CHAPTER 4

Conscious, Subconscious, Unconscious: A Cognitive Perspective

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I cannot but think that the most important step forward that has occurred in psychology since I have been a student of that science is the discovery ... that, in certain subjects at least, there is not only the consciousness of the ordinary field, with its usual center and margin, but an addition thereto in the shape of a set of memories, thoughts, and feelings which are extra-marginal and outside of the primary consciousness altogether, but yet must be classed as conscious facts of some sort, able to reveal their presence by unmistakable signs. I call this the most important step forward because, unlike the other advances which psychology has made, this discovery has revealed to us an entirely unsuspected peculiarity in the constitution of human nature.

WILLIAM JAMES, *Varieties of Religious Experience* (1902, p. 233)

The study of consciousness has had a checkered past in the history of psychology. It was almost the whole of the field for James and Wundt, but declined to virtual nonentity status with the onslaught of the behaviorist movement. Thereafter, interest in *unconscious* mental states persisted in the hands of the psychoanalysts, and was revived twice within the living memory of academic psychology: once with the debate over subliminal perception and learning without awareness, and again with the discovery of psychological deficits among medical patients who have undergone cerebral commissurotomy. The purpose of this chapter is to analyze various concepts related to conscious, subconscious, and unconscious mental contents and processes. It begins with a consideration of the features of conscious mental life, and of the way in which various special states of consciousness may be diagnosed through the logic of converging operations.

Concepts related to consciousness are then analyzed from the perspective of classic cognitive approaches to the mind. While these theories have plenty to say about conscious and unconscious mental contents and processes, they appear to leave little room for the kind of subconscious mental contents and processes inherent in the concept of dissociation. Nevertheless, a wide variety of phenomena encountered in the clinic, laboratory, and everyday life appear to invite such a concept. These phenomena are briefly and selectively reviewed. Finally, a tentative view of divided consciousness, dissociation, and subconscious thought and action is offered within the context of resource theories of attention and network models of memory.

ON CONSCIOUSNESS AND SPECIAL STATES OF IT

What gives us the impression that we are conscious? What kind of evidence would convince us that a machine such as a computer, or a nonhuman animal, or (for that matter) another human being, was conscious? Scientists and philosophers disagree violently on the answers, and even on whether these are sensible questions. But nobody doubts that we humans at least, possess consciousness. The facts that erase any doubt are the facts of experience. "The first fact for us, then, as psychologists, is that thinking of some sort goes on" (James, 1890, p. 224). With the coming of the cognitive revolution, psychologists have given increasing recognition to this "first fact" (Hilgard, 1977a, 1980a; Hochberg, 1970; Mandler, 1975a; Sperry, 1968, 1969). Consciousness, in the form of attention, perception, memory, imagery, and thought, is once again at the center of things—with the difference that mental contents and processes are approached with the same commitment to publicly verifiable, quantitative observation that characterized the behaviorist paradigm of Watson and Skinner. Still, there is evidently some lingering uncertainty as to just what consciousness is.

One way to gain conceptual clarity is to turn to the dictionary. Natsoulas (1978), following Dewey (1906), has recently offered an exegesis of the word *consciousness* as defined in the 1933 *Oxford English Dictionary*. At the other extreme, James (1890) and Jaynes (1976) have provided extremely articulate introspective analyses of the phenomenal experience of consciousness. We say that we are conscious when we register distal and proxmimal events in phenomenal awareness; reflect on our past experiences, categorical knowledge, and rules of judgment, inference, and problem solving; direct our attention selectively to some stimuli rather than others; and deliberately select and execute some action in response to environmental conditions and personal goals. In short, consciousness has to do with two things:

1. *Monitoring* ourselves and our environment, so that percepts, memories, and thoughts come to be accurately represented in phenomenal awareness.
2. *Controlling* ourselves and our environment, so that we are able to voluntarily initiate and terminate behavioral and cognitive activities.

The key to the experience of consciousness, as James (1890, p. 226) noted, is self reference, as experiencer or agent: "The universal conscious fact is not 'feelings exist' and 'thoughts exist' but 'I think' and 'I feel.'" The two functions are obviously interrelated: It is hard to think of deliberately initiating a response to, or making a judgment about, some event which has not entered our awareness; and many of our deliberate actions seem precisely geared to bringing new stimuli into our awareness and exploring them more closely (Powers, 1973). It is by means of consciousness that we become aware of events, interpret them, and plan and execute strategies for dealing with them. It is also consciousness that permits us to communicate our ideas, experiences, intentions, and expectations to other people. Consciousness, coupled with language, thus forms the basis for the development and evolution of culture, and opens up the possibility of learning by precept as well as by direct experience and example (Bandura, 1977).

