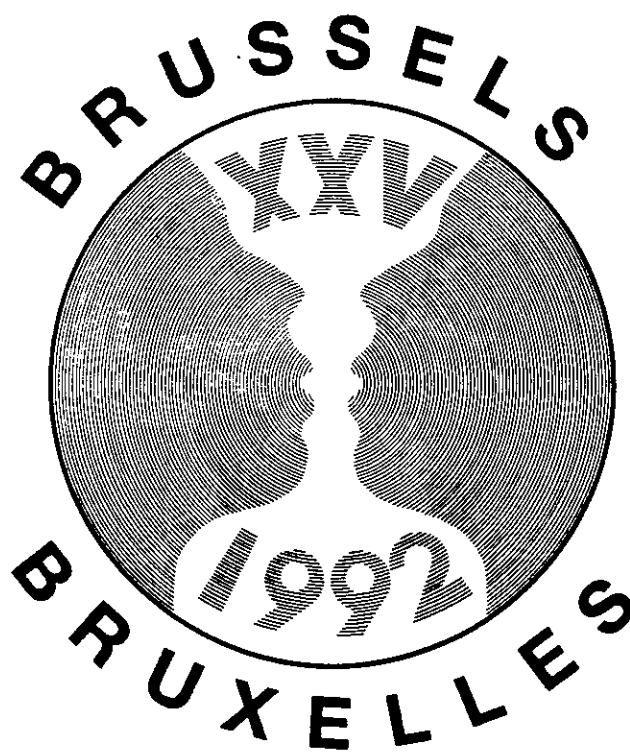




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Is the Unconscious Smart or Dumb?

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How sophisticated is unconscious cognition? This is one of the most fundamental questions about the unconscious that has been posed by research psychologists over the past century. Anthony Greenwald takes a contemporary look at this classical problem and concludes that unconscious cognition is severely limited in its analytic capability. In response, other leading scholars agree that the reality of unconscious processes is no longer questionable. Although there is some disagreement about just how sophisticated these processes are, the consensus is that exciting times are ahead for both research and theory concerning the mental processes involved in unconscious cognition.

The "unconscious" is currently being subjected to new scientific scrutiny. Certainly psychological interest in the subject is not new, but new experimental methods have prompted a contemporary, new look at an otherwise classical problem. Greenwald (1992, this issue) calls this renewed interest *New Look 3*. Do unconscious ideas, impulses, and emotions determine and drive our conscious thoughts, perceptions, and behavior? Or, as Greenwald puts the question, "How smart is unconscious cognition?" Freud, for one, believed in the "smart" view of the unconscious. Freud likened the mind to an iceberg, in that only a small portion of the mind lay above the surface, conscious, while the vast majority of mental processes take place below the surface, unconscious. For Freud, the unconscious did not always do what was best, but it certainly did affect much of mental life and worked in very complex ways.

Before answering Greenwald's question of how smart the unconscious is, the meaning of *smart* or *dumb* as they relate to the unconscious must be made clear. There is not a great deal of consensus over a single definition of what constitutes intelligence, but several factors are widely agreed upon for what makes a smart mental process. Greenwald suggests that one thing that might be meant by smart is that the processes are complex. Smart processes are used to classify patterns (such as black lines on a white page) into abstract, sophisticated, meaningful information. Analysis of letters may be thought of as more sophisticated than the analysis of lines and angles. Se-

mantic analysis of words would be more complex and sophisticated than the analysis of letters. Propositional analysis, the analysis of multiple word strings into object-action relations would be still more sophisticated. Some advocates of a smart unconscious (e.g., Silverman & Weinberger, 1985) suggest that the meaning of sentences can be unconsciously processed.

A second thing that might be meant by smart is the ability to deal flexibly with a novel situation. This is contrasted with dumb processes that might be termed *routine*—mental processes that are used in the same way time after time after time. Certainly many psychoanalytic advocates would support the belief that the unconscious knows how best to protect the conscious mind, using repression, projection, and displacement flexibly, each where and when it might be most useful. As will be seen, however, many cognitive psychologists suggest that the unconscious specializes in performing only routine activities.

A third thing that might be meant by smart is that the mental processes do what is best for us. However, even believers in a smart unconscious agree that the unconscious does not always do what is best. In fact, believers in a smart unconscious fully embrace the idea that these processes that lie below the surface of awareness often lead people to react inappropriately.

A belief in a smart unconscious crops up in the most unexpected places. When two young men, 18-year-old Ray and 20-year-old James, died of self-inflicted shotgun blasts, their families sued the British rock band Judas Priest ("Rock Group Not Liable," 1990). The families claimed that there were subliminal messages touting satanism and promoting suicide on the band's 1978 *Stained Class* album, and these messages caused the young men to form a suicide pact. The families sought more than \$6 million in damages. Could subliminal messages drive men to kill themselves? Judge Jerry Carr Whitehead ruled that

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Erdelyi would consider, and would ultimately select, for his 1985 book on this subject: *Psychoanalysis: Freud's Cognitive Psychology*.

In spite of the accomplishments of New Look 2, the unconscious continued to be regarded skeptically by many cognitive psychologists. However, Greenwald (1992) argues that current research findings now leave little doubt that people sometimes perceive things without conscious awareness. An impressive case can be found in recent literature to support the notion that unconscious cognitive processes do indeed influence how people respond to their environment. Greenwald provides many examples. One common modern-day procedure that demonstrates this influence involves priming. In a typical priming study, subjects go through two stages (Tulving & Schacter, 1990). First, they see a list of items, called targets, for example a series of pictures. Then, minutes or months later, the subjects are tested. The test might require subjects to look at degraded pictures and name the object seen. Priming is demonstrated if the test performance is higher for targets that were previously encountered than for control items that were not previously encountered. Priming can be observed even in cases in which the target stimuli are so faint as to be consciously not detected—evidence, some might say, that people are influenced by stimuli that are not consciously processed. But, Greenwald argues, these involved unconscious processes that are not particularly sophisticated; rather, they involve relatively simple cognitive functions. Greenwald puts it succinctly when he summarizes by proclaiming that the unconscious is analytically unsophisticated and its achievements are “severely limited.” Limited achievements would certainly imply to Greenwald that the unconscious has not been shown to be able to get people to buy popcorn, drink Coke, shoot themselves, or in general do things they would not ordinarily do. Just because people can respond to a subliminal message does not mean they will automatically follow its directives. In short, his is a view that the unconscious is not particularly smart. However, it should be mentioned that Greenwald supports the not-so-smart unconscious most strongly when he talks about one particular meaning of unconscious cognition, namely the cognition that one can have in the absence of attention.

Any *American Psychologist* reader worth his or her weight in curiosity would probably now be wondering what the proponents of New Look 2, or even New Look 1 for that matter, would be thinking. To satisfy this curiosity, a number of leading researchers and theoreticians, including New Look 1 representative Jerome Bruner and New Look 2 representative Matthew Erdelyi, were invited to comment on Greenwald's arguments. They took a variety of approaches: Some wrote pieces that were largely conceptual or historical in nature, whereas others wrote pieces with an empirical focus.

Bruner (1992, this issue) takes us back to the 1940s and 1950s to remind us what the original New Lookers were thinking about. As he recalls now, the first experiments of the day had little if anything to do with the unconscious, either a dumb version or a smart (dynamic)

version. The earliest experiments were more about perceptual salience or selectivity. Only later in the period did the unconscious peek through in the discussions of perceptual defense studies and related work that held great appeal for the psychoanalytically inclined. Bruner is brief in describing the busy and littered battleground on which (New Look 1) war was fought. The skirmishes were nasty at times and did little to answer the questions about the intelligence of unconscious processes. When forced to confront this question head on, Bruner clearly sides with the camp that says the unconscious is not very smart.

Matthew Erdelyi (1992, this issue) also reminds us that the New Look was more than just the study of the unconscious and that the New Look in perception needs no reclaiming. He notes that beyond a doubt schema and input, defense and memory interact with each other. It is clear that one of the original propositions of the New Look, that expectations affect perception, is beyond all dispute. Erdelyi, however, suggests that the unconscious needs to be reclaimed “gingerly” (p. 785). The lack of consensus on where the division between conscious and unconscious processes lies is the major stumbling block. To accept the most strict criterion of what is unconscious apparently relegates the unconscious to unreliability and insignificance. To accept a more liberal criterion admits a host of dubious effects into the unconscious. Erdelyi rightly points out the paralyzing effect of this lack of a clear conception of the unconscious has had on empirical progress. Although the solution to this problem may not be immediately apparent, Erdelyi does conclude that when our conception of the unconscious is clarified and research into the nature of (not just the existence of) the unconscious takes place, we will find that the unconscious is more sophisticated, smarter, than has been generally believed.

John Kihlstrom, most would agree, is one of the leading contemporary observers of “the cognitive unconscious” (the title of an article he published in *Science*, 1987). In that article, and in his current article with Terrence Barnhardt and Douglas Tatar (1992, this issue), he reminds us that the idea of unconscious mental life has a long and distinguished history that goes back long before Freud. Helmholtz, for one, stressed the idea that the perceptual experience is in large part determined by unconscious inferences based on knowledge of the world and memory of past experiences (Kihlstrom, 1987). This is not to diminish the important things that Freud had to say about the unconscious, an unconscious that Kihlstrom et al. characterize as “hot and wet” (p. 789). But Freud does not deserve all the credit. Moreover, since Freud's hot and wet proposals, a great deal of sophisticated work has been completed that paints a somewhat different picture of unconscious processes—a colder and drier picture. As for whether Kihlstrom et al. think the unconscious is smart or dumb, they do not seem to like the question. In any event, they hedge by saying “it depends.” Depending on how the contents in question are rendered unconscious and on just what the subject is required to do, we may end up concluding the unconscious is smart

Persuaders get deeply "hidden" tool: Subliminal projection. (1957, September 16). *Advertising Age*, p. 127.

Silverman, L. H., & Weinberger, J. (1985). Mommy and I are one: Implications for psychotherapy. *American Psychologist*, 40, 1296-1308.

