivation parallels those offered in the domain of implicit cognition

(memory, perception, learning, and thinking), but it has not been easy to clinch the case for unconscious motives. As with implicit learning, there are big differences in how explicit and implicit motives are assessed—big enough, frankly, to raise the question of whether the two types of tests are actually assessing the same motives; or whether the typically low correlation between them indicates that they differ in terms of accessibility to conscious awareness or is simply a reflection of method variance (Campbell & Fiske, 1959). The cases for implicit memory and implicit perception are strengthened by the fact that they are dissociable, even though the same cues are used to test for both conscious and unconscious expressions; the case for implicit learning is weakened by the absence of such closely matched tests. The same problem adheres to implicit motivation.

#### *The Affective Unconscious*

On the affective side of the ledger, Peter Lang cogently argued that, in principle, every emotional state consists of three components: the subjective feeling, the physiological correlate, and the behavioral response (Lang, 1968). If so, then—at least in principle—we can identify explicit emotion with the subjective feeling state, and *implicit emotion* with the behavioral and physiological components. Where physiological or behavioral components of emotion occur in the absence of a feeling state we can rightly speak of a dissociation between explicit and implicit emotion (Kihlstrom, Mulvaney, Tobias, & Tobis, 2000). Some clinical psychologists refer to such a situation as a state of *desynchrony* (e.g., Rachman & Hodgson, 1974); but desynchronies can take multiple forms, and here we are interested only in dissociations between subjective feeling states and overt or covert behavioral manifestations of emotion.

The success in documenting implicit cognition, especially in the domains of perception and memory, makes the idea of implicit emotion plausible—even if, again, we are treading close to Freudian territory. But, as with implicit motivation, not much by way of compelling evidence has accrued so far. In the most interesting study to date, Winkielman and his colleagues found that masked presentation of happy or angry faces affected subjects’ judgments in a consumer-testing situation (Winkielman, Berridge, & Wilbarger, 2005). The effect can be explained as follows: Perception of the emotional faces induced corresponding emotional states in the subjects, and these emotional states in turn affected their judgments. Because the faces were not

consciously perceived, this outcome would count at the very least as an example of implicit perception. But because the subjects did not report any changes in emotional state either, it counts as an example of implicit emotion as well. The subjects' choice behavior was influenced not just by a percept but also an affective state, of which they were unaware.

Lately, Greenwald, Banaji, and their colleagues have introduced the Implicit Association Test, a reaction-time measure intended to reveal prejudices and other attitudes that subjects are not aware of harboring (e.g., Greenwald et al., 2002). As in the case of implicit motivation, the principal evidence that the IAT taps unconscious emotion is the relatively low correlation between attitudes as assessed by the IAT and corresponding attitudes measured by traditional methods, such as a rating scale. The point is controversial, as the IAT is infected by a number of potentially confounding variables (e.g., Arkes & Tetlock, 2004; for a reply, see Banaji, Nosek, & Greenwald, 2004). Moreover, the correlations in question are not, actually, all that low. Nosek (2007) reported a mean correlation of .48 between IAT and explicit "attitude thermometer" measures of the same attitude. However, it should be noted that this value is relatively high by the standards of multimethod personality research (e.g., Mischel, 1968). Even accepting the characterization of IAT correlations as "low," it is not yet clear that the IAT taps attitudes that are truly unconscious, as opposed to providing an unobtrusive measurement (Webb, Campbell, Schwartz, & Sechrest, 1966) of consciously accessible attitudes that the subject merely refuses to disclose to the investigator.

### Reflections and Implications

Although the findings cited here give sufficient reason for taking unconscious mental life seriously, it has to be said that the evidence in each of these domains is not equally strong. Implicit perception and implicit memory have now been established to the satisfaction of all but a few critics (and it is possible that no amount of evidence would convince these naysayers anyway). Implicit learning has been explored in the laboratory for more than 40 years, but still the dissociation between explicit and implicit learning has not been established with the rigor that characterizes research in the domains of perception and memory. Implicit thought is on somewhat softer ground, if only because there have been so few relevant studies. This holds true for implicit motives as well as implicit emotions.

There is also the matter of the comparative power of unconscious processing. Recently, in both the scientific literature and the popular press, authors have touted the power of unconscious learning and thought—that unconscious learning and automatic processing allow us to solve more complex problems, more efficiently, than is possible consciously (Gladwell, 2005; Wilson, 2002). In some sense, these claims revive Romantic notions of the power of *The Unconscious* that were popular in the 19th century (Hartmann, 1868/1931). But it has to be said that these claims are not well founded in scientific evidence—if for no other reason than that there are relatively few methodologically adequate comparisons of conscious and unconscious processing. There is every reason to think that unconscious perception is analytically limited, for example. The existence of schools and universities, and other cultural institutions for the deliberate transmission of knowledge from one person, and one generation, to another are ample evidence of the power and importance of conscious, deliberate thinking, and conscious, deliberate learning.

