Chapter 17
The Psychological Unconscious

John F. Kihlstrom
University of Arizona

Non amo te, Sabidi, nec possum dicere quare:
hoc tantum possum dicere, non amo te.
MARCUS VALERIUS MARTIALIS
Epigrammata, I, 32*

The doctrine of mentalism states that mental states are to actions as causes to effects. When classifying the mental states that are causally implicated in behavior, philosophers and psychologists have generally taken refuge in the threefold "trilogy of mind" proposed initially by Kant, and later adopted by the German and Scottish philosophers: cognition, emotion, and motivation (Hilgard, 1980b). As psychology developed as an empirical science, research focused on those mental states that were accessible to consciousness. Thus, Wundt, Titchener, and other structuralists who founded the earliest psychological laboratories generally assumed that the mind is able to observe its own inner workings. Their research relied on the method of introspection, by which trained observers attempted to analyze their own percepts, memories, and thoughts into elementary sensations, images, and feelings. This line of scientific inquiry on conscious mental life was interrupted by the radical behaviorism of Watson and his followers, who argued that consciousness was nonexistent, epiphenomenal, or irrelevant to behavior. One of the most salutary by-products of the "cognitive revolution," and the subsequent development of an interdisciplinary cognitive science, has been the revival of interest in consciousness (Hilgard, 1977, 1980a, 1987).

This is fine so far as it goes, but even the 19th-century psychologists recognized that the mental structures and processes underlying experience, thought, and action were not completely encompassed within the span of conscious awareness. That is to say, consciousness is not all there is to the mind. For example, Helmholtz concluded that conscious perception was the product of unconscious inferences based on the individual's knowledge of the world and memories of past experience. Somewhat later, Freud asserted that our conscious mental lives were determined by unconscious ideas, impulses, and emotions, as well as defense mechanisms unconsciously arrayed against them (see Bowers & Meichenbaum, 1984; Ellenberger, 1970;

*Many readers will be familiar with the following free translation by the 18th century English poet Thomas Brown (Howell, 1980):

I do not love you Dr Fell, but why I cannot tell;
But this I know full well, I do not love you, Dr. Fell.

Klein, 1977; Perry & Laurence, 1984; Whyte, 1960). Ever since that time, investigators have explored the dynamic and the cognitive unconscious in separate, largely independent lines of inquiry (Burston, 1986).

THE DYNAMIC UNCONSCIOUS IN PSYCHOANALYSIS

The dynamic unconscious is sometimes considered to be the intellectual property of psychodynamic approaches to personality and psychopathology that evolved beginning in the 19th century (Ellenberger, 1970; Macmillan, 1989), and especially of the psychoanalytic tradition initiated by Sigmund Freud. As defined by Shevrin and Dickman (1980), the dynamic unconscious is psychological, meaning that the terms applied to conscious experience ("perception," "affect," "motive," etc.) are also applicable to unconscious mental life; it is active, meaning that unconscious processes affect ongoing behavior and experience; and it is different, meaning that unconscious processes are organized differently, and follow different procedural rules, than their conscious counterparts. In the clinical theory of psychoanalytic psychology, the psychological unconscious is manifest in the formation of symptoms—bothersome ideas, impulses, and behaviors for which the patient cannot account, and over which he or she has no control. It should be noted that Shevrin and Dickman (1980) actually use the term "*psychological* unconscious," as opposed to unconscious brain events and other physiological processes (see also Kihlstrom, 1984). Because their discussion is explicitly framed by psychoanalytic theory, it seems appropriate to introduce it here. However, it should be noted that except for certain implications concerning the drive-relatedness of unconscious processes, and the unconscious origins of dreams and symptoms, their treatment applies equally well to the cognitive and dynamic views of the psychological unconscious.

Based on his observations of hysterical patients, and his analysis of such phenomena as dreams, errors, and jokes, Freud (1900/1953, Ch. 7) initially proposed a topographical division of the mind into three mental compartments, or "systems," which he called *Cs*, *Pcs*, and *Ucs*. The system *Cs*, or conscious mind, contains those thoughts, feelings, motives, and actions of which we are phenomenally aware at the moment. Freud explicitly likened consciousness to a sensory organ capable of perceiving other mental contents. The system *Pcs*, by contrast, contains mental contents that are not currently in conscious awareness, but that are available to consciousness, and that can be brought into awareness under certain conditions. Finally, the system *Ucs* contains mental contents that are unavailable to consciousness—that cannot enter awareness under any circumstances. According to Freud, contents are exchanged between the systems *Pcs* and *Cs* by virtue of "cathexis"—by having attention paid to, or withdrawn from, them; contents residing in the system *Ucs* are kept out of (or expelled from) the system *Pcs* by means of repression. As others (e.g., Erdelyi, 1985) have noted, this topographical model, with its spatial metaphors, may be read as an anticipation of modern multistore models of human information processing.

Freud maintained this account of the vicissitudes of consciousness for approximately two decades (Freud, 1912/1958, 1915/1957, 1917/1961), but then introduced a wholesale revision of his view, shifting from a topographical to a functional analysis of the mind (Freud, 1923/1961, 1940/1964). This new account postulated three different types of mental activity, rather than three different storage structures: the "id," "ego," and "superego." The id was described as the seat of the instincts, which are expressed through either the automatic discharge of reflex action, or the hallucinatory wish-fulfillment of primary-process thought. The ego is concerned with the external physical environment, and discovers reality by means of the logical operations of secondary-process thought. The superego, similarly, is concerned with the constraints on instinctual expression imposed by the moral values of the external social environment.

Although it might seem natural to graft the topographical model onto the functional one, such a connection proved untenable. The id is strictly unconscious, and except in cases of psychosis can be known only through inference. By the same token, consciousness is necessarily a quality of the ego—after all, the ego functions expressly to permit us to become aware of external reality. At the same time, however, the defense mechanisms are also part of the ego, and their operations are not accessible to consciousness; and since the ego cannot be con-

scious of all of external reality at once, some of its contents (and, correspondingly, of the superego) must necessarily be preconscious.

The problem of reconciling the two different divisions of the mind, topographic and functional, was not solved by Freud before he died. Nevertheless, his assignment of some nonconscious mental functions to the ego, in both its defensive and nondefensive spheres, initiated an important research tradition within post-Freudian psychoanalysis. Beginning with the work of Anna Freud, and especially in the hands of Heinz Hartmann, David Rapaport, and George Klein, psychoanalytic ego psychology focused on the nondefensive, reality-oriented tasks of the ego (Kihlstrom, 1988). The research of the ego psychologists dealt with conventional topics of perception, memory, and thinking, and in many respects it resembled that being performed elsewhere in academic laboratories. In other respects, however, their work was quite different: For example, it favored prose over nonsense syllables as stimulus materials; took images and dreams seriously; and emphasized the interplay of emotional, motivational, and cognitive processes. The tradition of psychoanalytic ego psychology was linked most closely with mainstream experimental psychology by the work of Bruner, Klein, and others on the "New Look" in perception and attendant research on such topics as subliminal perception, perceptual defense and vigilance, and repression–sensitization (Bruner & Klein, 1960; Erdelyi, 1974, 1985).

In the present context, the most important feature of psychoanalytic ego psychology is that it took seriously the question of the psychological unconscious, and of the relations between conscious and nonconscious mental processes, at a time when most academic psychologists had difficulty taking consciousness itself seriously. A sort of manifesto for this viewpoint has been offered by Shevrin and Dickman (1980), who review a number of studies of selective attention, subliminal perception, and event-related potentials (ERPs) in support of two broad propositions: (1) that the initial stage of human information processing is outside of consciousness, is psychological in nature, is active in its effect on consciousness, and operates on principles that are qualitatively different from those governing conscious cognition; and (2) that representation of a mental event in consciousness is jointly determined by stimulus, state, and motivational factors.

At the same time, it should be noted that although Shevrin and other ego psychologists locate their research and theorizing squarely within the Freudian tradition, little if any of their evidence bears directly on the propositions of classical psychoanalysis—a point made by Shevrin and Dickman themselves (1980). In the first place, most work on selective attention and ERPs bears on mental states and processes that are preconscious, and does not address questions of nonconscious mental life (to adopt Freud's usage of these terms). For example, demonstrations of parallel processing at early stages of perception, while arguably evidence for qualitative differences between conscious and nonconscious cognition, do not perforce support a distinction between primary- and secondary-process thinking. Even research on perceptual defense and repression, while clearly relevant to the effects of emotion and motivation on cognition, rarely go beyond events that are merely unpleasant to tap the primitive sexual and aggressive contents that Freud attributed to the id—a criticism offered by Rapaport (1942) almost a half-century ago.

The undoubted success of ego-psychological research on preconscious (and even unconscious) mental life, while having its origins in neo-Freudian psychoanalysis, does not thereby support the essential propositions of psychoanalytic theory. This is because precisely the same propositions are offered, implicitly or explicitly, by cognitive theories that evolved independently of, and owe no intellectual allegiance to, the psychoanalytic tradition. To put it another way, research on subliminal perception, motivated forgetting, and the like offers little support for the Freudian conception of nonconscious mental life because the propositions that have been tested are rarely unique to Freudian theory. Such support can only be provided by research that tests those hypotheses that are unique to Freudian theory—for example, that unconscious contents are sexual and aggressive in nature, and that unconscious processes are primitive and irrational. Such experiments are hard to come by, and positive findings rarer still.

THE PSYCHOLOGICAL UNCONSCIOUS IN COGNITIVE THEORY

Within 19th-century academic psychology, perhaps the most forceful advocate of noncon-

scious mental life was William James (1890; see also Hilgard, 1969; Kihlstrom & Tobias, 1989; Myers, 1986; Taylor, 1983). James held that mental states can be unconscious in at least two different senses. First, a mental event can be excluded from attention or consciousness: "We can neglect to attend to that which we nevertheless feel" (1890, p. 201; see also pp. 455–458). These unattended, unconscious feelings are themselves mental states. Second, and more important, James drew on the clinical observations of cases of hysteria and multiple personality—some made by others, some by himself (Taylor, 1983)—to argue for a division of consciousness into primary and secondary (and, for that matter, tertiary and more) consciousnesses *(sic)*, only one of which is accessible to phenomenal awareness at any point in time. To avoid a possible oxymoron in the negation of consciousness, which was what really bothered him, James preferred to speak of "co-conscious" or "subconscious" mental states, rather than "unconscious" ones.