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Wright, G. (1978). Better by you, better than me. In Judas Priest (performers) *Stained class* [album]. New York: Columbia Records.

habitual or automatic, or as comprising procedural knowledge. Similarly, some describe the partial monitoring that occurs for background conversations in a crowded room as unconscious, whereas others refer to it as pre-attentive. This article, in part, attempts to convince those who currently avoid speaking of unconscious cognition that this manner of speech can now be used quite respectably.

Two Senses of Unconscious

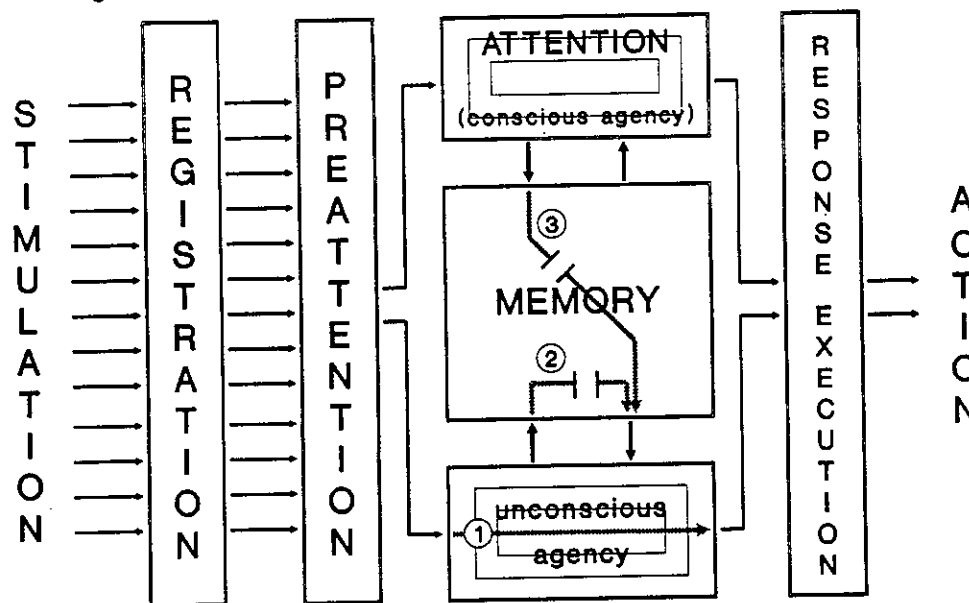
The most general meaning of *unconscious* is "unaware of." There are two quite different senses of "unaware of" that appear widely in cognitive psychological research and theory.

Sense 1: Outside of attention. If consciousness is interpreted as the selective aspect of attention (Kahneman, 1973; Posner & Boies, 1971), then one is unconscious or unaware of stimuli that impinge on receptors but fall outside the metaphorical spotlight of selective attention. This sense of the conscious-unconscious distinction is supported both by nearly 40 years of modern research on selective attention and by a long tradition in which attention has been a central topic of psychology (e.g., James, 1890; Pillsbury, 1908). The major research questions associated with this *attentionless* sense of unconscious cognition are, What are the limits of cognitive analysis of registered-but-unattended stimuli?, and What memory residues are established by such stimuli?

Sense 2: Lack or failure of introspection. If consciousness is interpreted as the ability to report experience validly, then one is unconscious or unaware of the occurrence, causes, or other attributes of attended objects, events, or actions when one cannot report those properties validly. Unlike the attentionless sense, this one presumes (a) a language-using organism, (b) a reflexive (self-describing) cognitive ability, and (c) the existence of a valid reference description of one's experience. For phenomena involving misperceptions of causes or of other object or event attributes, it is often difficult to distinguish faulty introspection from other cognitive errors. As a consequence, most studies of this sense of unconscious cognition involve failures to remember events that are known to have been attended. The major research question associated with this *verbally unreportable* sense of unconscious cognition is, How are cognition and action influenced by failures to remember experienced-but-unrecalled events?

Attention, which plays a critical role in the analysis in this article, is a central concept of cognitive psychology's once-dominant *information processing* theoretical framework (e.g., Broadbent, 1958; Neisser, 1967; Norman, 1968). Information-processing analyses characterize cognition as a series of stages, or transformations, between stimulus input and response output (Smith, 1968). Among these stages, as the locus of conscious agency, attention occupies a major position. Figure 1 locates the

Figure 1
Information-Processing Model of Conscious and Unconscious Cognition



Note. Boxes represent information processing stages, which occur in the order indicated by the arrows connecting them. The nested boxes within the stages of *conscious agency/attention* and *unconscious agency* indicate substages, or levels of analysis of increasing analytic complexity. The attentionless sense of unconscious cognition is represented by paths that do not pass through the box for *conscious agency/attention*. Path 1 indicates the route assumed for unconscious automatic activation in research on subliminal activation and selective attention. Path 2 indicates the route assumed for unconscious establishment of memory, and Path 3 for unconscious retrieval of memory. Gaps in the latter two paths indicate passage of time between establishment and use of memory.

pendent replications, a cautious conclusion should not go beyond Cheesman and Merikle's (1984) conservative position—that semantic activation requires above-objective-threshold presentation conditions. At the same time, experiments using stimulus conditions that are clearly above objective thresholds (but presumably below subjective thresholds) have obtained semantic activation findings with apparent relative ease (e.g., Bargh & Pietromonaco, 1982; Cheesman & Merikle, 1984; Devine, 1989; Erdley & D'Agostino, 1987; Kitayama, 1990; Neuberg, 1988; Perdue, Dovidio, Gurtman, & Tyler, 1990; see also Bargh, in press).

Can subliminal presentations result in cognitive analyses of multiword strings? There have been reports of such effects, especially in association with tests of psychoanalytic hypotheses. The best known of these findings (described as *subliminal psychodynamic activation* [SPA], using "Mommy and I are One" as the text of a subliminal stimulus; Silverman & Weinberger, 1985) has been identified, on the basis of meta-analysis, as a reproducible phenomenon (Hardaway, 1990; Weinberger & Hardaway, 1990). Despite this strong evidence, many researchers remain skeptical about the SPA result (see, e.g., the survey reported in Appendix B). Such skepticism is almost certainly due to the lack of widespread enthusiasm for the SPA result's proposed psychodynamic interpretation (Silverman & Weinberger, 1985). Because of the positive affective values of words in the critical stimulus (especially *Mommy* and *I*), it is possible that observed effects might be explained by cognitive analysis limited to the level of single words. Some support for that interpretation is afforded by Hardaway's demonstration (1990, p. 183, Table 3) that other affectively positive strings that include *Mommy* or *One* also produce significant effects. However, these other effects are weaker than the effect of the specific string, "Mommy and I are One."

In summary of evidence from studies of subliminal activation, it is now well established that analysis occurs for stimuli presented at exposure conditions in a region between objective and subjective thresholds; this analysis can extract at least some semantic content of single words. Conclusions about subliminal analysis of higher-level (multiword) information remain controversial, as does the proposition that word or other stimuli can produce subliminal activation when presented at or below objective threshold. Thus, subliminal activation research provides replicable evidence for attentionless unconscious cognition, but indicates only limited analysis for such stimuli and is not yet convincing that this analysis occurs for stimuli that are undetectable.

Selective Attention

Experiments on selective listening and selective viewing require subjects to focus attention on one of two or more sources of stimulation. Subjects are instructed to attend closely to and report information from one source (the primary channel), while being tested indirectly for effects

of information from another (secondary channel). As can be seen in some recent reviews (Allport, 1989; Johnston & Dark, 1986; Holender, 1986; Miller, 1987), selective attention procedures vary considerably in the extent to which they prompt or permit subjects to divide attention between the two channels, rather than focusing exclusively on one. When selective attention procedures succeed in withdrawing attention from the secondary channel, they can provide evidence bearing on the extent of analysis of unattended information—attentionless unconscious cognition.

In *dichotic listening* procedures, which present different messages to the two ears, it is readily demonstrated that low-level (physical feature) content of the secondary channel, such as pitch, loudness, and spatial location of sound, is analyzed (e.g., Cherry, 1953). By contrast, it is more difficult to demonstrate that single word meanings are analyzed, and some results that indicate analysis of words in the secondary channel are plausibly due to procedures that permitted voluntary switching of attention to the secondary channel (see Holender, 1986; Johnston & Dark, 1986). Nevertheless, numerous findings indicate not only analysis of secondary channel content at the level of individual words, but short persistence of memory for that content (see the discussion of negative priming findings, below). An especially valuable result is the identification of content in the secondary channel that can cause a spontaneous shift of attention to that channel. From such studies, it is well established that significant verbal stimuli in a secondary channel, such as one's name (Moray, 1959), or a word that is expected on the basis of primary channel content (Treisman, 1960), or a word that has been associated with electric shock (Dawson & Schell, 1982), are more likely than other verbal stimuli to attract attention. These findings strongly suggest that the secondary channel is analyzed at a level involving at least minimal aspects of word meaning. The authoritative review by Johnston and Dark (1986), "Selective Attention," concluded that semantic analysis of secondary-channel words occurs only when the words have high relevance to an attended task.

Dichoptic viewing is the procedure of presenting separate stimuli to the two eyes. *Binocular rivalry* occurs when images received by the two eyes mismatch in low-level features such as orientation or spatial frequency (Blake, 1989). In the visual region of such mismatch, the image from only one eye (the dominant eye) is visible. Parallel to research on dichotic listening, one strategy for assessing the level of analysis that occurs for the suppressed (unconscious) visual field is to determine what stimuli presented to it can cause it to capture attention (become dominant). In a 1978 review, Walker concluded "that there is evidence that the suppressed stimulus in rivalry is being fully analyzed and evaluated" (p. 376). However, in a more recent review, Blake (1989) suggested a reversal of Walker's conclusion on the basis of further studies that more thoroughly ruled out possibilities of attention to the secondary channel. Blake concluded that "suppression is accomplished at a relatively early stage

sleeping subjects have generally not succeeded (Aarons, 1976; Swets & Bjork, 1990).

In summary of research on unconscious establishment of memory, the best established effects are subliminal mere exposure and negative priming effects. These replicable findings indicate that attentionless unconscious cognition produces memory traces at the level of object or word representations. However, tests for establishment of more complex memory traces have generally not found them.