This much seems clear enough. It seems clear enough, too, that under some circumstances we experience profound alterations in the monitoring and/or controlling functions of consciousness. Ingesting drugs such as marijuana or LSD, practicing a meditative discipline such as yoga or Zen, falling asleep, and becoming hypnotized all seem to lead to such alterations; so do certain syndromes of psychopathology such as acute schizophrenia and hysteria. Ludwig (1966) has provided a list of the features of various states in which consciousness is ostensibly "special" or "altered." Ludwig's list offers a useful characterization of the kinds of phenomena observed in various special states of consciousness, but it is important to realize that it is *only* a list; there is no reason to think that it is exhaustive. More important, these features themselves have additional attributes which may be important in deciding whether a particular condition qualifies as a "special" or "altered" state of consciousness. For example, we might want to include the condition that the state be temporary, so that eventually the person reverts to baseline conditions; otherwise, a "special state" becomes a "normal trait." This would eliminate as a special state of consciousness such conditions as chronic coma, as well as the various stages of cognitive development proposed by Piaget and the "raising" of consciousness discussed in Marxist theory. It is debatable whether falling in love and out of it would qualify. We might also want to specify that the change from "normal" to "altered" consciousness and back be relatively abrupt; or that some threshold of significance and pervasiveness be crossed, so that a special state represents some dramatic departure from the individual's usual manner of relating to the world as a whole. This would eliminate learning some specific item of new information from the category of alterations in consciousness.

Finally, whatever list is employed, we do not know how many features must be present before some mental condition may qualify as a special state of consciousness. Following contemporary analyses of categorization (e.g., Rosch & Lloyd, 1978; Smith & Medin, 1981), it seems best to think of the notion of "special state of consciousness" as a natural concept represented by a prototype or one or more exemplars consisting of features which are correlated with category membership. No such feature is singly necessary, and no set of features
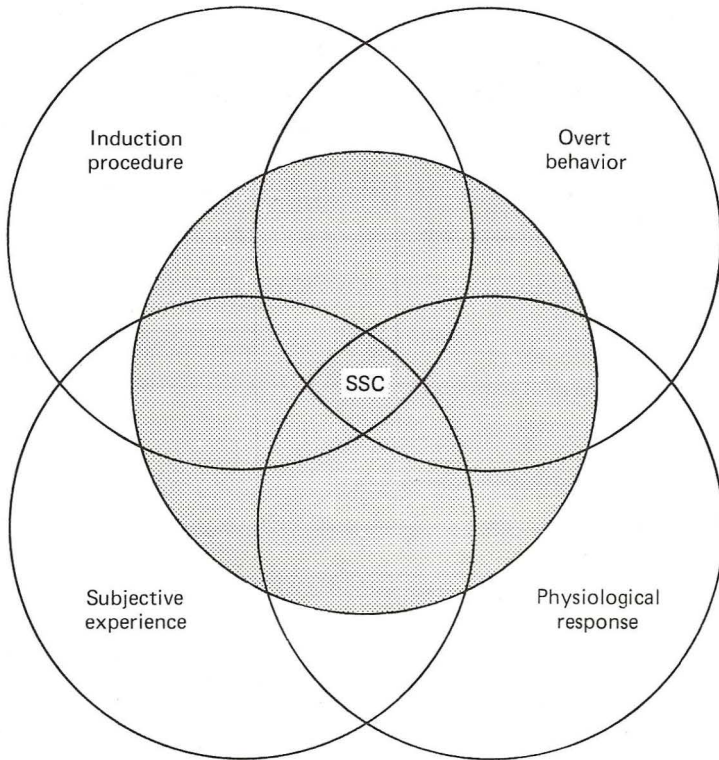
Figure 4.1.   Converging operations contributing to the diagnosis of a special state of consciousness (after Stoyva & Kamiya, 1968).

is jointly sufficient, to define a state as special, so that there are no clear boundaries between one special state of consciousness and another, or between altered and normal consciousness. The situation with special states, then, is similar to that which obtains in psychiatric diagnosis (e.g., Cantor & Genero, in press; Orne, 1977).