The radical behaviorists were no more interested in nonconscious than in conscious mental life, so empirical interest in the kinds of problems that interested Helmholtz and James (not to mention Freud) declined precipitously in the years after World War I. Serious theoretical interest in nonconscious mental life had to wait for the triumph of the cognitive revolution (Hilgard, 1980a, 1987). For example, the classic multistore model of information processing, of the sort proposed by Atkinson and Shiffrin (1968), implicitly makes consciousness coterminous with attention and primary memory. In this way, the model seems to identify nonconscious mental life with early, "preattentive" mental processes, such as feature detection and pattern recognition, that occur prior to the formation of a mental representation of an event in primary memory. By regarding attention and rehearsal as prerequisites for a full-fledged cognitive analysis of an event, and by implicitly identifying consciousness with higher mental processes, the classic multistore model leaves little or no room for the *psychological unconscious*—complex mental structures and processes that influence experience, thought, and action, but that are nevertheless inaccessible to phenomenal awareness.

A rather different perspective on nonconscious mental life is provided by Anderson's (1983) ACT* model of the architecture of cognition. ACT* holds that people can become aware of declarative knowledge (about themselves, their environments, their processing goals, and other relevant information), and that this awareness depends on the amount of activation possessed by the representations in question. However, it also holds that procedural knowledge is not available to introspection under any circumstances. Thus, procedural knowledge appears to be unconscious in the strict sense of the term. Because unconscious procedural knowledge is the cognitive basis for all higher thought processes, ACT* and similar revisionist models afford a much wider scope for the cognitive unconscious than did the classic statements.

An even larger place for nonconscious mental structures and processes has been created by a recent variant on information-processing theory known as "connectionism" or "parallel distributed processing" (PDP; McClelland, Rummelhart, & the PDP Research Group, 1986; Rummelhart, McClelland, & the PDP Research Group, 1986). PDP models postulate the existence of a large number of interacting processing units, or "modules," each devoted to a specific task. Because the activation of individual processing units can vary continuously as opposed to discretely, it is not necessary for an object to be fully represented in consciousness before information about it can influence other units. In addition, only some modules are assumed to be accessible to awareness and subject to voluntary control. Finally, PDP models assume parallel rather than serial processing, which permits a large number of activated units to influence each other at any particular moment in time. The number of simultaneously active processing units, and the speed at which they pass information among themselves, both may exceed the span of conscious awareness. Thus, in contrast to multistore information-processing theories that restrict the cognitive unconscious to elementary sensory–perceptual operations, PDP models seem to consider almost all information processing, including the higher mental functions involved in language, memory, and thought, to be unconscious.

Consciousness and Automaticity

Theories aside, it is clear that a good deal of mental activity is unconscious in the strict sense of being inaccessible to phenomenal awareness under any circumstances. Although some unconscious procedural knowledge ap-

pears to be innate, other cognitive and motoric skills that are acquired through experience may become routinized through practice, and their operations thereby rendered unconscious. In a metaphor derived from computer science, this process is described as "knowledge compilation," suggesting that the format in which the knowledge is represented has been changed (Anderson, 1982). In this way, both innate and acquired cognitive procedures may be unconscious in the strict sense of the term (Nisbett & Wilson, 1977). Unconscious procedural knowledge has also been described as "automatic," as opposed to "controlled" or "effortful" (for reviews, see Kahneman & Triesman, 1984; Shiffrin & Schneider, 1984). Automatic processes are so named because they are inevitably engaged by the presentation of specific stimulus inputs, regardless of any intention on the part of the subject. In addition, automatic processes consume few or no attentional resources, permitting us to perform two or more complex tasks simultaneously so long as at least one of them is routinized.

All theorists appear to be united about these two features of automatic processes (Anderson, 1982; Hasher & Zacks, 1979, 1984; LaBerge, 1975; Logan, 1980; Posner & Snyder, 1975; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977, 1984). The first criterion, of course, represents the defining feature of automaticity: To put it bluntly, automatic processes are those that are executed automatically. Set down this way, of course, the definition of automaticity is circular. Thus the second criterion seems to have been adopted in part to escape tautology, and perhaps because of difficulties in objectively measuring or controlling subjects' intentions as well (though this does not seem to be an insurmountable obstacle; see Peterson & Hochberg, 1983). But it should be noted that the concept of automaticity does not *require* anything other than independence from intention. It is certainly possible to conceive of automatic processes that, once invoked by appropriate stimulus conditions, consume attentional resources—just as a room heater, automatically activated by a thermostat, consumes electricity.

Even if the lack of intention and attention (together or separately) were to be accepted as criteria for automaticity, there are still procedural difficulties involved in documenting them in any particular case. Consider, for example, an experiment on spatial location in which word pairs are presented in one of four quadrants of a computer screen (e.g., Fleeson & Kihlstrom, 1988). In a "true incidental" condition, subjects are asked to make a judgment about the word pairs, but not instructed to remember them or where they occurred. In an "item-only/intentional" condition, subjects are asked to remember the words, but not the locations in which they were presented. In an "item-plus-context/intentional" condition, subjects are asked to remember both the words and their locations. Suppose that subsequent testing shows that memory for spatial location does not differ between the two intentional conditions, but is diminished in the true incidental condition. The first result indicates that the processing of spatial location is automatic, while the second indicates that it is intentional. Which comparison is relevant to the question of intentionality?

Hasher and Zacks (1979, 1984) have offered four additional criteria for defining a process as automatic. In their formulation, information is automatically processed if the following conditions hold:

1. The information is processed independent of the subject's intention (this is the first of the consensus criteria).
2. The mental representation of information processed automatically does not differ from that of the same information processed in an effortful manner.
3. Training and feedback do not improve processing.
4. There are no individual differences in processing.
5. There are no age differences in processing.
6. Arousal, stress, or simultaneous task performance have no effect on processing (this is a variant on the second of the consensus criteria).

These additional criteria have formed the foundation for a number of interesting lines of research. For example, Hasher and Zacks's (1979) proposal that information pertaining to the temporal and spatial context of events is automatically encoded, coupled with the assumption that automatic processes are age-invariant, has led to a number of studies comparing memory for context in children, young adults, and the elderly. Although comparisons of intentional versus incidental encoding conditions sometimes support the conclusion that

context is encoded automatically (Hasher & Zacks, 1984), other evidence indicates that the elderly have special difficulty encoding context (Burke & Light, 1984; Schacter, Kaszniak, & Kihlstrom, in press)—a finding that violates the criterion of invariance of automatic processes with age. Under these circumstances, it seems better for the present to decouple Hasher and Zacks's (1979) additional criteria from the concept of automaticity, and to treat the effects of such factors as training, age, and individual differences as empirical questions, as opposed to a priori assumptions.

A further quandary concerns the proper name for the opposite of "automaticity." Posner and Snyder (1975) and Bargh (1984) contrast "automatic" processes with "conscious" ones; Schneider and Shiffrin (e.g., Shiffrin & Schneider, 1984) with "controlled"; Logan (1980) and Bargh (1984) with "attentional"; and Hasher and Zacks (1979, 1984) with "effortful." Each of these contrasts captures something about automaticity, but some seem to represent *a priori* theoretical commitments that should be expressed as empirical questions. It is not necessarily the case that automatic processes should be unconscious, and that intentional ones should be conscious—or even that automatic processes should consume no attentional resources. Thus, the implicit opposition of automatic, involuntary, unconscious, and effortless processes against those that are controlled, conscious, and effortful leads to a certain amount of uncertainty when classifying particular mental processes. To take an example, posthypnotic suggestions are (in the classic case) executed outside of conscious awareness, but they are not automatic in the sense of either being invariant across conditions (Spanos, Menary, Brett, Cross, & Ahmed, 1987) or requiring no attentional resources (Hoyt & Kihlstrom, 1989). For the present, it seems best to contrast automatic processes with those that are controlled or intentional.

Implicit Perception and Memory

Although the procedural knowledge structures guiding thought and action may be unconscious, the declarative knowledge structures on which they operate are ordinarily thought to be available to conscious awareness. Thus, we generally assume that people notice and can describe the salient features of an object or event, even if they cannot articulate the way in which those features have been integrated to form certain judgments made about it. However, another implication of automatization is that the processes in question may operate on structures of declarative knowledge that are not themselves fully conscious. This raises the question of subliminal perception—the possibility that events that are not consciously detected may nonetheless have an impact on perceptual and cognitive functioning (Dixon, 1971, 1981).

Ever since the first demonstration of subliminal perception, by Peirce and Jastrow (1884), various methodological critiques have sought to demonstrate that events cannot be analyzed for meaning unless they have been consciously identified and attended to (for a recent review, see Holender, 1986). Recently, however, a number of compelling demonstrations of preconscious processing have appeared in the literature. For example, Marcel (1983a, 1983b) employed a lexical decision task in which one stimulus word (the prime) is followed by another word (the target), and the subject has to decide whether the target is a meaningful word. Such judgments are facilitated when the prime is also a word, and especially when the prime and target are from the same taxonomic category; however, most of these demonstrations have involved primes that could be consciously detected by the subject. Marcel followed his primes with masking stimuli, with the result that subjects were unable to detect the primes reliably. Nevertheless, such primes facilitated performance on the lexical decision task. Since semantic priming obviously requires some degree of semantic processing, it appears that meaning analyses can be performed on stimuli that are themselves outside of conscious awareness. Marcel's essential findings have since been confirmed by a number of investigators (e.g., Fowler, Wolford, Slade, & Tassinary, 1981; Greenwald, Klinger, & Liu, 1989; Reingold & Merikle, 1989). Despite persisting methodological critiques (e.g., Cheesman & Merikle, 1985, 1986; Erickson, 1960; Holender, 1986), the available literature clearly supports the proposition that certain aspects of semantic processing can occur in the absence of conscious awareness.