Unconscious Retrieval of Memory

Unconscious Learning

In a series of experiments started during the 1960s, Reber (e.g., 1967, 1989; Reber & Allen, 1978) developed an *artificial grammar* procedure in which subjects study 20 or more strings, each containing a half-dozen or so consonants, produced by a set of rules (a finite-state grammar) that is complex enough to be virtually impossible for subjects to discover. Nevertheless, after the study phase, subjects typically show significant, although considerably less than perfect, ability to discriminate novel strings generated by the grammar from novel nongrammatical strings. Similar results have been obtained by others (e.g., Matthews et al., 1989).

A conceptually related method is the *pattern learning* experiment (Lewicki, Czyzewska, & Hoffman, 1987; Lewicki, Hill, & Bizot, 1988). In an illustrative version of this procedure, a target stimulus for which the subject is searching may occur in any of four quadrants of a computer display on each trial. Rather than being entirely random, however, the target's location on a subset of trials is determined by its location over a sequence of preceding trials. The rules that govern target location are too complex to allow discovery by subjects but, nevertheless, subjects typically show gradual improvements in performance, indicated by decreasing latencies in locating the target quadrant in displays that contain many distractors. In some other versions of the pattern learning procedure (e.g., Kushner, Cleeremans, & Reber, 1991), the subject's task is to predict the identity of the target on the next trial; with this task, gradual increases in prediction accuracy occur.

Most researchers using procedures similar to the artificial grammar and pattern learning experiments have used easily perceived, attended stimuli. When subjects' nonverbal performances indicate learning that they cannot articulate verbally—referred to by Reber (1967) as “implicit learning” and by Lewicki, Hill, and Czyzewska (1992, this issue) as “nonconscious acquisition of covariation”—that learning can be regarded as unconscious (in the verbally unreportable, not the attentionless, sense). However, that interpretation is controversial. Several researchers (e.g., Brooks & Vokey, 1991; Dulany, Carlson, & Dewey, 1984, 1985; Perruchet, Gallego, & Savy, 1990; Perruchet & Pacteau, 1990) have suggested that some (not all) artificial grammar or pattern learning findings are explainable by assuming that subjects acquire partial

conscious knowledge about the experimental patterns. This skeptical position is supported by finding that subjects in some artificial grammar and pattern learning experiments can report fragmentary stimulus patterns that, even though falling well short of the complexity of the rules used to generate the stimuli, could consciously mediate the observed modest levels of rule-consistent performance. At the same time, subjects' ability to articulate partial rules on demand does not oblige concluding that those rules actually governed their observed (nonverbal) performance. It remains plausible that performance improvements in some pattern learning tasks are mediated by unconscious (i.e., verbally unreportable) knowledge.

Recently, Lewicki, Hill, and colleagues have introduced a new procedure that they describe as revealing *self-perpetuation of encoding biases* (Hill, Lewicki, Czyzewska, & Boss, 1989; Lewicki, Hill, & Sasaki, 1989). This procedure is similar to the pattern learning experiment, but includes an extinction period, which occurs after initial exposure to rule-generated stimuli, and during which the stimulus-generating rules are suspended. These experiments produce the surprising finding that rule-consistent performance increases during the extinction period. The increase is typically weak, but it is remarkable that it occurs at all. The evidence for this phenomenon is too recent to allow opportunity for appearance of any counterliterature of the sort that surrounds the artificial grammar and pattern learning experiments. Nevertheless, the phenomenon seems likely to be useful in understanding such real-world occurrences as maintenance of prejudicial stereotypes that exceed environmentally observed category-trait covariations; it poses an interesting challenge for theoretical explanation.

It now appears that the earliest strong claim of some investigators—that subjects acquired verbally unreportable complex rules—is no longer being actively advocated. Greatest consensus supports the view that subjects can learn covariations, or fragmentary rules, that partially approximate the complex rules that were used to generate the experimental stimuli. The conclusion in favor of unconscious (in the sense of verbally unreportable) learning rests on findings that subjects' verbal descriptions of the basis for their performance do not agree with experimenters' descriptions of what they are (nonverbally) doing.

Although debate over interpretations of artificial grammar and pattern learning findings continues, it seems undeniable that subjects are often *unable* to verbally describe complex performances, even ones that they acquired with full benefit of attention. For example, a skilled typist may be unable to report which left-hand finger is used most frequently to type the digit 1, or which thumb is used most often to press the space bar after ending a word by typing the letter *d*. Because of the ease of producing (and confirming) examples such as those just given for typing, it seems unproductive to focus research on the question of whether or not verbally unreportable learning occurs—it certainly does. Of more interest is to establish the conditions under which it occurs, the com-

vided in the research of Nissen and Bullemer (1987) and Cohen et al. (1990).

Unconscious Cognition in Clinical Phenomena

The preceding review establishes that attentionless unconscious cognition is generally quite limited in the sophistication of analyses it can perform. This conclusion severely calls into question the psychoanalytic conception in which unconscious cognition matches or exceeds the cognitive sophistication of conscious cognition. At the same time, it is important not to belittle the significance of the unconscious cognition that has been demonstrated.

Previous scholarly reviews of unconscious cognition have often contrasted the poverty of laboratory research evidence with the richness of clinical case reports (e.g., Erdelyi, 1985; Holmes, 1974). Consequently, and in light of this article's stress on the analytic poverty of unconscious cognition, the reader may ask, Can (or how can) analytically unsophisticated unconscious cognition manage achievements such as the self-deceptions (e.g., Lockard & Paulhus, 1988; Sackeim & Gur, 1978) and repression (e.g., Erdelyi & Goldberg, 1979; Horowitz, 1988) that are documented so extensively by clinical psychologists and psychoanalysts? Perhaps surprisingly, these questions have potentially simple answers.⁶

Self-Deception

In clinical accounts of self-deception it is assumed that, when an ego-threatening situation arises, this situation is first discovered by unconscious agency, which then prevents the threatening knowledge from reaching conscious attention. A presumed example is a hospitalized cancer patient who, although terminally ill, manages to retain belief in a favorable prognosis. The self-deception interpretation is that unconscious agency comprehends the terminal diagnosis, but prevents that knowledge from achieving conscious status.

A simpler account of self-deception follows from the observation that one can avoid a threatening situation without having done the cognitive analysis needed to know exactly what the threat is. As an analogy, consider that in order to discard unwanted (junk) mail one need only identify a few superficial cues, such as low postage cost, machine addressing, commercial return address, and low-quality envelope paper. These cues quite suffice to guide behavior of discarding the mail. This adaptive avoidance response obviously has no requirement of knowledge of the specific nature of the event being avoided (the contents of the envelope). Similarly, adaptive cognitive defenses should be able to operate on the basis of superficial warning signals, with no more than partial knowledge of the threatening state of affairs. The psychoanalytic assumption, that the cognitive system unconsciously constructs and uses a representation of the exact nature of an ego threat in order to manage an effective defense, is simply unnecessary. (The junk mail analogy to cognitive ego defense was described more fully by Greenwald, 1988.)

Repression

The psychoanalytic account of repression assumes that cognizant unconscious agency, aware of ego-threatening memories, prevents those memories from being consciously retrieved and thereby causing distress. This interpretation parallels the just-given psychoanalytic account of self-deception; the two accounts differ primarily in that self-deception involves current perception and judgment, whereas repression involves memory. Perhaps the most plausible evidence for repression comes from clinical cases showing that—with effort—long-unavailable, painful memories are occasionally retrieved (e.g., Erdelyi, 1985, pp. 244ff.).

A simpler account of repression uses empirically established phenomena of implicit memory as the basis for understanding apparent instances of recovery of repressed memories (see also Kihlstrom, Barnhardt, & Tatarzyn, 1992). Explanations of implicit memory assume that memory traces of an attended event are often preserved despite inability to recall the event. Because these unconscious traces influence conscious experience (as manifestations of implicit memory), they can provide a basis for recovering the otherwise unretrievable event. The present author has noticed such influences when watching a televised drama, presumably for the first time, while being able to guess upcoming plot turns with remarkable prescience. This experience leads to recovery of the lost (explicit) memory of having previously seen that particular drama. Clearly, this implicit-becomes-explicit memory account is far simpler in its theoretical interpretation than the psychoanalytic account, which requires a sophisticatedly cognizant (and near omniscient) unconscious agency. Note, too, that the implicit memory account can explain false memories (paramnesias and *déjà vu*). For example, the first-time viewer who is unsurprised by the plot turns of a drama might mistakenly conclude that it was previously seen.

Unconscious Cognition in Neural Networks

Any substantial foundation for the once-fashionable skeptical position of many academic psychologists—that empirical findings do not warrant belief in psychologically significant unconscious cognitive phenomena—has crumbled in the face of recent research. The recent developments that seem most significant are (a) development of the concept of subjective threshold, which has guided the design of procedures that produce replicable subliminal semantic activation effects, and (b) the proliferating discovery of performances that serve as indirect memory measures, establishing the great extent to which memory operates independently of verbal ability to report past experience.

These innovations have occurred along with other changes in psychology that are widely recognized as con-

⁶ The simple answers that follow can be recognized as bearing some similarity to ones offered in Dollard and Miller's (1950) behaviorist interpretation of psychoanalytic theory.

can account nonparadoxically for semantic analysis without presence-absence discrimination.

In addition, the network form of theory readily permits response outputs to combine conscious (reportable) and unconscious contributions. The assumption that conscious and unconscious contributions are mixed in single performances has, indeed, been appearing with increasing emphasis in the unconscious cognition literature (see Jacoby et al. 1992; Merikle, 1992; Reingold & Merikle, 1988). In contrast, Figure 1's model encourages the view that conscious and unconscious agency operate simultaneously and largely independently, which is to say that they are *dissociated*. (Dissociation continues to be possible in, even if not suggested or required by, Figure 2's network structure.)

Summary of the Argument

1. Two meanings of unconscious cognition are distinguished: (a) cognition without attention, and (b) verbally unreportable cognition. A recent blossoming of research on these two types of unconscious cognition has established several procedures that have replicable findings.