More to the point, the debate over automaticity testifies to the odd situation that consciousness still makes psychologists uncomfortable—what Flanagan (1992) calls *conscious shyness*. Partly as a holdover from the dark days of behaviorism, and partly as a reflection of the functionalist stance that is so popular in the philosophy of mind, psychologists and other cognitive scientists are often reluctant to take consciousness seriously, or even utter the word. Still, we must take care that our acceptance of unconscious mental life does not tilt unnecessarily into a stance of conscious inessentialism or epiphenomenalism. Unconscious states and processes can influence ongoing experience, thought, and action; but that fact does not warrant relegating conscious mental life to the dustbin of "folk psychology."

Beyond mere acceptance that the psychological unconscious is a viable concept after all, the phenomena I have described here may offer a new approach to one of the central problems in psychology, cognitive science, and neuroscience—what we might call the mysterious leap from the body to the mind: What are the neural substrates of conscious awareness? Studies of the physiology of sleep and dreams (e.g., Hobson, Pace-Schott, & Stickgold, 2000), and of general anesthesia (e.g., Hameroff & Penrose, 1996), will help us to understand the neural substrates of *being conscious* as opposed to unconscious. And studies of automatic and controlled processes (e.g., Schneider & Chein, 2003)



will help us to understand the neural substrates of *acting consciously* as opposed to unconsciously.

Another piece of the puzzle will come from studies comparing the neural correlates of explicit and implicit perception, memory, thought, and the like (e.g., Schacter & Badgaiyan, 2001). The explicit-implicit distinction offers a natural control group for neuroscientific research: what are the differences, in terms of neural activity, between the conscious and the unconscious influence of percepts and memories. In this way, we may get new insights into precisely what makes conscious percepts, and conscious memories, conscious. Among these insights may be that the neural correlates of consciousness are going to be as variable as consciousness itself. Conscious recollection has its seat in the hippocampus and the rest of the medial temporal lobe memory system, for example, but conscious (visual) perception has its seat in the striate cortex. Where the neural correlates of consciousness lie may depend precisely on what people are conscious of—what their conscious mental states are *about*. And, for that matter, the same point may be taken with regard to automaticity: the neural distinction between automatic and controlled processes may depend on precisely what has been automatized.

Setting neuroscience aside, the explicit-implicit distinction also gives us some insight into the *psychological* distinction between conscious and unconscious mental life. Returning to Brentano's and Russell's discussion of intentionality, note that each of their examples of a mental state invokes the self and delineates a kind of ownership between the person and what is going through his or her mind (see Chapter 57, "Self-Knowledge"). In linguistic terms, conscious mental states always include some reference to the self as the agent or patient of some action, or the stimulus or experiencer of some state.

Consider the sorts of tasks in which we demonstrate the dissociation between explicit and implicit memory. First, the subject studies a list of words, including the word *paragon*. On an explicit memory task, the subject is asked what he or she remembers and replies, in effect, "I remember" such-and-such an event from the past—with the emphasis on the first person: "I remember studying *this item*." But when a subject is asked to complete a word-stem or a fragment, or to identify a word, or to determine whether a letter string is a word, self-reference is missing, or is there in a very different way: "That fragment can be completed with *paragon*," instead of the more familiar response *parachute*, or *parallel*.

Whatever is going on in the brain during conscious perception and memory, what is going through the mind is a connection between some mental representation of some object or event, and a mental representation of the self. This link appears to be missing in instances of unconscious processing (Kihlstrom, 1997).

### Not a Tumbling-Ground for Whimsies

More than 200 years ago, Immanuel Kant asked whether the notion of unconscious mental states made any sense, and concluded that it does. But only 100 years ago, William James, writing in the *Principles*, warned that the unconscious was "the sovereign means for believing what one likes in psychology, and of turning what might become a science into a tumbling-ground for whimsies." It is all too easy for us, as psychologists, especially psychologists still living in the shadow of Freud, to tell people what they *unconsciously* believe, or feel, or want—how could they possibly contradict us? Studies of automatic and controlled processes, and of explicit and implicit perception, memory, and the like, offer a solution to James's warning, because they offer strict criteria for identifying unconscious mental processes and unconscious mental states—and for tying inferences about subjects' unconscious mental lives to objective evidence of their behavior in the controlled environment circumstances of the laboratory. The result is that we can now talk about the unconscious in a scientifically respectable way, discover its scope and limitations, and seek to identify the neural correlates of consciousness—which represents a great advance in the science of mental life.

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