Preconscious processing appears to be mediated by the activation of relevant mental representations already stored in memory. Are anal-

ogous effects observed in memory itself? Just as there are palpable effects on experience, thought, and action of events that cannot be consciously perceived, so there may be similar effects of events that cannot be consciously remembered. An early demonstration along these lines was provided by Nelson (1978), whose subjects showed significant savings in relearning paired associates that they were unable to recall or even to recognize from a previous learning experience. Other demonstrations have made use of repetition priming effects, in which the processing of an unremembered item is facilitated by the fact that it was encountered previously. Similarly, studies of priming in tests involving lexical decision or word identification (e.g., Jacoby & Dallas, 1981), or completion of word fragments (e.g., Tulving, Schacter, & Stark, 1982), have shown that the magnitude of the priming effect is independent of the subject's ability to recognize the item as having been presented in a previous study session (see Schacter, 1987, for a review).

Relearning and priming effects such as these show that task performance may be affected by available memories of prior experiences, even though those experiences are not accessible to conscious recall. On the basis of results such as these, Schacter (Graf & Schacter, 1985; Schacter, 1987) has drawn a distinction between "explicit" and "implicit" memory. Explicit memory involves the conscious re-experiencing of some aspect of the past, whereas implicit memory is revealed by a change in task performance that is attributable to information acquired during a prior episode. An increasingly large literature from both patient and nonpatient populations indicates that people can display implicit memory without having any conscious recollection of the experiential basis of the effect.

The effects of implicit memory are conceptually similar to the effects of subliminal perception, in that both reveal the impact on experience, thought, and action of events that are not accessible to conscious awareness. The term "implicit" perception might be offered as an alternative to "subliminal" perception, in an attempt to get away from the unfortunate psychophysical implications of the concept of the "limen." However, in contrast to implicit perception, the events contributing to implicit memory effects are clearly detectable by the subject at the time they occur, attention is devoted to them, and they are at least momentarily represented in phenomenal awareness. Arguably, "implicit memory" should be reserved for those situations where a consciously perceived event is subsequently lost to conscious recollection, leaving "implicit perception" for instances where stimulus information in the current (or immediately past) environment affects ongoing experience, thought, and action. Since memory is the residual trace of perceptual activity, it stands to reason that implicit percepts can reveal themselves in memory—even if it should turn out that implicit percepts produce only implicit memories. Still, both sets of phenomena illustrate the cognitive unconscious, by showing perception and memory outside of phenomenal awareness.

One thorny theoretical issue in studies of implicit memory is whether priming effects can reflect the acquisition of new knowledge, or only the activation of pre-existing information. Consider, for example, the case where subjects study paired associates such as "sour–grapes" or "small–potatoes," and are then asked to give the first word that comes to mind when cued with "sour" or "small." Subjects will show priming of the targeted responses—a classic manifestation of implicit memory—independently of their ability to explicitly recall the word pairings on the study list. Because phrases such as "sour grapes" and "small potatoes" are common English idioms, the priming seems to reflect the activation of knowledge already stored in semantic memory. The question is whether completely novel pairings, such as "sour–potatoes" and "small–grapes," would have the same effect. The answer is affirmative (e.g., Schacter & Graf, 1989), but it appears that although implicit memory for pre-existing knowledge is independent of encoding conditions, implicit memory for new associations occurs only if the subject engages in some degree of deep processing at the time of presentation.

It seems likely that implicit perception is subject to the same sorts of constraints. That is, events in the current environment may actively influence mental functioning outside of conscious awareness, but only under conditions where (1) the event activates pre-existing knowledge or (2) the subject devotes active attention to the segment of the stimulus field where the event occurs. These conjectures remain to be tested. However, it is clear that the positive evidence for implicit perception and memory should not be taken as grounds for

concluding that *all* current and past events, regardless of whether they are consciously attended, are encoded in memory and influence ongoing experience, thought, and action—as implied, for example, by the specter of subliminal advertising (Moore, 1982) or subliminal persuasion (Merikle, 1988). On the contrary, a major task for future research is to discover the conditions under which implicit percepts and memories are formed, and those in which they are expressed.

Implicit Thought and Learning

Implicit perception and memory do not exhaust the domain of the psychological unconscious. For example, it appears that we can also have implicit *thought*, as revealed in some recent experiments by Bowers and his associates (Bowers, 1984, 1987; Bowers, Regehr, Balthazard, & Parker, in press). In these experiments, subjects are presented with word triads patterned after those of the remote-associates test, and are instructed to think of a word that they all have in common. Some of the triads are soluble, but others are not. Subjects are presented with both kinds of triads simultaneously, and must indicate which is which. An example is provided below:

Triad A	Triad B
playing	still
credit	pages
report	music

Bowers finds that subjects can perform this task with considerable accuracy, even though they cannot solve the soluble triad. They seem to be responding to some vague "feeling of knowing" analogous to that observed in episodic and semantic memory. But the point is that the correct solution influences the subjects' choice behavior, even though they are not consciously aware of it, in much the same manner as in implicit perception and memory.

A rather different line of research has sought to document the conceptually related phenomenon of implicit *learning*—as demonstrated by subjects' ability to use rules acquired through experience, in the absence of awareness of the rules themselves. In some ways, of course, implicit learning is demonstrated in language acquisition, where speakers acquire the ability to distinguish grammatical from ungrammatical utterances, even though they cannot articulate the grammatical rules underlying the judgments. Reber (1976, 1989) has attempted to model this process in the laboratory by developing artificial grammars whose rules control the construction of well-formed strings of letters. One such grammar runs approximately as follows:

A1. The first letter of the string can be either P or T.

B1. If the first letter was T, the next letter must be S.
B2. If the next letter was S, it can be repeated an infinite number of times.
B3. If S was not repeated, the next letter must be X.
B4. If the next letter was X, then the next letter can be either X or S.
B5. If the next letter was S, the string ends.
B6. If the next letter was X, the next letter must be T.
B7. If the next letter was T, go to C2.

C1. If the first letter is P, the next letter must be T.
C2. If the next letter was T, it may be repeated an infinite number of times.
C3. If T was not repeated, the next letter must be V.
C4. If the next letter was V, the next letter must be P or V.
C5. If the next letter was V, the string ends.
C6. If the next letter was P, the next letter may be X or S.

D2. If the next letter is S, the string ends.
D3. If the next letter is X, the next letter must be T.
D4. If the next letter was T, go to C2.

In Reber's procedure, subjects are asked to memorize a set of (perhaps) 20 grammatical letter strings (e.g., PVPXVPS or PTTTVPS). They are then tested with a number of new strings, some of which (e.g., PTTTTVPS) conform to the rule, while others (e.g., PTVPXVSP) do not. Interestingly, subjects are able to distinguish grammatical from nongrammatical letter strings at better than chance levels, even though none of them are able to give a full and accurate account of the grammatical rule that they have clearly induced

from the study set. Other investigators have produced similar sorts of demonstrations (e.g., Broadbent, FitzGerald, & Broadbent, 1986; Lewicki, 1986; Razran, 1961). Although their interpretation is somewhat controversial (Brewer, 1974), it seems plausible to conclude that these experiments do show the acquisition of new knowledge in the absence of either conscious intent to learn, or conscious awareness of what is learned.

IMPLICIT COGNITION IN NEUROPSYCHOLOGY AND PSYCHOPATHOLOGY

The reference experiments just described give us *prima facie* evidence for four different aspects of the cognitive unconscious. In Schacter's (1987) work, we have implicit memory: a change in task performance attributable to some past event, but in the absence of conscious recollection of that event. In Marcel's (1983a, 1983b) research, we have implicit perception: a change in task performance attributable to some *current* event, but in the absence of conscious perception of that event. Bowers's (1984, 1987) studies reveal implicit thought—reflections in behavior of problem-solving activity outside phenomenal awareness. And Reber's (1976, 1989) experiments reveal implicit learning—the acquisition of knowledge in the absence of reflective awareness of the knowledge itself. It should be noted that these sorts of implicit cognition effects are produced under conditions that might be described as "degraded:" stimulus presentations that are too brief to be consciously perceived; encoding conditions, or retention intervals, that produce memories too weak (in some sense) to be retrieved; problems that are too difficult to be solved except by crossword mavens; grammars that are fiendishly complex. But it turns out that consciousness does not depend on stimulus features alone.

Thus, in other cases, the problem is not in the task environment imposed on the subjects, but rather with the subjects themselves. For example, some of the most dramatic demonstrations of the effects of implicit memory come from studies by Schacter (1987) and his associates, among others, on cases of the amnesic syndrome resulting from bilateral damage to the medial temporal lobe (including the hippocampus) and diencephalon (including the mammillary bodies). These patients display a gross anterograde amnesia, meaning that they cannot remember events that occurred since the onset of the brain damage; other intellectual functions remain relatively intact. When they study a list of familiar words, and are asked to recall them shortly thereafter, they show gross impairments in memory compared to controls. But quite different results are obtained when they are asked to identify briefly presented words, or to complete a word stem or other fragment with a meaningful word. Not surprisingly, intact subjects show superior performance on trials where the correct response is a word that had appeared on the previously studied list, compared to those where the correct response is an entirely new word. This advantage of old over new items reflects a sort of priming effect of the previous learning experience. However, amnesic subjects also show normal levels of priming, despite the fact that they cannot remember the words they studied.