2. Unconscious cognition has been found to be severely limited in its analytic capability. For attentionless unconscious cognition, research on selective attention and subliminal activation has established nothing cognitively more sophisticated than analysis of partial meanings of single words. Furthermore, claims that such analysis occurs for stimuli that are undetectable (i.e., subliminal stimuli at or below objective thresholds) are not yet solidly supported.

3. It is well established that attended stimulus presentations yield much more learning than can be subsequently reported verbally by subjects. This learning includes establishment of physical-feature representations of objects and learning of covariations among objects. There is some evidence that the complexity of such learning varies directly with attention at the time of initial learning.

4. The current view of analytic simplicity of unconscious cognition deviates sharply from the psychoanalytic theories that dominated research on unconscious cognition prior to the 1980s. This deviation is great enough to justify characterizing the recent work as constituting a new (third) New Look at unconscious cognition.

5. Because of recent developments of research methods, some remaining empirical controversies are likely to be resolved soon. The most significant current controversies concern (a) the minimal stimulus conditions under which subliminal semantic activation occurs, (b) the theoretical significance of the replicated subliminal psychodynamic activation phenomenon, and (c) the role of conscious mediation in unconscious learning results.

6. In recognition of the theoretical importance of understanding the analytic limits of attentionless unconscious cognition, some of the present conclusions can be focused on an empirical challenge—the *two-word challenge*. In the current state of empirical knowledge, the

task of demonstrating that attentionless unconscious cognition can extract the meaning of a two-word sequence poses a theoretically significant challenge. In any attempt to meet this challenge, to assure that the effect depends on analysis of the words in sequence, the meaning of the two-word sequence should not be communicated (even in part) by each word individually. And, to assure that the two words are not attended, it is suggested that the test use one of the two types of procedure (selective attention or subliminal activation) that are best established as precluding such attention.⁸

7. If the evidence for cognitively sophisticated capabilities of unconscious cognition does not soon switch from being controversial to being conclusive, it will be time, at last, to abandon psychoanalytic theory's proposal that unconscious cognition is the analytic peer (or superior) of conscious cognition.

⁸ Greenwald and Liu (1985) made an unsuccessful attempt to meet this challenge, using the subliminal evaluative priming task of Greenwald et al. (1989). In Greenwald and Liu's test, evaluative meanings of two-word subliminal priming sentences were designed to be uncorrelated with the evaluative meanings of their component words (examples were *enemy loses* and *friend wins*, both of which are evaluatively positive as sentences despite having opposed evaluative meanings at the level of single words). It was found that the priming effects of these stimuli were determined by their component individual words' meanings, rather than by their sentence meanings.

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or that (a) some example of the phenomenon is empirically established, (b) empirical data are convincing that no version of the phenomenon occurs, or (c) there has not been enough research to warrant either a positive or negative conclusion.

Copies of the 14-item survey were circulated to 65 persons who have been active in research on unconscious cognition, including many whose work is cited in the article; 31 responses were received. The responses, summarized below, do not qualify in any sense as an evaluation of current empirical knowledge. Rather, they indicate the extent to which existing research has been persuasive in producing acceptance or rejection of the various propositions with which the survey was concerned.

Four unconscious cognition phenomena received endorsement by more than 50% of respondents. With percentage of respondents who judged that some version of the phenomenon is empirically established given in parentheses, these were: (a) subliminal semantic activation by single words presented under conditions between objective and subjective threshold (93%), (b) analysis of single words in a secondary (unattended) auditory

channel in selective attention experiments (84%), (c) subliminal mere exposure effect for objects presented between objective and subjective threshold (74%), and (d) analysis of single words in a secondary (unattended) visual channel (61%).

Greatest skepticism was associated with phenomena involving analysis of multi-word stimuli (30% to 45% of respondents indicating that empirical evidence establishes that the survey's four phenomena in this category do not occur). Nevertheless, 16% judged that subliminal analysis of multi-word stimuli was established when stimuli are presented between objective and subjective threshold; these positive judgments certainly were based chiefly on evidence from subliminal psychodynamic activation ("Mommy and I are One") experiments. Propositions concerning subliminal activation by single words and subliminal mere exposure effects for stimuli at or below objective threshold were more positive than negative, but were also clearly controversial, with response distributions among positive/negative/more-research-needed categories, respectively, of 42%/29%/26% and 39%/19%/39%.

on where it stood in terms of one's measured hierarchy of values (a finding that today seems utterly banal, but which in the late 1940s and 1950s stirred the doves more than a little).

But something new came out of that study that presaged stirring times ahead. Psychologists found a weak but reliable and systematic tendency for subjects—prior to recognizing certain target words—to report seeing words that were their synonyms or, more accurately, were within the same value domain as the not-yet-recognized visual targets. Indeed, it was also the case (weakly but reliably) that *lowest* value target words produced denigrative hypotheses. *Subception* was on its way in, but there is an issue that needs to be considered before I turn to that.

These results, and several like them, suggested that there was something at work that depended on the pre-recognition processing of semantic and even value features of the input. This caught us all rather aback, but it was not long before there were all manner of experiments afoot to discover what other surprising features of input the judas eye of the perceptual process could register in exercising perceptual selectivity. Postman and I (Bruner & Postman, 1947)—neither of us particularly doctrinaire about the unconscious in its psychoanalytic sense—hit on the idea of relating associative reaction times with perceptual recognition thresholds. We chose for visual targets those words (again controlled for frequency) that elicited the longest, the midmost, and the shortest associative reaction times, and sometime afterward presented them to the subjects whom we had tested, this time in the usual tachistoscopic recognition experiment. We fully expected associative reaction time to correlate with recognition thresholds. Instead, the words producing the longest associative reactions either produced the highest or the lowest recognition thresholds. We duly attributed delay of recognition to a process of “perceptual defense,” with the reduced recognition times attributed to “perceptual vigilance.” Not long after, Leo Postman and I (Postman & Bruner, 1948) discovered that if one stressed one's subjects by hassling them while they were engaged in a tachistoscopic recognition task, their recognition thresholds were also elevated. So we began to conceive of defense as a response to stress induced by subception of a disturbing word.

Very soon, however, the corner was turned into psychodynamics. One study (Lazarus, Eriksen, & Fonda, 1951) reported, for example, that outpatients at a clinic who were judged by their therapists to use denial and repression as ego defenses showed more of a tendency to exhibit perceptual defense, whereas those who used intellectualizing and counterphobic defenses were more prone to perceptual vigilance. This was followed by a study showing that nonsense syllables associated with stress elicited galvanic skin responses before correct recognition occurred (Lazarus & McCleary, 1951). The question thus naturally arose concerning how deeply perceptual input was processed prior to its conscious recognition.

Psychoanalytically committed investigators were, of course, inclined to take the view that everything was “seen” through the judas eye of the unconscious mind prior to getting into consciousness, but the more conservative critics (i.e., the main body of American experimental psychologists) would have none of it. They tried either to explain it all away by frequency effects (without ever quite explaining how such effects worked) or to dismiss it as an instance of response withholding by embarrassed subjects faced with dirty words in the presence of a clean psychologist.

But the fat was in the fire. The more psychoanalytically inclined New Lookers came to dominate the debate, concentrating on the search for a typology of perceptually focused forms of ego defense to account for how patients managed their perceptual experiences psychodynamically. In its own right, that work (particularly the research of George Klein, e.g., 1964, and his students) did much to promote a new “ego psychology” into the old psychoanalysis. What resulted, I realize in retrospect, was a split between those who were principally interested in psychodynamics and those who were committed to the study of cognition—for 1956, the mythical birthday of the cognitive revolution, was approaching.

I went on to study information and redundancy as they affect perceptual processing time (Miller, Postman, & Bruner, 1954); Postman soon moved on to study inferential and memory processes; and very soon a British phase of the New Look began to emerge, dominated by an amalgam of ideas derived from information theory, from Kenneth Craik (1943), and from Bartlett (1957). The principal players were Donald Broadbent (e.g., 1971) and his students, Neville Moray (1969), Colin Cherry (1957), and several others, mostly at Cambridge and Oxford Universities. They were soon deep into studies of dichotic listening and the distribution of attention. The new banner was information processing, and it might have been called the second New Look but for the fact that it rapidly became mainline psychology. William Hirst (in Le Doux & Hirst, 1986) has provided an acute account of this new direction, and I shall not try to condense his subtle assessment here.

I want to mention only one line in this work, for it bears on Greenwald's (1992) question about how smart the unconscious is. Broadbent (1957) proposed, in trying to explicate the results of studies on dichotic listening, that the task was to find the selectivity bottleneck in perceptual processing. His first proposal was that it was something like a filter and that it operated far downstream close to input, and it operated principally on relatively unprocessed sensory input. For example, it is easier to tune out a voice coming into the ignored ear if it is of a different pitch than if it is of the same pitch. Then Anne Treisman (1969) discovered that the chance of crossing over to the unattended ear increased at points at which the semantic content in the two ears were related. This implied some cognitive processing by the neglected ear and suggested that the bottleneck in the processing was higher up than was originally proposed by Broadbent.

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should be "reclaimed" gingerly. One standard problem is the term's tendency to fission into multiple significations. By 1923 Freud had articulated three formally acknowledged senses of the unconscious (the descriptive, dynamic, and systemic), and several unacknowledged ones as well (cf. Erdelyi, 1985). Greenwald (1992) at this juncture has spilt the term into two senses. Unfortunately, it is difficult to carve the grainy construct at palpable joints and distinctions often produce more confusion than they reduce. In Greenwald's case, Sense 1 ("outside of attention") seems to assume that attention is only directed at external stimuli. In the psychoanalytic system, however, attention can be deployed inwardly as well. This is not an uncommon position in cognitive or clinical psychology and, actually, is one that is suggested in Greenwald's own Figure 1, which shows attention connected to memory as well as to incoming inputs. Inward-turned attention is akin to introspection, and so Greenwald's distinction between Sense 1 and Sense 2 ("failure of introspection") is not altogether definitive. The distinction that Greenwald seems actually to want to make is that between processing of unconscious inputs (*unconscious perception*) and processing of unconscious internal information (*unconscious cognition or memory*).