Although the available evidence is somewhat controversial, some phenomena analogous to implicit cognition appear to be observed in a variety of other neuropsychological syndromes as well. For example, Weiskrantz and his colleagues (Weiskrantz, 1980; Weiskrantz, Warrington, Sanders, & Marshall, 1974) have reported a patient who had extensive damage to the striate cortex of the occipital lobes. Although the patient reported an inability to see, he was nonetheless able to respond appropriately to some visual stimuli—a phenomenon called "blindsight" (for a review, see Campion, Latto, & Smith, 1983, and commentaries). Similarly, patients with bilateral lesions to the mesial portions of the occipital and temporal cortex are unable to recognize previously encountered faces as familiar—a condition known as "prosopagnosia." Nevertheless, there are now several reports indicating that prosopagnosic patients show differential behavioral responses to old and new faces (e.g., deHaan, Young, & Newcombe, 1987; Tranel & Damasio, 1985); this dissociation is similar to the implicit memory seen in the amnesic syndrome.

Even in the absence of demonstrable brain insult, injury, or disease, conceptually implicit cognition effects have been reported in the conversion disorders, once labeled "conversion hysteria" (for reviews, see Hilgard, 1977; Kihlstrom, 1984, in press; Kihlstrom & Hoyt, 1988). For example, Hilgard (cited in Hilgard

& Marquis, 1940) demonstrated that a patient with functional anesthesia and paralysis could acquire a conditioned finger withdrawal response in the affected arm; similarly, Brady and Lind (1961) showed that a functionally blind patient nonetheless displayed discriminative responses to visual stimulation. More recently, Sackeim, Nordlie, and Gur (1979) and Bryant and McConkey (1989) have reported cases of visual conversion disorder in which choice behavior was influenced by visual cues, even though the patients reported that they were unaware of the visual stimuli in question. The outcomes of these clinical case studies, then, parallel those of modern, well-controlled studies of implicit perception in intact subjects. The difference is that the stimuli shown to influence behavior are not degraded, but are clearly perceptible in terms of intensity, duration, and other characteristics.

In much the same way, studies of the memory disorders affecting patients with limited amnesia, fugue, and multiple personality reveal phenomena paralleling implicit memory (Kihlstrom, in press; Schacter & Kihlstrom, 1989). A number of case studies of functional retrograde amnesia show the likely influence of implicit memories for events that are otherwise inaccessible to conscious awareness. For example, a rape victim studied by Gudjonsson (1979; Gudjonsson & Taylor, 1985) showed electrodermal responses to stimuli related to events that she could not remember. And a case of fugue was solved by asking the patient to dial numbers randomly on a telephone: she unknowingly dialed her mother, who subsequently provided an identification (Lyon, 1985). And in a case of amnesia following homosexual rape, the patient experienced an increase in subjective distress when presented with Thematic Apperception Test (TAT) cards depicting one person attacking another from behind (Kaszniak, Nussbaum, Berren, & Santiago, 1988; see also Schacter, Wang, Tulving, & Freedman, 1982).

The most dramatic evidence along these lines comes from cases of multiple personality disorder (Schacter & Kihlstrom, 1989). Although a symmetrical or asymmetrical amnesia between personalities is commonly considered to be a cardinal symptom of this syndrome (Bliss, 1986; Kihlstrom, in press), some interpersonality transfer may be observed on tests of implicit as opposed to explicit memory. For example, Ludwig, Brandsma, Wilbur, Bendfeldt, and Jameson (1972), in the first experimental study of memory in multiple personality, found a number of instances in which information acquired by one personality influenced the performance of another personality on various learning and conditioning tasks, despite an apparent amnesic barrier between these same alter egos. Similarly, Nissen, Ross, Willingham, MacKenzie, and Schacter (1989) found some evidence of implicit memory shared by eight alter egos that were mutually amnesic on tests of explicit memory. However, such priming and transfer were not obtained between all the personalities, or on all the experimental tasks.

DISSOCIATION AND NEODISSOCIATION

The differences between explicit and implicit perception seen in conversion disorder, and between explicit and implicit memory seen in the functional amnesias, suggest that they share underlying mental processes in common (Kihlstrom, in press). In the late 19th and early 20th centuries, Freud's rival Pierre Janet (1889, 1907) described this process as one of dissociation (actually, his term was *désagrégation*). Janet's work on hysteria was overshadowed by Freud's (Perry & Laurence, 1984), and his magnum opus *Psychological Automatisms* (1889) unfortunately has gone untranslated. For these reasons, Janet's theoretical ideas are known primarily through secondary sources (Ellenberger, 1970; Hilgard, 1977), and only the briefest account of them can be given here.

Janet's theoretical work was predicated on Claude Bernard's paradigm of analysis followed by synthesis: the study of elementary psychological functions taken separately, and then the reconstruction of the whole mind based on knowledge of these parts. The elementary mental functions were labeled "psychological automatisms"; far from the elementary sensations, images, and feelings of the structuralists, they were construed as complex intelligent acts, adjusted to their circumstances, and accompanied by a rudimentary consciousness. Each automatism unites cognition, emotion, and motivation with action. Thus, automatisms resemble what some contemporary theorists (e.g., Anderson, 1983) would call "productions" (or "production systems")—condition–action units that are

executed in response to appropriate contextual cues.

Janet held that under normal circumstances, all psychological automatisms are bound together into a single stream of consciousness, each accessible to introspection and susceptible to voluntary control. However, the occurrence of mental trauma, especially in a vulnerable individual, may result in the splitting off of one or more psychological automatisms from conscious monitoring and control. Under these circumstances, there exist two or more streams of mental functioning (consciousness, in James's broad sense), each of which processes inputs and outputs, but only one of which is accessible to phenomenal awareness and voluntary control. The dissociated automatisms constitute "fixed ideas" *(idées fixes)*, which possess some degree of autonomy with respect to their development and effects on ongoing experience, thought, and action. The operation of these dissociated (as opposed to integrated or synthesized) psychological automatisms provides the mechanism for the major symptoms of hysteria: They produce the ideas, images, and behaviors that intrude, unbidden, on the stream of conscious thought and action; and their capacity to process information is responsible for the paradoxical ability of the hysterically blind or deaf to negotiate their environments successfully. Janet described these dissociated automatisms as "*sub*conscious" as opposed to "*un*conscious," and considered repression as just one possible mechanism for dissociation.

Janet's ideas were championed by the American psychologist Morton Prince (1906), and more recently by E. R. Hilgard (1977), who proposed a "neodissociation" theory of divided consciousness (see also Kihlstrom, 1984). Neodissociation theory assumes that the mental apparatus consists of a set of cognitive structures similar to Janet's automatisms and Bartlett's (1932) schemata, which monitor, organize, and control both thought and action in various domains. Each of these structures can seek or avoid inputs, or facilitate or inhibit outputs. The structures are arranged hierarchically, are normally in communication with each other, and are linked to a superordinate structure that provides for executive monitoring and control.

As the ultimate endpoint for all inputs, and the ultimate starting point for all outputs, the executive control structure provides the psychological basis for the phenomenal experiences of awareness and intentionality. However, certain conditions can alter the integration and organization of these structures, breaking the links between one or more subsystems or between a subsystem and the executive. Such a situation results in a condition of divided consciousness, in which percepts, thoughts, feelings, and actions are processed without being represented in phenomenal awareness. Such circumstances, of course, can lead to phenomena of implicit cognition, and to behaviors that are perceived as involuntary.

Whether in its original or its updated form, dissociation theory provides a rather different view of nonconscious mental functioning than does psychoanalytic theory (Hilgard, 1977; Kihlstrom, 1984). In the first place, dissociation theory holds that nonconscious mental contents are not necessarily restricted to primitive sexual and aggressive ideas and impulses, nor are nonconscious mental processes necessarily irrational, imagistic, or in any other way qualitatively different from conscious ones; they are simply not consciously accessible. In the second place, dissociation theory holds that the restriction of awareness need not be motivated by purposes of defense, nor need it necessarily have the effect of reducing conflict and anxiety; rather, it can occur simply as a consequence of particular psychological operations. Although largely compatible with the principles of contemporary cognitive psychology, dissociation theory also offers a somewhat different perspective on the cognitive unconscious. Thus, nonconscious mental processes are not restricted to automatized procedural knowledge, and nonconscious mental contents are not limited to unattended or degraded percepts and memories. These differences suggest that dissociative processes deserve more attention from both cognitive and clinical psychologists than they have received in the recent past.

IMPLICIT COGNITION IN SPECIAL STATES OF CONSCIOUSNESS

Setting aside the neurological and psychiatric syndromes, even normal subjects in special states of consciousness can give evidence of perception, memory, and thought outside of awareness. An especially interesting vehicle for such research is hypnosis, a social interaction in which one person (the hypnotist) gives suggestions to another (the subject) for experi-

ences involving alterations in perception, memory, and voluntary action. For example, it may be suggested that the subject: cannot see a particular object in his or her visual field; will forget the events that transpired during hypnosis; or will execute a suggestion after hypnosis has been terminated (Kihlstrom, 1984, 1985a, 1985b, 1987; Kihlstrom & Hoyt, 1988). In highly hypnotizable individuals, responses to these suggestions seem to involve alterations in the accessibility to consciousness of relevant percepts, memories, and thoughts.

Consider an experiment (Kihlstrom, 1980, 1985b) that was originally construed as bearing on the episodic–semantic distinction in memory. The subjects memorized a list of unrelated words to a strict criterion of learning, and then received a suggestion that they would not be able to remember the words they had learned. On an initial test of recall, the hypnotic virtuosos showed a very dense posthypnotic amnesia, remembering virtually none of the words they had previously memorized. Nevertheless, these amnesic subjects were significantly more likely to give list items as responses on a word association test, compared to carefully matched control items—a kind of priming effect.

These priming results show an effect of episodic memory for a prior experience on subjects' performance on a semantic memory task, despite the fact that the subjects could not remember the experience that was the source of the priming effect. In other words, the hypnotic subjects displayed implicit memory for their earlier experience, just as amnesic patients do. The big difference is that amnesic patients do not encode these memories particularly well, as evidenced by the fact that there are no known circumstances under which they can display explicit memory for them. By contrast, posthypnotically amnesic subjects are able to recall their experiences perfectly following administration of the prearranged reversibility cue. Thus, for hypnotic subjects the episodic memories remain available for conscious retrieval, by virtue of having been adequately encoded at the outset, even if they are temporarily inaccessible.