There are more substantive problems with the concept of the unconscious than the merely pesky terminological ones. Like so many other useful constructs in psychology, including perception and memory, the unconscious is a pretheoretic notion that becomes problematic in boundary regions. Thus, although we can loosely categorize phenomena under the headings of perception and memory, our happy dichotomy comes to grief when we concern ourselves with the precise point at which perception becomes memory; indeed, there is probably no such divide, no instant moment of pure perception that gives way to memory (cf. Erdelyi, 1974). The same is the case with the conscious-unconscious distinction. To the clinician it is a helpful nomenclatural heuristic; patients do often give the impression of having no awareness of memories, scripts, or emotions that control their behavior. Nevertheless, when laboratory psychologists try to discover the true divide between the subliminal and the supraliminal, their efforts inevitably bog down in a tangle of methodological problems that in fact are covers for conceptual problems.

Thus, it seems to be often assumed implicitly that an actual dichotomy exists between the conscious and the unconscious. This originally was the explicit assumption underlying the *limen* of Herbart (1824-1825) and Fechner (1860)—which it should be noted was a limen or threshold of *consciousness* (subjective or conscious sensation) and not, as often supposed, a sensory threshold. Mainstream psychophysics has given up on the strict limen concept (cf. Macmillan, 1986) and substitutes arbitrary definitions (e.g., 50% detection, $d' = 1$, $d' = 0$, etc.). If a literal limen does not exist, no methodological contortions will locate it.

Then, too, no agreement exists on when a null report or series of null reports should be taken to indicate ab-

sence of awareness. Again, mainstream psychophysics maintains that information is registered and accessible below the subject's decision criterion. The *subjective threshold* of Merikle and Cheesman (1986), if I understand it correctly, is simply another term for the perceiver's decision criterion, and subliminal perception in this sense is not so much a new development (Greenwald, 1992) as a new term for subcriterion perception—a given, rather than a controversy in signal detection theory (e.g., Green & Swets, 1966; Macmillan, 1986). That the subject can possess true stimulus information below the point he or she claims to perceive nothing is an incontrovertible and long-established fact (e.g., Pierce & Jastrow, 1884 [cf. Kihlstrom, Barnhardt, & Tataryn, in press]; Poetzl, 1917; Sidis, 1898). There is some current sympathy for a liberalized definition of subliminality in terms of subcriterion perception or recall (Bowers & Hilgard, 1988; Greenwald, 1992) but it must be emphasized that such a definition, although establishing subliminal perception and memory beyond doubt, would also buy into a host of dubious effects (e.g., early perceptual defense and subception effects, hypnotic hypermnnesia) that traditionally have been dismissed as artifacts (cf. Erdelyi, 1974, 1988).

A still further problem with establishing what is unconscious is that the manner in which the subject's consciousness is interrogated (i.e., tested) yields different measures of accessibility to consciousness, so that what appears to be unconscious under one class of querying turns out to be conscious or partially conscious under another (e.g., Dulany, Carlson, & Dewey, 1984, 1985; Reber, Rhianon, & Regan, 1985). Again the debate tends to be framed in terms of methodology when in fact the problem is conceptual: There is simply no unarbitrary standard for what constitutes correct querying; or, in terms of Greenwald's (1992) Figure 2, there is no unarbitrary rule as to which "output units" reflect consciousness, nor even that consciousness needs to be linked to verbal outputs. This issue is not just an experimental problem. The subject may use unsatisfactory self-querying techniques (attend to the wrong output units) and for this reason fail to achieve awareness for some target material. We deal here not with artifact but with psychological fact.

Time has also emerged as a critical issue. If a test for accessibility follows by some time the presentation of the stimulus, as in the processing of the information in the rejected channel in dichotic listening, on-line reactivity in the absence of any subsequent memory for the stimulus can be dismissed as an artifact of forgetting (Holender, 1986). For this reason, Holender and others have dismissed evidence for the unconscious based on the dichotic listening paradigm. However, as it is impossible to elicit immediate responses to a stimulus (indeed, perception itself is not immediate, but a microgenetic process unfolding over time), no response to the stimulus can bypass the objection (cf. Erdelyi, 1986). Any unconscious process may in fact have been fleetingly conscious but forgotten.

Forgetting or amnesia is not the only memory problem; hypermnnesia—the increase of memory over time

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aspects of perception, language, thought, and motor control are mediated by procedures that are inevitably engaged by certain conditions, and cannot be brought into direct introspective awareness under any circumstances, is by now almost noncontroversial. Greenwald (1992) rightly sets this literature aside and focuses his attention on the potential influence of unconscious mental *contents* as opposed to unconscious mental *processes*, wherein considerable controversy persists. But the literature exists, nonetheless, and it represents a distinguished tradition of research and theory that evolved independently of psychodynamic theory.

The point is that much contemporary research on unconscious mental life is dismissed on the grounds that Freud had said it all before and that our carefully designed and painstakingly executed experimental work is either trivial or merely a gloss on the clinical insights of the Master. To the contrary, it is important to recognize that much of this research would have been done had Freud (or Janet, for that matter) never lived.

More important, the psychological unconscious documented by latter-day scientific psychology is quite different from what Sigmund Freud and his psychoanalytic colleagues had in mind in fin de siècle Vienna. Their unconscious was hot and wet; it seethed with lust and anger; it was hallucinatory, primitive, and irrational. The unconscious of contemporary psychology is kinder and gentler than that and more reality bound and rational, even if it is not entirely cold and dry. In any event, the evidence for the unconscious discussed by Greenwald (1992) in no way provides evidence for psychodynamic ideas (for an opinion to the contrary, see Shevrin & Dickman, 1980). In some ways, this situation is regrettable. It seems doubtful that there will be too many novels written or too many movies made about semantic priming effects. But then again, the plot lines of both *Spellbound* and *The Manchurian Candidate* rely on implicit memory; so perhaps a nonpsychoanalytic formulation of the psychological unconscious still can be pretty interesting, even to artists, writers, and other nonpsychologists.

The Scope of the Evidence

Greenwald (1992) rightly restricts his treatment to the most reliable and compelling evidence for unconscious processes: phenomena that have been thoroughly studied under tight experimental control, have been observed outside of the laboratory that discovered them, and whose eliciting conditions and boundaries are in some sense known. However, there are other domains in which the evidence, although admittedly controversial, should be considered. For example, there are certain neuropsychological conditions that seem to involve unconscious processing of the same highly limited sort that Greenwald identifies in subliminal perception. In the "blindsight" syndrome, associated with damage to the striate cortex of the occipital lobes, patients display discriminative responses to stimuli that they are unable to see (see Weiskrantz, 1986). However, these responses are typically limited to questions of presence or absence, relative lo-

cation, or gross movement; the patients cannot make accurate judgments about color, form, or identity. And although there is some evidence for implicit memory for events occurring during surgical anesthesia (e.g., Kihlstrom & Schacter, 1990), it is highly likely that these effects are analytically limited in much the same manner that Greenwald observes in subliminal perception.

On the other hand, and returning to the dissociative tradition in psychopathology initiated by Janet, there are the symptoms and syndromes of "hysteria," now known as the dissociative and conversion disorders. In these conditions, subjects present with disorders of consciousness that, in some ways, mimic the effects of brain damage: amnesia, blindness, deafness, anesthesia, and paralysis (for reviews, see Kihlstrom, Barnhardt, & Tatarzyn, in press; Kihlstrom, Tatarzyn, & Hoyt, in press; Schacter & Kihlstrom, 1989). When these patients report that they cannot remember, or see, or hear, they are reporting on their conscious experiences, or rather, their lack thereof. Yet, as Janet and many others have shown, careful examination shows the clear impact of current or past events on these patients. In fact, as Janet himself understood, such dissociations are considered to be diagnostic of these disorders.

Similarly, in a tradition exemplified by Hilgard (1986, 1992; Kihlstrom, 1992), the same sorts of divisions of consciousness can be produced in selected subjects by means of hypnotic suggestions for amnesia, analgesia, deafness, and the like. Thus, just as patients with multiple personality show transfer of implicit but not explicit memory between alter egos (Schacter & Kihlstrom, 1989), subjects with posthypnotic amnesia show priming effects of words and savings in relearning skills that they do not remember (for a review, see Kihlstrom, 1985). And just as functionally blind patients show the influence of visual stimuli on choice behavior, so do their normal counterparts given suggestions for hypnotic blindness (Kihlstrom, Barnhardt, & Tatarzyn, in press). There are many other such examples.

These sorts of influences are unconscious, in the same sense that subliminal activation is unconscious: The patients and subjects in question are apparently not aware of the events that affect them. But these unconscious influences may be quite different from those observed in subliminal perception (to take one example), for the simple reason that the events in question, although inaccessible to phenomenal awareness, may nonetheless be subject to quite complex cognitive processing.

The Question of Analytic Power

The sheer diversity of the available evidence for unconscious perception, memory, thought, and learning, is important precisely because an appreciation of the full span of the psychological unconscious may provide an additional perspective on the matter of the analytic power of unconscious processes. Greenwald (1992) is quite right to focus on this issue, given the apparent discrepancy between, for example, dramatic claims for unconscious processing of messages such as Mommy and I are one

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Studies using subjective measures to demonstrate unconscious perceptual processes date from the very beginning of experimental psychology in North America (e.g., Peirce & Jastrow, 1884). As an example of the general approach, consider an experiment reported by Sidis in 1898. Sidis showed subjects cards containing a single printed digit or letter. "The subject was placed at such a distance from the card that the character was far out of his range of vision. He saw nothing but a dim, blurred spot or dot" (p. 170). In fact, "the subjects often complained that they could not see anything at all; that even the black, blurred, dim spot often disappeared from their field of vision" (p. 171). However, when Sidis asked his subjects to name the characters printed on the cards, their responses were correct more often than would be expected on the basis of simple guessing, even though many subjects expressed the belief "that they might as well shut their eyes and guess" (p. 171). Sidis concluded that his experiments indicated "the presence within us of a secondary subwaking self that perceives things which the primary waking self is unable to get at" (p. 171).