Although the most extensive evidence for implicit cognition in special states of awareness comes from research on hypnosis (e.g., Kihlstrom, 1984, 1985a; Kihlstrom & Hoyt, 1988), hints of similar effects may also be found elsewhere. For example, upon awakening, individuals rarely report any memory for events that transpired while they were asleep—dreams and reveries, brief awakenings, episodes of sleepwalking or sleep talking, presentation of instructional materials, and the like (Arkin, Antrobus, & Ellman, 1978). In fact, such a lack of explicit memory is one of the subjective criteria by which sleep is diagnosed, and constitutes the main evidence against the efficacy of sleep learning (Aarons, 1976). Nevertheless, there is some evidence of implicit memory for sleep experiences (Eich, in press; Schacter & Kihlstrom, 1989). The most dramatic example is provided by Evans's (1979) studies of sleep suggestion. In these studies, subjects were found to respond about 20% of the time to suggestions for simple motor behaviors administered during Stage REM sleep. Although they were unable to remember suggestions, cues, or responses upon awakening, they continued to respond to appropriate cues on subsequent nights—clear evidence for the behavioral influence of memory outside of awareness.

In a similar vein, the adequacy of general anesthesia is assessed, in large part, by the surgical patient's inability to remember his or her surgery (Rosen & Lunn, 1987). Although it is extremely rare for surgical patients to remember details of their operations, conversations among members of the medical team, and the like, there is some evidence for implicit as opposed to explicit memory for surgical events (e.g., Bennett, 1988; Kihlstrom & Schacter, in press). For example, Bennett (1988) has found evidence of postanesthetic suggestion effects, similar to those obtained by Evans (1979) in sleeping subjects. Furthermore, a recent experiment found significant priming effects on a word association task similar to the one described earlier (Kihlstrom, 1980), in patients who were presented with a list of paired associates during surgery (Kihlstrom, Schacter, Cork, Hurt, & Behr, 1989).

A TAXONOMY OF THE COGNITIVE UNCONSCIOUS

These sorts of clinical and experimental studies, conducted in a wide variety of domains and with many different types of subjects, seem to lead to two general types of conclusions. First, consciousness is not to be identified with any particular perceptual–cognitive functions, such as discriminative response to stimulation, perception, memory, or the higher mental pro-

cesses involved in judgment or problem solving. All of these functions can proceed outside of phenomenal awareness. Rather, consciousness is an experiential quality that may accompany any of these functions. The fact of conscious awareness may have particular consequences for psychological function: It seems necessary for voluntary control, for example, as well as for communicating one's mental states to others and for sponsored teaching. But it is not necessary for many forms of complex psychological functioning. Second, they lead to a provisional taxonomy of nonconscious mental structures and processes constituting the domain of the cognitive unconscious.

There are, within the domain of procedural knowledge, a number of complex processes that are unconscious in the proper sense—unavailable to introspection, in principle, under any circumstances. By virtue of routinization (or perhaps because they are innate), such procedures operate on declarative knowledge without either conscious intent or conscious awareness, in order to construct the person's ongoing experience, thought, and action. Execution of these mental processes, which can be known only indirectly through inference, is inevitable and consumes no attentional capacity. They may be described as unconscious in the strict sense of that term—in short, they comprise the "unconscious proper."

In principle, declarative knowledge is available to phenomenal awareness, and can be known directly through introspection or retrospection. However, it is now clear that procedural knowledge can interact with and utilize declarative knowledge that is not itself accessible to conscious awareness. The phenomena of implicit perception and memory suggest a category of "preconscious" declarative knowledge structures. Unlike truly unconscious procedural knowledge, these percepts and memories are available to awareness under ordinary circumstances. Although activated to some degree by current or prior perceptual–cognitive activity, and thus able to influence ongoing experience, thought, and action, they do not cross the threshold required for representation in working memory, and thus for conscious awareness. These representations, which underlie the phenomena of implicit perception and memory, reside on the fringes of consciousness, and changed circumstances can render them consciously accessible—at least in principle.

The phenomena of hypnosis and related states seem to exemplify a category of "subconscious" declarative knowledge. These mental representations, which are fully activated by perceptual inputs or acts of thought, are above the threshold ordinarily required for representation in working memory, and are available to introspection and retrospection under some circumstances, seem nevertheless dissociated from phenomenal awareness (Hilgard, 1977). Dissociative phenomena are of theoretical interest because they cannot comfortably be classified as either unconscious or preconscious. They are not limited to innate or routinized procedural knowledge; their execution is not automatic, and it consumes cognitive capacity. The stimulus input has not been degraded in any way, and the resulting memory traces are fully encoded and available for explicit retrieval. From the point of view of activation notions of consciousness, these phenomena are theoretically interesting because they indicate that high levels of activation (supported by the active deployment of attention and complex mental processing), although presumably necessary for residence in working memory, are not sufficient for conscious awareness.

THE MECHANISM OF CONSCIOUSNESS

What is required in order to achieve conscious awareness? At a psychological level of analysis, it seems that conscious awareness requires that a mental representation of an event be connected with some mental representation of the self as agent or experiencer of that event (Kihlstrom, 1984, 1987, 1989; Kihlstrom & Tobias, 1989). In his discussion of the stream of consciousness, James (1890) wrote that "the first fact for . . . psychologists is that thinking of some sort goes on" (p. 219). He also wrote, immediately thereafter, that "thought tends to personal form" (p. 220)—that is, every thought (by which James meant every conscious mental state) is part of a personal consciousness: "The universal conscious fact is not 'feelings exist' or 'thoughts exist' but '*I* think' and '*I* feel,' " (p. 221, emphasis added).

In other words, an episode of ongoing experience, thought, and action becomes conscious if, and only if, a link is made between the mental representation of the event itself and some mental representation of the self as the

agent or experiencer of that event. This mental representation of self, including the internal environment, resides in working memory as a memory structure, along with coexisting representations of the current external environment (Anderson, 1983; Kihlstrom & Cantor, 1984; Kihlstrom et al., 1988). Both self and context representations are necessary for the construction of a full-fledged conscious perception—which, following James, always seems to take this form: "*I see* (or hear, smell, taste, etc.) *this, now.*" And since memory is the residual trace of perceptual activity, these elements are necessary for the reconstruction of a full-fledged conscious recollections as well.

Within a generic associative-network theory of knowledge representation (e.g., Anderson, 1983), an episode of experience is represented by one node connecting three others: an "event" node, containing a raw description of an event; a "context" node, specifying the spatial and temporal (and perhaps emotional and motivational) context in which the event occurred; and a "self" node, indicating the person as the agent or the experiencer of the event. Conscious recollection of such an event occurs only when the representation of the self is retrieved along with some other information about the event. The inability to retrieve the links among all three types of propositions accounts for some of the peculiarities in conscious memory (Kihlstrom, 1984; Kihlstrom & Tobias, 1989; Reed, 1988). What unites the various phenomena of the cognitive unconscious—automatic processing and the various forms of implicit perception, memory, and thought—is that the link to self either does not get forged in the first place, or else it is subsequently lost. Thus, Claparede (1911/1951) wrote of the amnesic syndrome: "If one examines the behavior of such a patient, one finds that everything happens as though the various events of life, however well associated with each *other* in the mind, were incapable of integration with the *me* itself" (p. 71; emphasis in original).

Recently, Schacter (in press) has offered some provocative speculations concerning the neuropsychological foundations of conscious and nonconscious mental processes. A large number of neurological syndromes may be described as disorders of consciousness (for a review, see Schacter, McAndrews, & Moscovitch, 1988). For example, the dissociations between implicit and explicit memory seen in the amnesic syndrome suggest that the disorder reflects, in part, a failure to encode consciously accessible memories or to gain conscious access to memories, rather than a gross anterograde amnesia. Similarly, close examination of prosopagnosia yields evidence of discriminative response to old and new faces, even in the absence of conscious feelings of familiarity. And patients with cortical blindness show evidence of "blindsight" in their performance of visually guided responses. Evidence for disruptions in consciousness in the language disorders is tentative but also provocative (for a review, see Schacter et al., 1988). For example, patients with lesions in certain regions of the left occipital and temporal lobes, and adjacent areas, show an acquired dyslexia in which they cannot recognize whole words but must rely on a strategy of letter-by-letter decoding. Nevertheless, such patients can make correct lexical decisions concerning words presented too briefly to be decoded on a letter-by-letter basis, thus giving evidence of implicit *reading.* Within the broad class of aphasias, patients with lesions in Broca's area show disruptions in the use of Syntax, whereas those with lesions in Wernicke's area appear to lose semantic information. Even so, careful study sometimes reveals a selective disruption of explicit, but not implicit, linguistic knowledge. For example, patients with lesions in Broca's area can make accurate judgments of grammaticality, whereas their counterparts with lesions in Wernicke's area show semantic priming on lexical decision tasks. Finally, patients suffering many different neurological syndromes show symptoms of "anosognosia," meaning that they appear to be unaware of the extent of their psychological deficits (for a review, see McGlynn & Schacter, 1989).

Surveying this material, Schacter (in press) has proposed that the conscious experience of perceiving, remembering, and knowing reflects the operation of a hypothetical "conscious awareness system" (CAS), which is different from the executive system that initiates and monitors various cognitive–behavioral activities. The CAS normally interacts with the modules that regulate such operations as perception, memory, and language, and the product of such interaction is the conscious experience of perceiving, remembering, comprehending, or communicating. Thus, processing by one of the modules is not by itself sufficient to produce conscious experience. Consciousness

requires some output from the module in question to the CAS. Certain forms of brain damage produce a breakdown in communication between, say, the module governing memory and that governing consciousness, without necessarily impairing the functions of the memory module per se, or the connections between CAS and modules for perception or language. Such a state of affairs would result in an impairment of explicit but not implicit memory, but no defects in explicit perception or language functioning.

Schacter (in press) has not gone so far as to locate the CAS at a specific cortical site, but he has described several possible neuropsychological mechanisms underlying the communication breakdown. Damage to the CAS itself, of course, would produce a general loss of explicit cognition across a wide variety of domains. The fact that such a syndrome has not been observed suggests that CAS is widely distributed across the cortical mass. Concerning the specific disorders of consciousness, one possibility is that a relatively intact cognitive module becomes functionally disconnected (Geschwind, 1965) from an intact CAS; another is that the damaged cognitive module sends degraded signals to an intact CAS. Although these and other possibilities remain to be explored, Schacter's (in press) ideas represent an important new direction in the study of the biological substrates of consciousness.

THE PSYCHOLOGICAL UNCONSCIOUS IN THE TRILOGY OF MIND

It should be noted that most experimental work on nonconscious processing has followed Helmholtzian rather than Freudian lines, in employing neutral stimulus materials and sterile laboratory procedures that effectively limit the role played by personality factors, or the influence of the psychological unconscious on interpersonal relations. Moreover, most of the work summarized here has been more or less exclusively cognitive in nature, and has deemphasized the rest of the trilogy of mind—the emotional and motivational factors that are of central interest to personality and social psychology. Even so, several recent lines of work indicate how the concepts and paradigms employed in the laboratory study of the cognitive conscious may be extended to these domains.

Some of this research has an explicitly psychodynamic flavor. For example, Shevrin and his colleagues (Shevrin & Dickman, 1980) have studied the ERPs evoked in neurotic patients by words theoretically related to their complaints. By means of a tachistoscope, the words are presented too briefly to be consciously recognized: nevertheless, the patients appear to give differential ERPs to stimuli, depending on whether they are relevant to their complaints. In another line of research, Silverman and his colleagues (Silverman, 1976, 1983; Silverman, Lachman, & Milich, 1982; Silverman & Weinberger, 1985) have reported that brief tachistoscopic presentations of "symbiotic" messages such as "Mommy and I are one," too brief to be consciously recognized, can have effects on the behavior of both psychiatric patients and normal subjects. Shevrin's work focuses on the intensive study of carefully selected cases. Silverman's work has been somewhat more nomothetic in character, but his theoretical predictions have been controversial even among psychoanalysts, and his observations have proved difficult to replicate (Balay & Shevrin, 1988). Nevertheless, the two lines of research are obviously related to nonpsychodynamic work on implicit perception, and serve to illustrate the possibilities afforded by the marriage of psychodynamic theory with experimental method (Horowitz, 1988).

Other investigators, not necessarily aligned with the psychodynamic tradition, have also effectively used paradigms of implicit perception. For example, Kunst-Wilson and Zajonc (1980) have shown that mere exposure to line drawings of polygons increases judgments of their attractiveness, even though the exposures themselves are too brief to be consciously perceived (see also Seamon, Brody, & Kauff, 1983; Seamon, Marsh, & Brody, 1984). Bornstein, Leone, and Galley (1987) replicated and extended this effect: Not only did subjects show more positive attitudes toward people depicted in tachistoscopically presented photographs, but they also interacted more positively with these same individuals when they later encountered them in a contrived social interaction. Zajonc (1980) has used these results to claim that affective responses are independent of, and perhaps even prior to, cognitive processing. However, Mandler, Nakamura, and Van Zandt (1987) showed that mere exposure, outside of awareness, also increased ratings of brightness,

darkness, and *dis*liking. Thus, the preference effect of Kunst-Wilson and Zajonc (1980) seems to be a specific instantiation of a more general principle that activation of an internal representation of an object affects judgment about any relevant dimension of that object (Mandler et al., 1987), and does not support specific claims concerning the priority of affect (Lazarus, 1984; Zajonc, 1984).

Nevertheless, the effects on preference judgments and other emotional responses set the stage for other analyses of unconscious influences on social cognition and interaction (Cantor & Kihlstrom, 1987, 1989; Kihlstrom & Cantor, 1989). Some early research along these lines was reported by Nisbett and Wilson (1977; see also Wilson, 1985; Wilson & Stone, 1985), who argued that people largely lack introspective access to the actual determinants of their judgments and other behaviors (for critiques, see Bowers, 1984; Smith & Miller, 1978). More recently, programmatic research by Bargh (1984, 1989) has explored the impact of unconscious, automatic processes on impression formation; and another program by Lewicki (1986; Lewicki & Hill, 1987) has shown that information about the features of social stimuli (and the covariations among them) can be acquired through implicit learning and can influence behavior, even though it is stored in a form that is inaccessible to conscious awareness.

The success and vigor of these lines of research is clear to all observers, and promises much to the personality and social psychologists of the future. A full century since the publication of Janet's (1889) *Psychological Automatisms* and James's (1890) *Principles of Psychology*, and five decades since the death of Freud, the study of nonconscious life has been completely revolutionized. For the first time, contemporary cognitive psychology has begun to offer a clear theoretical framework for studying the relations between conscious and nonconscious mental life. Along with the development of a new class of psychological theories has come a new set of observations, derived from sophisticated new experimental paradigms, including research in cognitive neuropsychology. Thus far, this body of research has revealed a view of nonconscious mental life that is more extensive than the unconscious inference of Helmholtz, but also quite different—kindler, gentler, and more rational—from the seething unconscious of Freud.

Still and all, it should be recognized that almost all of the work to date has been done within the confines of cognitive psychology and cognitive neuropsychology, with relatively little attention paid to the role of unconscious processes in personality and social interaction. Thus, it would seem that an important agenda item for the near future would be the deliberate adoption by personality and social psychologists of the concepts and principles that have served their cognitive colleagues so well, and the systematic extension of research on the psychological unconscious beyond words and polygons to people and actions, and beyond implicit cognition to implicit emotion and implicit motivation.

ACKNOWLEDGMENTS

The point of view represented herein is based in part on research supported by Grant Nos. MH-35856 and MH-44739 from the National Institute of Mental Health, and by Subcontract No. 1122SC from the Program on Conscious and Unconscious Mental Processes of the John D. and Catherine T. MacArthur Foundation, through the University of California–San Francisco. I thank Terrence L. Barnhardt, Lawrence J. Couture, Martha L. Glisky, Marcia K. Johnson, Susan M. McGlynn, Elizabeth Merikle, Paula M. Niedenthal, Mary A. Peterson, Daniel L. Schacter, Douglas J. Tataryn, and Betsy A. Tobias for their comments.

REFERENCES

Aarons, L. (1976). Sleep-assisted instruction. *Psychological Bulletin, 83,* 1–40.

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review, 89,* 369–406.

Anderson, J. R. (1983). *The architecture of cognition.* Cambridge, MA: Harvard University Press.

Arkin, A. M., Antrobus, J. S., & Ellman, S. J. (1978). *The mind in sleep.* Hillsdale, NJ: Erlbaum.

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spends (Eds.), *The psychology of learning and motivation* (Vol. 2, pp. 89–195). New York: Academic Press.

Balay, J., & Shevrin, W. (1988). The subliminal psychodynamic activation method: A critical review. *American Psychologist, 43,* 161–174.

Bargh, J. A. (1984). Automatic and conscious processing of social information. In R. S. Wyer and T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 3, pp. 1–43). Hillsdale, NJ: Erlbaum.

Bargh, J. A. (1989). Conditional automaticity: Varieties of automatic influence in social perception and cognition. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 3–51). New York: Guilford Press.

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge, England: Cambridge University Press.

Bennett, H. L. (1988). Perception and memory for events during adequate general anesthesia for surgical operations. In H. M. Pettinati (Ed.), *Hypnosis and memory* (pp. 193–231). New York: Guilford Press.

Bliss, E. L. (1986). *Multiple personality, allied disorders, and hypnosis*. New York: Oxford University Press.

Bornstein, R. F., Leone, D. R., & Galley, D. J. (1987). The generalizability of subliminal mere exposure effects: Influence of stimuli perceived without awareness on social behavior. *Journal of Personality and Social Psychology, 53*, 1070–1079.

Bowers, K. S. (1984). On being unconsciously influenced and informed. In K. S. Bowers & D. Meichenbaum (Eds.), *The unconscious reconsidered* (pp. 227–272). New York: Wiley-Interscience.

Bowers, K. S. (1987). Revisioning the unconscious. *Canadian Psychology, 28*, 93–104.

Bowers, K. S., & Meichenbaum, D. (Eds.). (1984). *The unconscious reconsidered*. New York: Wiley-Interscience.

Bowers, K. S., Regehr, G., Balthazard, C., & Parker, K. (in press). Intuition in the context of discovery. *Cognitive Psychology*.

Brady, J. P., & Lind, D. I. (1961). Experimental analysis of hysterical blindness. *Behaviour Research and Therapy, 4*, 331–339.

Brewer, W. F. (1974). There is no convincing evidence for operant or classical conditioning in adult humans. In W. B. Weimer & D. S. Palermo (Eds.), *Cognition and the symbolic processes* (pp. 1–42). Hillsdale, NJ: Erlbaum.

Broadbent, D. E., FitzGerald, P., & Broadbent, M. H. P. (1986). Implicit and explicit knowledge in the control of complex systems. *British Journal of Psychology, 77*, 33–50

Bruner, J. S., & Klein, G. S. (1960). The function of perceiving: New Look retrospect. In S. Wapner & B. Kaplan (Eds.), *Perspectives in psychological theory*. New York: International Universities Press.

Bryant, R. A., & McConkey, K. M. (1989). Visual conversion disorder: A case analysis of the influence of visual information. *Journal of Abnormal Psychology, 98*, 326–329.

Burke, D. M., & Light, L. L. (1981). Memory and aging: The role of retrieval processes. *Psychological Bulletin, 90*, 513–546.

Burston, D. (1986). The cognitive and dynamic unconscious: A critical and historical perspective. *Contemporary Psychoanalysis, 22*, 133–157.