Does Sidis's (1898) experiment provide convincing evidence that complex stimulus information can be perceived without awareness? An answer to this question depends completely on one's willingness to accept the assumption that the subjects' verbal reports provided a completely adequate measure of all relevant conscious information. If this assumption is accepted, then studies based on subjective measures can provide compelling evidence for perception without awareness. However, if this assumption is not accepted, then studies such as Sidis's experiment may provide nothing more than additional demonstrations of the unreliability of introspective reports. After all, statements or comments indicating an absence of relevant conscious experiences may simply reflect biases introduced by either the experimental setting or the subjects' preconceived ideas concerning the value of particular types of perceptual experiences for guiding decisions.

Because of these interpretive problems with subjective reports, some investigators prefer to use objective measures to distinguish between aware and nonaware states. Intuitively, objective measures are very seductive. If a stimulus is so weak that it is impossible for a subject to distinguish between its presence or absence, then it seems reasonable to assume that presentation of this stimulus did not lead to conscious awareness. In addition, measures of discriminative capacities can have an important methodological advantage relative to introspective self-reports; with objective measures, perceptual sensitivity can be measured independent of the influence of preconceived biases. Given both the intuitive appeal and the methodological advantage of objective measures, it is perhaps not surprising that a number of reviewers (e.g., Eriksen, 1960; Holender, 1986) have suggested that awareness should be equated with a subject's ability to discriminate among alternative stimulus states.

Unfortunately, studies using objective measures have not provided evidence, either for or against perception

without awareness, that is any more definitive than has been provided by studies using subjective measures. As an illustration of a problem common to a number of studies, consider Marcel's (1983) classic experiments. When Marcel first reported his findings at a conference in 1974, they created considerable excitement, as they seemed to demonstrate that visual stimuli are perceived even when subjects cannot discriminate between their presence or absence. However, when Marcel's methods were carefully scrutinized, it became clear that the tasks did not really provide a satisfactory objective measure of stimulus detection (e.g., Merikle, 1982). The insensitivity of the detection task probably reflected the fact that most subjects believed they never saw a stimulus. For this reason, it is very likely that the subjects said "no" whether a stimulus was present or absent. If the lack of sensitivity was in fact due to the subjects saying "no" on most trials, then the detection task used by Marcel was nothing more than a complex method for having subjects indicate their subjective experiences.

As Greenwald (1992, this issue) suggests, no compelling evidence for perception without awareness has been obtained in any study that has used an objective measure of conscious awareness. In retrospect, this is perhaps not a surprising conclusion. Perception in the absence of stimulus detection or discrimination could only be demonstrated if these measures were only influenced by conscious perceptual processes and never affected by unconscious processes. But why should any behavioral measure be influenced exclusively by conscious perceptual processes? As Merikle and Reingold (in press) noted, a much more reasonable expectation is that any measure of perception can be affected by both conscious and unconscious processes. If objective measures do in fact reflect both conscious and unconscious processes, then establishing conditions under which these measures exhibit no sensitivity whatsoever would eliminate all evidence for perception, either conscious or unconscious. Thus, if one believes, as some reviewers believe (e.g., Holender, 1986), that objective measures are the only adequate behavioral measure of awareness, then there may very well never be any satisfactory evidence for perception without awareness.

On the other hand, if one accepts that subjective measures can be valid indicators of awareness, then there is considerable evidence for perception without awareness. In fact, it is relatively easy to demonstrate that perception occurs when subjects do not believe that they have either seen or heard an adequate stimulus. Adams (1957) even suggested that this phenomenon is so robust that it can be used as a classroom demonstration. Similarly, subjective measures have proved successful in the study of cortically blind patients, who report no relevant conscious visual experiences for objects presented in their blind fields but demonstrate considerable knowledge of these objects when they are required to make forced-choice decisions (e.g., Weiskrantz, 1986). Given that subjective measures are the only class of measures that have consistently led to successful demonstrations of perception

tivated, as decisions to target words were facilitated independent of the biasing context. These results indicate that context exerts relatively few constraints when words are perceived without awareness, but conscious awareness is necessary for the selection of context-relevant interpretations.

Conclusion

In each of these studies demonstrating qualitative differences, awareness was defined and operationalized in a somewhat different manner. If the success of these studies was judged solely on the basis of the soundness of the a priori justification for the particular measure of awareness, then debate would still rage over whether these studies actually demonstrated perception without awareness. However, the important findings in these and other recent studies (e.g., Jacoby & Whitehouse, 1989; Merikle & Reingold, 1990) are that performance differs qualitatively across the aware and nonaware conditions. Such findings point to some interesting differences in the control of thought and action that may distinguish conscious from unconscious perceptual processes. In addition, these qualitative differences also constrain alternative interpretations of the data. Thus, demonstrations of qualitative differences can both validate measures of awareness and show how conscious and unconscious processes differ.

Investigations of qualitative differences also provide the key for answering Greenwald's (1992) question concerning whether unconscious processes are "smart" or "dumb." Because of the preoccupation with existence proofs for so many years, this question has not been adequately addressed. Greater research effort devoted to the study of qualitative differences should provide more definitive answers. However, at this time, how sophisticated unconscious perceptual processes may be is unknown. The answer depends entirely on what differences future research may discover and document. These yet-to-be-documented qualitative differences will also determine whether all the efforts to distinguish conscious from unconscious processes have been worthwhile, as the nature of these qualitative differences will determine the ultimate value of the long-standing conceptual distinction between conscious and unconscious processes.

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perception (i.e., subjectively encoded meanings of stimuli) is functionally independent from the information-processing algorithms and heuristics responsible for generating those subjective meanings. This fundamental independence is evident in virtually all areas of human cognition. Moreover, this lack of access to the nature of these processes (which are essentially responsible for most of what we see, experience, and feel) is not limited to the so-called low-level processes that support only the consciously controlled cognition (e.g., pattern recognition). People have no access to processes as high level as those involved in playing chess (deGroot, 1965), feeling love (Walster & Walster, 1978), forming impressions of people (Kihlstrom, 1987; Lewicki, 1986a), or problem solving and creative thinking (Sternberg, 1986), and when researchers attempt to learn directly from subjects anything about how such judgments or decisions are generated, subjects are usually as helpless as when they are asked to explain how they identify right angles in three-dimensional space or recognize patterns. All they know is that they just do it.

In light of those arguments, it is important to learn about the processes leading to the acquisition of procedural knowledge outside of conscious awareness, because they contribute to the very foundations of the human cognitive system.

Acquisition of Information About Covariations (Encoding Algorithms)

A considerable amount of evidence indicates that the human cognitive system is capable of nonconsciously detecting and processing information about covariations between features or events in the outside world (Lewicki, Hill, & Sasaki, 1989; Lewicki, 1986a; Lewicki, Czyzewska, & Hoffman, 1987; Reber, 1989; for a review, see Hill & Lewicki, 1991). Moreover, subjects' nonconscious ability to detect and process covariations was found to be superior to their (relatively poor) ability to detect the same information in a consciously controlled manner (see also Nisbett & Ross, 1980). Nonconscious processing occurs even if the conditions that are necessary for the consciously controlled processing of covariations (Crocker, 1981) are not met—for example, when the covariation is "hidden" (e.g., pertains to peripheral aspects of the stimulus material).

The nonconscious processing of covariations results in the development of respective procedural knowledge (Winograd, 1975) that participates in the encoding of subsequently encountered, relevant stimuli. For example, the nonconscious processing of a covariation between a facial feature *x* and a personality characteristic *y* results in the development of a tendency to interpret (encode) behaviors of subsequently encountered people who possess this feature (*x*) as indicative of personality characteristic *y*. This kind of procedure knowledge is referred to as *encoding algorithms*. The encoding algorithms provide elementary "inferential rules," used by the individual in the process of translating stimuli into subjectively meaningful experiences and converting them into memory-compatible code. Therefore, the nonconscious pro-

cessing of information about covariations results in the development of the elementary functional components of the cognitive system that determine the way in which individuals interpret information, think, make judgments, form preferences, and so on.

Some basic properties of the process of nonconscious acquisition of information about covariations were investigated using the *matrix scanning* procedure. The subjects' task in matrix scanning experiments is to locate a target character (e.g., digit "6") in the subsequently presented matrices of distractor characters. It was demonstrated in a number of experiments that if there is a non-salient but consistent covariation between some pattern of the background (distractor) characters and the locations of the target (across a number of trials), then subjects can process that covariation nonconsciously and store it in the form of procedural knowledge that specifically facilitates their subsequent encoding performance. In other words, without being aware of it, subjects in the matrix scanning experiments use the information about the background (which is easy to identify) to guide their search for the target locations.

How "Nonconscious" Is the Nonconscious Acquisition of Information?

Results from a variety of tests provide convergent evidence that subjects in the nonconscious covariation-processing experiments have no access to the newly acquired procedural knowledge. Also, they have no idea that they have learned anything from the stimulus material, even though the newly acquired knowledge consistently guides their behavior.

In one of the studies (Lewicki, Hill, & Bizot, 1988) that addressed the issue of the relation between conscious and nonconscious knowledge, an unusual sample of subjects was selected to assure that they would be sufficiently cooperative and intellectually capable enough to report any potential introspective experience (of "acquiring new information") they could have during the experiment. All of the subjects were faculty members of a psychology department. In the Lewicki et al. (1988) study, subjects nonconsciously acquired a set of encoding algorithms that allowed them to more efficiently (faster) encode locations of a target on a computer screen and, thus, to perform better in a search task. When the crucial covariation that was built into the sequence of target locations on the cathode-ray tube was changed (i.e., became inconsistent with the previous algorithm), subjects' performance, as measured by reaction times and the accuracy of responses, deteriorated. The subjects knew that the study investigated nonconscious cognition and tried hard to figure out the experiment. However, none of them came even close to discovering the real nature of the manipulation. Debriefing indicated that none of the subjects had any clue as to what kind of knowledge they had nonconsciously acquired in the experiment. Moreover, it was revealed that although subjects noticed the sudden decrease of their performance, at the point when the covariation changed, they attributed the decrease to factors that were entirely

the feature of sadness. However, this specific label was never used in the training-phase stimulus material when subjects watched videotapes depicting their peers, some of whom expressed feelings of sadness or depression. In the testing phase, subjects showed the expected bias when they rated some of the new stimulus persons as more "pessimistic," "sad," "dissatisfied," or "lonely." These results indicate that in the process of acquisition of the manipulated encoding algorithm, subjects nonconsciously abstracted and generalized the meaning of a general concept from its specific instantiations encountered in the stimulus material.