Campion, J., Latto, R., & Smith, Y. M. (1983). Is blindsight an effect of scattered light, spared cortex, and near-threshold vision? *Behavioral and Brain Sciences, 6*, 423–486.

Cantor, N., & Kihlstrom, J. F. (1987). *Personality and social intelligence*. Englewood Cliffs, NJ: Prentice-Hall.

Cantor, N., & Kihlstrom, J. F. (1989). Social intelligence and cognitive assessments of personality. In R. S. Wyer & T. K. Srull (Eds.), *Advances in social cognition* (Vol. 2, pp. 1–59). Hillsdale, NJ: Erlbaum.

Cheesman, J., & Merikle, P. M. (1985). Word recognition and consciousness. In D. Besner, T. G. Waller, & G. E., MacKinnon (Eds.), *Reading research: Advances in theory and practice* (Vol. 5, pp. 311–352). New York: Academic Press.

Chessman, J., & Merikle, P. M. (1986). Distinguishing conscious from unconscious perceptual processes. *Canadian Journal of Psychology, 40*, 343–367.

Claparede, E. (1951). [Recognition and "me-ness"]. In D. Rapaport (Ed.), *Organization and pathology of thought* (pp. 58–75). New York: Columbia University Press. (Original work published 1911)

deHaan, E. H. F., Young, A., & Newcombe, F. (1987). Face recognition without awareness. *Cognitive Neuropsychology, 4*, 385–415.

Dixon, N. (1971). *Subliminal perception: The nature of a controversy*. London: McGraw-Hill.

Dixon, N. (1981). *Preconscious processing*. Chichester, England: Wiley.

Eich, E. (in press). Learning during sleep. In R. R. Bootzin, J. F. Kihlstrom, & D. L. Schacter (Eds.), *Sleep and cognition*. Washington, DC: American Psychological Association.

Ellenberger, H. F. (1970). *The discovery of the unconscious: The history and evolution of dynamic psychiatry*. New York: Basic Books.

Erdelyi, M. H. (1974). A new look at the New Look: Perceptual defense and vigilance. *Psychological Review, 81*, 1–25.

Erdelyi, M. H. (1985). *Psychoanalysis: Freud's cognitive psychology*. San Francisco: W. H. Freeman.

Erickson, C. W. (1960). Discrimination and learning without awareness: A methodological survey and evaluation. *Psychological Review, 67*, 279–300.

Evans, F. J. (1979). Hypnosis and sleep: Techniques for exploring cognitive activity during sleep. In E. Fromm & R. E. Shor (Eds.), *Hypnosis: Developments in research and new perspectives* (pp. 139–184). New York: Aldine.

Fleeson, W., & Kihlstrom, J. F. (1988). *Automatic and effortful encoding of episodic context*. Unpublished manuscript, University of Michigan.

Fowler, C. A., Wolford, G., Slade, R., & Tassinary, L. (1981). Lexical access with and without awareness. *Journal of Experimental Psychology: General, 110*, 341–362.

Freud, S. (1953). The interpretation of dreams. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 4, pp. 1–338; Vol. 5, pp. 339–621). London: Hogarth Press. (Original work published 1900)

Freud, S. (1957). The unconscious. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 14, pp. 159–215). London: Hogarth Press. (Original work published 1915)

Freud, S. (1958). A note on the unconscious in psychoanalysis. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 12, pp. 255–266). London: Hogarth Press. (Original work published 1912)

Freud, S. (1961). Introductory lectures on psycho-analysis. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 15, pp. 1–239; Vol. 16, pp. 243–463) London: Hogarth Press. (Original work published 1917)

Freud, S. (1961) The ego and the id. In J. Strachey (Ed.

and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 19, pp. 1–66). London: Hogarth Press. (Original work published 1923)

Freud, S. (1964). An outline of psycho-analysis. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 23, pp. 139–207). London: Hogarth Press. (Original work published 1940)

Geschwind, N. (1965). Disconnexion syndromes in animals and man. *Brain, 88,* 237–294.

Graf, P., & Schacter, D. L. (1985). Implicit and explicit memory for new associations in normal and amnesic subjects. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11,* 501–518.

Greenwald, A. G., Klinger, M. R., & Liu, T. J. (1989). Unconscious processing of dichopatically masked words. *Memory and Cognition, 17,* 35–47.

Gudjonsson, G. H. (1979). The use of electrodermal responses in a case of amnesia. *Medicine, Science, and the Law, 19,* 138–140.

Gudjonsson, G. H., & Taylor, P. J. (1985). Cognitive deficit in a case of retrograde amnesia. *British Journal of Psychiatry, 147,* 715–718.

Hasher, L., & Zacks, R. T. (1979). Automatic and effortful processes in memory. *Journal of Experimental Psychology: General, 108,* 356–388.

Hasher, L., & Zacks, R. T. (1984). Automatic processing of fundamental information: The case of frequency of occurrence. *American Psychologist, 39,* 1372–1388.

Hilgard, E. R. (1969). Levels of awareness: Second thoughts on some of William James' ideas. In R. B. MacLeod (Ed.), *William James: Unfinished business.* Washington, DC: American Psychological Association.

Hilgard, E. R. (1977). Controversies over consciousness and the rise of cognitive psychology. *Australian Psychologist, 12,* 7–26.

Hilgard, E. R. (1980a). Consciousness in contemporary psychology. *Annual Review of Psychology, 31,* 1–26.

Hilgard, E. R. (1980b). The trilogy of mind: Cognition, affection, and conation. *Journal of the History of the Behavioral Sciences, 16,* 107–117.

Hilgard, E. R. (1987). *Psychology in America: A historical survey.* San Diego: Harcourt Brace Jovanovich.

Hilgard, E. R., & Marquis, D. G. (1940). *Conditioning and learning.* New York: Appleton-Century-Crofts.

Holender, D. (1986). Semantic activation without conscious identification in dichotic listening, parafoveal vision, and visual masking: A survey and appraisal. *Behavioral and Brain Sciences, 9,* 1–66.

Horowitz, M. J. (1988). *Psychodynamics and cognition.* Chicago: University of Chicago Press.

Howell, P. (1980). *A commentary on Book I of the epigrams of Martial.* London: Athlone.

Hoyt, I. P., & Kihlstrom, J. F. (1989). *Posthypnotic suggestion and waking instruction: Allocation of attentional resource in simultaneous tasks.* Unpublished manuscript, University of Wisconsin.

Jacoby, L. L., & Dallas, M. (1981). On the relationship between autobiographical memory and perceptual learning. *Journal of Experimental Psychology: General, 110,* 306–340.

James, W. (1890). *Principles of psychology.* New York: Holt.

Janet, P. (1889). [*Psychological automatisms*]. Paris: Alcan.

Janet, P. (1907). *The major symptoms of hysteria.* New York: Macmillan.

Kahneman, D., & Triesman, A. (1984). Changing views of attention and automaticity. In R. Parasuraman & D. R. Davies (Eds.), *Varieties of attention* (pp. 29–61). New York: Academic Press.

Kaszniak, A. W., Nussbaum, P. D., Berren, M. R., & Santiago, J. (1988). Amnesia as a consequence of male rape: A case report. *Journal of Abnormal Psychology, 97,* 100–104.

Kihlstrom, J. F. (1980). Posthypnotic amnesia for recently learned material: Interactions with "episodic" and "semantic" memory. *Cognitive Psychology, 12,* 227–251.

Kihlstrom, J. F. (1984). Conscious, subconscious, unconscious: A cognitive view. In K. S. Bowers & D. Meichenbaum (Eds.), *The unconscious reconsidered* (pp. 149–211). New York: Wiley-interscience.

Kihlstrom, J. F. (1985a). Hypnosis. *Annual Review of Psychology, 36,* 385–418.

Kihlstrom, J. F. (1985b). Posthypnotic amnesia and the dissociation of memory. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol. 19, pp. 131–178). Orlando, FL: Academic Press.

Kihlstrom, J. F. (1987). The cognitive unconscious. *Science, 237,* 1445–1452.

Kihlstrom, J. F. (1988). Personality. In E. R. Hilgard (Ed.), *Fifty years of psychology: Essays in honor of Floyd Ruch* (pp. 139–152). Glenview, IL: Scott, Foresman.

Kihlstrom, J. F. (1989). Cognition, unconscious processes. In G. Adelman (Ed.), *Neuroscience year: The yearbook of the encyclopedia of Neuroscience* (pp. 34–36). Boston: Birkhauser Boston.

Kihlstrom, J. F. (in press). Dissociative disorders. In P. B. Sutker & H. E. Adams (Eds.), *Comprehensive handbook of psychopathology* (2nd ed.). New York: Plenum.

Kihlstrom, J. F., & Cantor, N. (1984). Mental representations of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 17, pp. 1–47). Orlando, FL: Academic Press.

Kihlstrom, J. F., & Cantor, N. (1989). Social intelligence and personality: There's room for growth. In R. S. Wyer & T. K. Srull (Eds.), *Advances in social cognition* (Vol. 2, pp. 197–214). Hillsdale, NJ: Erlbaum.

Kihlstrom, J. F., Cantor, N., Albright, J. S., Chew, B. R., Klein, S. B., & Neidenthal, P. M. (1988). Information processing and the study of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 145–178). San Diego: Academic Press.

Kihlstrom, J. F., & Hoyt, I. P. (1988). Hypnosis and the psychology of delusions. In T. F. Oltmanns & B. A. Maher (Eds.), *Delusional beliefs: Interdisciplinary perspectives* (pp. 66–109). New York: Wiley-Interscience.

Kihlstrom, J. F., & Schacter, D. L. (in press). Anesthesia, implicit memory, and the cognitive unconscious. In B. Bonke, W. Fitch, & K. Millar (Eds.), *Memory and awareness in anesthesia.* Rotterdam: Swets & Zeitlinger.

Kihlstrom, J. F., Schacter, D. L., Cork, R. C., Hurt, C., & Behr, S. E. (1989). *Implicit and explicit memory following surgical anesthesia.* Unpublished manuscript, University of Arizona.