The process of semantic abstraction and generalization in the nonconscious development of encoding algorithms was also demonstrated in studies in which verbal descriptions of activities of stimulus persons were used in the training phase to manipulate covariations between certain personality features (Lewicki, 1986a). No labels (adjectives) were used in those descriptions; instead, examples of specific behaviors instantiated the features. In the testing phase, subjects rated a sample of new stimulus persons on relevant dimensions anchored with labels that were not used in the learning phase. Subjects' responses were consistent with the manipulation, indicating that information about specific behaviors presented in the learning phase was nonconsciously abstracted and converted into general encoding concepts.

This process of nonconscious generalization was also observed in research with small children (Czyzewska et al., 1991). In a recent experiment, four- and five-year-olds nonconsciously learned a covariation between colors of clothes of children presented on posters and very general categories of their activities: "physically active" (e.g., riding a bike, jumping, playing ball, running) versus "physically passive" (e.g., watching TV, waiting, drawing, reading).

Nonconscious Development of Knowledge Structures That Are Relatively Independent From Experience

If the process of nonconscious generalization of covariations encountered in the "outside" world were the only mechanism responsible for the nonconscious development of encoding algorithms and procedural knowledge, then all of them would have to mirror the actual covariations between features, or events, in reality. This is obviously not the case. Common unreasonable biases, gradually developing irrational preferences for particular colors, places, and people, as well as various common forms of disorders (e.g., neuroses, phobias, borderline personality dysfunctions), indicate that many encoding algorithms and other elements of procedure knowledge develop in the cognitive system, relatively independent from, or at least not as a direct function of, experience with the outside world. Several mechanisms have been identified that can account for such instances of relative independence or even discrepancy between procedural knowledge and the environment.

Self-Perpetuation of Encoding Algorithms

It has been demonstrated in a number of studies that when stimuli are ambiguous, encoding algorithms may nonconsciously impose on them preexisting interpretive categories, even if the stimuli "objectively" do not match those categories. The resulting biased interpretation of stimuli, as supportive of the preexisting encoding dispositions, has been shown to become a *source* of subjective experiences that are consistent with these dispositions. This way, the encoding bias may gradually develop in a self-perpetuating manner (Hill et al., 1989; Lewicki et al., 1989). Considering the decisive role of encoding algorithms for generating the subjective meaning of what one is encountering, and given the ambiguity and openness to alternative interpretations of many, especially social, stimuli that one encounters in everyday life, the process of self-perpetuation of encoding algorithms may play an important role in the development of a variety of individual differences in how individuals encode and react to the environment (Hill et al., 1990; Hill, Lewicki, & Neubauer, 1991; Lewicki et al., 1989).

In the learning phase of a typical experiment, subjects participated in (ostensible) training in "the intuitive interpretation" of some stimuli. The stimulus material contained a hidden covariation between some subtle features or events. In the testing phase, subjects' task was to interpret a very long sequence of new, relevant stimuli based on intuition. Consistent with the self-perpetuation hypothesis, over a prolonged testing phase, subjects' responses gradually became increasingly consistent with the nonconscious encoding algorithm acquired in the learning phase, despite the fact that this testing-phase material did not include any supportive evidence. In other words, once initiated, the development of the new encoding algorithms continued in a self-perpetuating manner. The initial experiences capable of triggering such a self-perpetuating development of a bias (and starting the "snowball") may in real life be conditions that are very difficult to identify because they may be incidental, nonsalient, and not even consciously remembered as meaningful events by a perceiver (Jacoby & Witherspoon, 1982). There is evidence demonstrating that surprisingly little consistent evidence is sufficient to produce an initial encoding bias (Lewicki, 1986b), and in some circumstances even a single instance may be sufficient (Lewicki, 1985).

The self-perpetuation process was demonstrated using a variety of stimulus materials, such as videotaped social interactions, descriptions of stimulus persons, silhouettes of stimulus persons, kinematic traces of body movements, words of an artificial language, matrix scanning, and digitized transformations of human faces (Hill et al., 1989; Hill et al., 1991; Lewicki et al., 1989). The process of self-perpetuation is probably the clearest example of a cognitive mechanism capable of nonconsciously generating, or making up, new knowledge structures that are independent of, or even inconsistent with, the objective nature of the person's environment. The other two identified mechanisms (see below) appear to

in one's emotional reactions toward some specific categories of situations or objects. However, despite their high efficiency and formal sophistication, those demonstrated processes in the experiments on nonconscious acquisition of knowledge appear to be at least initially unbiased toward any specific contents and impartial in the sense of being ready to process any type of information, regardless of the level of its consistency with the perceiver's consciously held beliefs or motivations (Lewicki, 1986a).

The answer to the question about intelligence would be affirmative if *intelligent* is understood as "equipped to efficiently process complex information." In this sense, our nonconscious information-processing system appears to be incomparably more able to process formally complex knowledge structures, faster, and "smarter" overall than our ability to think and identify meanings of stimuli in a consciously controlled manner.

In light of the evidence reviewed in this article, the "division of functions" between the nonconscious and consciously controlled aspects of human cognition appears to be quantitatively and qualitatively asymmetrical. Most of the "real work," both in the acquisition of cognitive procedures and skills and in the execution of cognitive operations, such as encoding and interpretation of stimuli, is being done at the level to which our consciousness has no access. Moreover, even if the access to that level existed, it could not be used in any way, because the formal sophistication of that level and its necessary speed of processing exceed considerably what can even be approached by our consciously controlled thinking. The "responsibilities" of this inaccessible level of our cognition are not limited to the housekeeping operations, such as retrieving information from memory or adjusting the level of arousal; they are directly involved in the development of interpretive categories, drawing inferences, determining emotional reactions, and other high-level cognitive operations traditionally associated with consciously controlled thinking.

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The use of indirect tests to reveal unconscious influences of memory is illustrated by experiments examining the memory performance of amnesics. Amnesics perform poorly when directly asked to report on the past, but show near normal effects of memory in their performance on a variety of indirect tests (for a review, see Shimamura, 1989). For example, reading a word makes it more likely that amnesics will later be able to complete a fragment of that word, even though they are unable to recall or recognize the word as one that they had read earlier (e.g., Warrington & Weiskrantz, 1974). These results and others suggest that amnesics may often use memory for prior events, but have little or no subjective experience of remembering. Similar dissociations between performance and awareness have been found in other neurological syndromes. For example, in "blindsight," patients make visual discriminative responses without the subjective experience of seeing (Weiskrantz, 1986). In prosopagnosia, patients show discriminative galvanic skin responses to familiar faces without the subjective experience of recognizing those faces (see Young & De Haan, 1990).

People with normally functioning memory also show dissociations in their performance on direct versus indirect tests of memory (for reviews, see Richardson-Klavehn & Bjork, 1988; Roediger, 1990; Schacter, 1987). For example, reading a list of words increases the likelihood that subjects can later read those words when they are flashed very briefly on a computer screen, and such effects can be independent of the ability to recognize the words as earlier studied (Jacoby & Dallas, 1981). Direct and indirect measures of perception have also been shown to be dissociable (for reviews, see Bornstein & Pittman, *in press*). Marcel (1983), for example, showed that brief presentation of a word influenced subsequent decisions about related words even though subjects were unable to report that a word had been flashed when given a direct test of perception.

Thus, dissociations between direct and indirect tests of memory and perception take the same form as do dissociations between projective tests of personality and self-report measures. Both provide evidence for the existence of unconscious processes. However, as is well-known by researchers in the psychoanalytic tradition, although projective tests of personality are aimed at measuring unconscious influences, the tests are also open to other influences, such as attempts to deceive. Similar problems plague the use of indirect tests of memory and perception. We consider those problems after describing experiments showing unconscious influences on the subjective interpretation of events.

Unconscious Influences on Subjective Experience: Memory Illusions

The layperson is likely to take the existence of a single, shared "real world" as a given. By that naive realist view, the present is truly as it presents itself, and memory for the past can be trusted. The naive realist view was attacked by both psychoanalytic theory (e.g., Erdelyi, 1985) and

the New Look theory of perception (Bruner & Postman, 1949). In fact, there is now a great deal of support for the notion that an unconscious inference or attribution process underlies the subjective experience of perceiving (e.g., Helmholtz, 1867/1968; Marcel, 1983; Trope, 1986) and of remembering (Jacoby, Kelley, & Dywan, 1989; Ross, 1989; Spence, 1982).

Much as perceptual psychologists have used perceptual illusions to investigate the information used to construct perceptual experience, we have used memory illusions to investigate the construction of subjective experience. Memory for prior experience automatically influences the processing and interpretation of later events. One ubiquitous effect of past experience is to make current processing more efficient, rapid, or fluent. Such fluent processing is then unconsciously attributed to a source, thereby giving rise to a particular subjective experience. Errors in this attribution process can result in a variety of memory-based illusions.

Noise Judgments

The effect of prior exposure on perception of background noise serves as an example of memory-based illusions. In one experiment, Jacoby, Allan, Collins, and Larwill (1988) presented previously heard and new sentences against a background of white noise of varying loudness. Subjects judged the background noise as less loud when the sentences were old (had previously been heard) than when they were new. The relative ease of perceiving old sentences was misattributed to a lower level of background noise. That is, people were unable to separate out the contribution of memory to perception when judging noise level and so had the subjective experience of a low level of noise. Later experiments by a McMaster student, Jane Collins, have shown that this effect of prior experience on noise judgments is automatic in that people are unable to escape it. Even when subjects were informed about the effect and told to avoid it, they continued to judge the background noise accompanying old sentences as less loud than that accompanying new sentences. Current experience—even of fundamental physical dimensions—is colored by past experiences, and these effects are sometimes inescapable. Having had a particular experience, one cannot go back and recover one's naivete.