Kihlstrom, J. F., & Tobias, B. T. (1989). Anosognosia, consciousness, and the self. In G. P. Prigatano & D. L. Schacter (Eds.), *Awareness of deficit following brain injury: Clinical and theoretical aspects* (in press). New York: Oxford University Press.

Klein, D. B. (1977). *The unconscious: Invention or discov-*

ery? A historico-critical inquiry. Santa Monica, CA: Goodyear.

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

LaBerge, D. (1975). Acquisition of automatic processing in perceptual and associative learning. In P. M. A. Rabbit & S. Dornic (Eds.), *Attention and performance V.* New York: Academic Press.

Lazarus, R. S. (1984). On the primacy of cognition. *American Psychologist, 39,* 124–129.

Lewicki, P. (1986). *Nonconscious social information processing.* New York: Academic Press.

Lewicki, P., & Hill, T. (1987). Unconscious processes as explanations of behavior in cognitive, personality, and social psychology. *Personality and Social Psychology Bulletin, 13,* 355–362.

Logan, G. D. (1980). Attention and automaticity in Stroop and priming tasks: Theory and data. *Cognitive Psychology, 12,* 523–.

Ludwig, A. J., Brandsma, J. M., Wilbur, C. B., Bendfeldt, E., & Jameson, D. H. (1972). The objective study of a multiple personality: Or, are four heads better than one? *Archives of General Psychiatry, 26,* 298–310.

Lyon, L. S. (1985). Facilitating telephone number recall in a case of psychogenic amnesia. *Journal of Behavior Therapy and Experimental Psychiatry, 16,* 147–149.

Macmillan, M. B. (1989). *Freud reevaluated: The completed arc.* Unpublished manuscript, Monash University, Melbourne, Australia.

Mandler, G., Nakamura, Y., & Van Zandt, B. J. S. (1987). Nonspecific effects of exposure on stimuli that cannot be recognized. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 13,* 646–648.

Marcel, A. (1983a). Conscious and unconscious perception: Experiments on visual masking and word recognition. *Cognitive Psychology, 15,* 197–237.

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

McClelland, J. L., Rummelhart, D. E., & the PDP Research Group. (1986). *Parallel distributed processing: Explorations in the microstructure of cognition. Vol. 2. Psychological and biological models.* Cambridge, MA: MIT Press.

McGlynn, S. M., & Schacter, D. L. (1989). Unawareness of deficits in neuropsychological syndromes. *Journal of Clinical and Experimental Neuropsychology, 11,* 143–205.

Merikle, P. M. (1988). Subliminal auditory messages: An evaluation. *Psychology and Marketing, 5,* 355–372.

Moore, T. E. (1982). Subliminal advertising: What you see is what you get. *Journal of Marketing, 46,* 38–47.

Myers, G. E. (1986). *William James: His life and thought.* New Haven, CT: Yale University Press.

Nelson, T. (1978). Detecting small amounts of information in memory: Savings for nonrecognized items. *Journal of Experimental Psychology: Human Learning and Memory, 4,* 453–468.

Nisbett, R., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84,* 231–259.

Nissen, M. J., Ross, J. L., Willingham, D. B., MacKenzie, T. B., & Schacter, D. L. (1989). Memory and awareness in a patient with multiple personality disorder. *Brain and Cognition, 8,* 117–134.

Peirce, C. S., & Jastrow, J. (1884). On small differences of sensation. *Memorials of the National Academy of Sciences, 3,* 73–83.

Perry, C., & Laurence, J.-R. (1984). Mental processing outside of awareness: The contributions of Freud and Janet. In K. S. Bowers & D. Meichenbaum (Eds.), *The unconscious reconsidered* (pp. 9–40). New York: Wiley-Interscience.

Peterson, M. A., & Hochberg, J. (1983). Opposed-set measurement procedure: A quantitative analysis of the role of local cues and intention in form perception. *Journal of Experimental Psychology: Human Perception and Performance, 9,* 183–193.

Posner, M. I., & Snyder, C. R. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition: The Loyola Symposium.* Hillsdale, NJ: Erlbaum.

Prince, M. (1906). *The dissociation of a personality.* New York: Longmans, Green.

Rapaport, D. (1942). *Emotions and memory.* Baltimore: Williams & Wilkins.

Razran, G. (1961). The observable unconscious and the inferable conscious in current Soviet psychophysiology. *Psychological Review, 68,* 81–147.

Reber, A. S. (1976). Implicit learning of artificial grammars. *Journal of Verbal Learning and Verbal Behavior, 5,* 855–863.

Reber, A. S. (1989). Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General, 118,* 219–235.

Reed, G. (1988). *The psychology of anomalous experience* (rev. ed.). Buffalo, NY: Prometheus Books.

Reingold, E. M., & Merikle, P. M. (1989). Using direct and indirect measures to study perception without awareness. *Perception and Psychophysics, 44,* 563–575.

Rosen, M., & Lunn, J. N. (1987). *Consciousness, awareness, and pain in general anaesthesia.* London: Butterworths.

Rummelhart, D. E., McClelland, J. L., & the PDP Research Group. (1986). *Parallel distributed processing: Explorations in the microstructure of cognition. Vol. 1. Foundations.* Cambridge, MA: MIT Press.

Sackeim, H. A., Nordlie, J. W., & Gur, R. C. (1979). A model of hysterical and hypnotic blindness: Cognition, motivation, and awareness. *Journal of Abnormal Psychology, 88,* 474–489.

Schacter, D. L. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 13,* 501–518.

Schacter, D. L. (in press). Toward a cognitive neuropsychology of awareness: Implicit knowledge and anosognosia. *Journal of Clinical and Experimental Neuropsychology.*

Schacter, D. L., & Graf, P. (1989). Modality specificity of implicit memory for new associations. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15,* 3–12.

Schacter, D. L., Kaszniak, A. W., & Kihlstrom, J. F. (in press). Models of memory and the understanding of memory disorders. In T. Yanagihara & R. C. Peterson (Eds.), *Memory disorders in clinical practice.* New York: Marcel Dekker.

Schacter, D. L., & Kihlstrom, J. F. (1989). Functional amnesia. In F. Boller & J. Graffman (Eds.), *Handbook of neuropsychology* (Vol. 3, pp. 209–231). Amsterdam: Elsevier.

Schacter, D. L., McAndrews, M. P., & Moscovitch, M.

(1988). Access to consciousness: Dissociations between implicit and explicit knowledge in neuropsychological syndromes. In L. Weiskrantz (Ed.), *Thought without language* (pp. 242–278). Oxford: Oxford University Press.

Schacter, D. L., Wang, P. L., Tulving, E., & Freedman, M. (1982). Functional retrograde amnesia: A quantitative case study. *Neuropsychologia, 20,* 523–532.

Schneider, W., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: I. Detection, search, and attention. *Psychological Review, 84,* 1–66.

Seamon, J. G., Brody, N., & Kauff, D. M. (1983). Affective discrimination of stimuli that are not recognized: Effects of shadowing, masking, and cerebral laterality. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 9,* 544–555.

Seamon, J. G., Marsh, R. L., & Brody, N. (1984). Critical importance of exposure duration for affective discrimination of stimuli that are not recognized. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10,* 465–469.

Shevrin, H., & Dickman, S. (1980). The psychological unconscious: A necessary assumption for all psychological theory? *American Psychologist, 35,* 421–434.

Shiffrin, R. W., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending, and a general theory. *Psychological Review, 84,* 127–190.

Shiffrin, R. W., & Schneider, W. (1984). Automatic and controlled processing revisited. *Psychological Review, 91,* 269–276.

Silverman, L. H. (1976). Psychoanalytic theory: "The reports of my death are greatly exaggerated." *American Psychologist, 31,* 621–637.

Silverman, L. H. (1983). The subliminal psychodynamic activation method: Overview and comprehensive listing of studies. In J. Masling (Ed.), *Empirical studies of psychoanalytic theories* (pp. 69–100). Hillsdale, NJ: Erlbaum.

Silverman, L. H., Lachman, F. M., & Milich, R. H. (1982). *The search for oneness.* New York: International Universities Press.

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

Smith, E. R., & Miller, J. D. (1978). Limits on perception of cognitive processes: Reply to Nisbett and Wilson. *Psychological Review, 85,* 355–362.

Spanos, N. P., Menary, E., Brett, P. J., Cross, W., & Ahmed, Q. (1987). Failure of posthypnotic responding to occur outside the experimental setting. *Journal of Abnormal Psychology, 96,* 52–57.

Taylor, E. (1983). *William James on exceptional mental states: The 1896 Lowell Lectures reconstructed.* New York: Scribner's.

Tranel, D., & Damasio, A. R. (1985). Knowledge without awareness: An autonomic index of facial recognition by prosopagnosics. *Science, 228,* 1453–1454.

Tulving, E., Schacter, D. L., & Stark, H. A. (1982). Priming effects in word-fragment completion are independent of recognition memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 8,* 336–342.

Weiskrantz, L. (1980). Varieties of residual experience. *Quarterly Journal of Experimental Psychology, 32,* 365–386.

Weiskrantz, L., Warrington, E. K., Sanders, M. D., & Marshall, J. (1974). Visual capacity in the hemianopic field following a restricted occipital ablation. *Brain, 97,* 709–728.

Whyte, L. L. (1960). *The unconscious before Freud.* New York: Basic Books.

Wilson, T. D. (1985). Strangers to ourselves: The origins and accuracy of beliefs about one's own mental states. In J. H. Harvey & G. Weary (Eds.), *Attribution: Basic issues and applications* (pp. 9–36). Orlando, FL: Academic Press.

Wilson, T. D., & Stone, J. I. (1985). Limitations of self-knowledge: More on telling more than we can know. *Review of Personality and Social Psychology, 6,* 167–183.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151–175.

Zajonc, R. B. (1984). On the primacy of affect. *American Psychologist, 39,* 117–123.