Measures of subjective experience may prove useful as indirect tests of other processes, in addition to memory. We have done preliminary research using noise judgments as indirect tests of categorization and of attitudes. Collins, McLeod, and Jacoby (1992) found that the perceived loudness of a background noise against which questions were asked was influenced by the emotion provoked by the questions. For example, the background noise accompanying the question "Would it be upsetting if your parents stopped supporting you?" was judged as much less loud than the same objective level of background noise presented with a neutral question. Our intent is to use tests of noise judgments as a new and improved Rorschach test. Among the advantages are that noise judgments are easily scored and that measures of subjective

by your best friend. Any positive attitude expressed to your worst enemy could be given heavy weight because responses of that sort would be opposed by social factors. This example illustrates the advantages of procedures in which alternative sources of influence are opposing one another rather than acting in concert. As we will describe, we have used such opposition procedures to provide unambiguous evidence of unconscious processing.

Even more information can be obtained by comparing an opposition condition with an in-concert condition. To continue our example: Although positive evaluations expressed to a known enemy could probably be taken as genuine, it is likely that those expressions would underestimate the acquaintance's true feelings. An important advantage could be gained by having both a known friend and a known enemy question the acquaintance. By that means, one could assess the extent to which the acquaintance exercised conscious control over attitude expression in response to social demands—a measure of “diplomacy” or “hypocrisy.” Given an estimate of conscious control, one is in a good position to assess the acquaintance's true attitude. The point of our example is to introduce a general method that can be used to separate the contributions of unconscious and consciously controlled processes to task performance. As we will show, having both an opposition condition and an in-concert condition allows us not only to demonstrate the existence of unconscious influences, but to estimate their magnitude.

The Advantages of Opposition

Many supposed demonstrations of unconscious perception and unconscious influences of memory have been called into question on the grounds that the experimenter mistakenly measured conscious rather than unconscious bases for performance (Holender, 1986; Richardson-Klavehn & Bjork, 1988). Those problems of interpretation arise because the experimental arrangement was such that both unconscious and conscious influences would facilitate task performance. Just as in the case of a known friend questioning an acquaintance, when effects act in concert, behavior might reflect unconscious influences or consciously controlled processes or both. Advantages can be gained by arranging the situation such that unconscious and conscious influences have opposite effects.

Consider, by way of example, Jacoby, Woloshyn, et al.'s (1989) use of a fame judgment task in which conscious and unconscious influences of memory were placed in opposition. Subjects in one condition devoted full attention to reading a list of nonfamous names, whereas those in a divided attention condition read the list of nonfamous names while monitoring an auditory string of digits. The old nonfamous names were then mixed with new famous and new nonfamous names and presented for a test of fame judgments. At test, subjects were correctly informed that all of the names on the previously read list were nonfamous, so that conscious recollection of reading a name on that list allowed subjects to be certain that the name was nonfamous. This conscious use

of memory opposed the increased familiarity produced by earlier reading a name. Formally, old nonfamous names would mistakenly be called *famous* only if the name was familiar (F) but subjects did not recollect (R) the name as having been presented earlier: $F(1 - R)$. Divided attention during study was predicted to impair conscious recollection and thus, to make it harder for subjects to oppose the effect of familiarity.

As predicted, subjects who devoted full attention to reading the nonfamous names were *less* likely to mistakenly call those old nonfamous names “famous” than they were the new nonfamous names. These subjects presumably could consciously recollect reading old names on the list, and so could know that they were nonfamous. The opposite occurred in the divided attention condition. Dividing attention resulted in old nonfamous names being *more* likely to be mistakenly called “famous” than new nonfamous names. That is, the effect of dividing attention was to limit the possibility of conscious recollection, leaving automatic or unconscious influences in the form of familiarity largely unopposed. We can be certain the false fame effect arose from an unconscious influence of memory, because conscious recollection would have produced the opposite effect.

Separating Conscious and Unconscious Influences: Process Dissociations

Placing effects in opposition can produce unambiguous evidence of automatic or unconscious influences, but does not allow one to estimate the magnitude of those influences. In fact, performance in an opposition condition actually *underestimates* unconscious influences (e.g., familiarity), because those influences are opposed by conscious recollection ($F[1 - R]$). To gain a true measure of unconscious influences, it is necessary to fully eliminate recollection (Set $R = 0$) or, alternatively, find some way of estimating the separate effects of unconscious and consciously controlled processing. It is the second alternative that we have pursued.

Informing subjects that earlier read names were nonfamous puts unconscious influences and conscious recollection in opposition—similar to an acquaintance being questioned by one's enemy. In contrast, an in-concert condition can be created by misinforming subjects that all of the earlier read names were actually “obscure” famous names. In this case, both recollection and familiarity would produce judgments of “famous.” This is because an old name could be judged famous either because it was recollected as being on the earlier read list (R) or because, although recollection failed ($1 - R$), the name was sufficiently familiar (F) to be accepted as famous; that is, the probability of calling an earlier read name “famous” would be $R + F(1 - R)$ and would reflect automatic and intentional uses of memory acting in concert—similar to an acquaintance being questioned by a known friend. With these two conditions, recollection can be estimated by subtracting the probability of calling an earlier read name “famous” on the opposition test ($F[1 - R]$) from that probability on the in-concert test

define unconscious processes do have *differential* effects on consciously controlled and unconscious processes. For example, limiting the attention given to briefly presented, pattern-masked words can reduce consciously controlled processing to near zero, as shown by performance in an in-concert condition being nearly identical to that in an opposition condition (Debner & Jacoby, 1992). Rarely, however, do such operations completely eliminate consciously controlled processing, and so they do not reliably provide a process-pure measure of automatic or unconscious processes. In contrast to their large effects on consciously controlled processes, factors such as full versus divided attention, aging, and speed of responding leave the contribution of unconscious processes invariant. Process dissociations of this sort provide support for the assumption that consciously controlled and unconscious processes *independently* contribute to task performance.

Our procedure measures conscious control as the difference between performance in conditions in which a person tries *to* versus tries *not to* engage in some act. The value of that measure of control is well-known to the layperson. Earlier, we illustrated the procedure with the example of testing friendship. As a second example, consider the problem of measuring the amount of control that one person has over another person, such as the control a parent has over a child. If a child is as likely to engage in an act when he or she is told not to as when told to, then the parent has no control. Control cannot be measured only by telling a child to or not to engage in some act; rather, control is assessed by the difference in performance between the two conditions. In contrast to consciously controlled processing, automatic or unconscious processes do not support selective responding but, rather, produce the same effect, regardless of whether that effect is in concert or opposed to one's intentions.

Elsewhere (Jacoby, Ste-Marie, et al., in press; Jacoby, Toth, et al., in press), we further describe the advantages of identifying unconscious influences with automaticity, as redefined by our procedures. One advantage is that recent theorizing about automaticity (e.g., Logan, 1988; Neumann, 1984) sheds light on questions about unconscious processes—for example, that theorizing is consistent with the possibility that unconscious influences are context specific rather than being general across contexts, as held by psychoanalytically inspired conceptions of the unconscious (cf. Fromkin, 1973). Important for producing unconscious influences may be the larger context in which an event occurs. People may be particularly susceptible to unconscious influences when an event fits into the flow of ongoing activity (cf. Wicklund, 1986). Concerns of that sort suggest that the power of unconscious processes may be badly underestimated by experiments that present single words or phrases out of context (cf. Greenwald's, 1992, "two-word challenge").

Greenwald (1992) holds that it is necessary to distinguish between two senses of the term *unconscious*—that is, to differentiate between unconscious perception and unconscious or automatic influences of memory. By his view, the important difference is that people were likely

to be aware of the events that later gave rise to unconscious influences of memory, whereas awareness is fully denied by claims of unconscious perception. With our focus on control, there are reasons to question the importance of that difference. Although the interval of time between presentation of an item and its test is shorter in investigations of unconscious perception than in investigations of memory, forgetting may occur during that interval. Unconscious perception might actually involve a fleeting awareness. At the extreme it is impossible to discriminate between a failure to remember and true unconscious perception, and fortunately, it does not seem terribly important to do so. This follows from our emphasis on control. Awareness at the time an effect operates is more critical than any earlier difference in awareness. If one is to avoid a source of influence, one must be aware of that influence when it exerts its effect. For both unconscious influences of memory and unconscious perception, behavior is affected by processes that are not under current volitional control.

Dividing attention either during study or at test can produce effects that parallel those produced by briefly presented, pattern-masked items. Although a useful tool, there really is nothing special about presenting items in impoverished perceptual conditions. Indeed, larger unconscious influences can probably be produced by manipulations of attention than by flashing items for a brief duration. In that regard, it is interesting to consider the controversy surrounding the effects of subliminal "back-masked" messages that are supposedly embedded in some rock music (Vokey & Read, 1985). Given the effects of divided attention, there may be more to fear from the "supraliminal" messages in background music than from any "subliminal" messages hidden in that music. The backgrounding of music, akin to dividing attention, likely makes one more open to the lyrics as a source of unconscious influences and persuasion. We might, then, have better reason to worry about the ill effects of backgrounding than those of back masking.

Conclusions

New Looks 1 (e.g., Bruner & Postman, 1949) and 2 (Erdelyi, 1974) were not entirely successful, because their proponents could not refute the claim that supposed measures of unconscious processing were contaminated by conscious processing. Recent findings of cognitive task dissociations, whereas fascinating, provide little real advance over New Looks 1 and 2, because their interpretation also rests on the assumption that a particular task provides a process-pure measure of unconscious processing. In that vein, the use of task dissociations as evidence for the existence of separate perceptual or memory systems (e.g., Cohen & Squire, 1980; Tulving & Schacter, 1990) is similar to the use of projective tests to identify particular personality characteristics. Under some conditions, task dissociations can be used to demonstrate the existence of unconscious processes, but they cannot measure the magnitude of those effects. Also, because of the few constraints on theorizing, by relying on task disso-

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