If special states of consciousness represent natural concepts, they also represent *hypothetical constructs*. Because we can never have direct knowledge of another mind, judgments about one's state of consciousness (and often our own; see Nisbett & Wilson, 1977) must be the work of informed imagination, inferred from a network of relationships among variables that are directly observable. Four sorts of observables are described below: none is necessary, and under certain circumstances knowledge of only one might be sufficient to index the presence of a special state of consciousness. The diagnosis of a special state can be made with confidence to the extent that there is convergence among the four kinds of variables, as in Figure 4.1 (Campbell & Fiske, 1959; Garner, Hake, & Ericksen, 1956; Stoyva & Kamiya, 1968).

Induction Technique

One way to define a special state of consciousness is as the output resulting from a particular input: this sort of operational definition is a residue of radical behaviorism. In this case, the presence of a special state is defined by the means employed to induce it: a psychedelic state follows the ingestion of LSD or marijuana, and hypnosis follows from receiving a hypnotic induction. Although there has been at least one attempt to employ such an input-output definition as the sole index of a special state (in the case of hypnosis; Barber, 1969), there are reasons for thinking that sole reliance on it is a mistake, and that some sort of manipulation check is also required. Obviously, the induction of a state does not necessarily follow from the performance of an ostensibly state-inducing ritual. As parents, lovers, and insomniacs know, sleep does not necessarily follow from crawling into bed and turning out the light; nor are these acts sufficient for sleep to occur. There may be resistance to the induction; or there may be individual differences which constrain response to the induction even when the situation is congenial and the individual has the proper set. Individual differences are important in another way: a person may be so disposed to enter the state (as in narcolepsy) as to require no induction at all.

Subject Report

Another approach is to define the state in terms of the person's subjective report that his or her consciousness is different from normal. Introspections such as these provided the data for much early psychological research, but the unreliability of the results led the behaviorists to reject subjective reports as proper data for psychology. With the cognitive revolution, introspections are permissible once again (Ericsson & Simon, 1980), but not without an appreciation of their limitations (Nisbett & Wilson, 1977). For example, sometimes subjects simply do not tell the truth. The good will which characterizes the experimental subject may lead him or her to say what the investigator wants to hear (Orne, 1962, 1977)—although, if the research is characterized in terms of open inquiry, the same good will should lead the subject to be candid. There are also familiar problems from the literature on eyewitness testimony stemming from the impact of leading questions (Barber, Spanos, & Chaves, 1974). Moreover, subjects may not recognize that they are in a special state until after it has terminated—as in the case of concussion or alcoholic blackout, in which the change in state is recognized only retrospectively by virtue of an amnesic gap.

Overt Behavior

"Objective" behavioral evidence is often preferred to "subjective" self-reports— though why this is so is a little puzzling, insofar as subjects can fake behavior as easily as they can lie (Orne, 1970, 1979). However, given the subject's good will and an experimental atmosphere of open inquiry, there are numerous behavioral indices available to the investigator who wishes to test for changes in the

monitoring and controlling functions of consciousness. The number of possible behavioral measures is limited only by the ingenuity of the experimenter. Measures of accuracy, organizational structure, and response latencies have proved especially useful elsewhere in cognitive psychology for gaining a view of various mental processes, and are likely to be promising in the investigation of special states of consciousness as well.

Psychophysiological Responses

Because overt behaviors and subject reports are under voluntary control and thus subject to distortion through motivated compliance and other social-influence processes, many investigators have turned to the covert, involuntary responses measured by psychophysiologists. This seems to be predicated on the perfectly reasonable assumption that because the brain is the body of mind, changes in consciousness should be associated with changes in nervous system activity. The best example is the correlation of rapid eye movements with dreaming, and the use of EEG criteria to mark the onset of sleep and to break it down into separate stages. It should be said, however, that these psychophysiological indices bring with them their own problems, not the least of which is the apparent fact that whether the question is distinguishing sleep from wakefulness (Johnson, 1970), or one emotion from another (Mandler, 1975b; Leventhal, 1983), psychophysiology alone is of no use. Even if there were specific patterns of psychophysiological response that were uniquely associated with various mental states, there would remain the fact that such indices have been validated against subjective report and overt behavior; and that a correlate cannot, logically, substitute for a criterion. As Malcolm (1959) points out, psychological concepts demand psychological referents. While psychophysiological correlates of mental activity are interesting in their own right (Hillyard & Kutas, 1983), to study them is not the same as to study consciousness. Subjective report and overt behavior, then, will serve as windows on the mind in a special state of consciousness.

States as Causes Versus States as Categories

In speaking of special states of consciousness, it is important to guard against the tendency to assign them a causal function—as, for example, in the statement that sleep causes dreams, or hypnosis causes hallucinations (Hilgard, 1969a). It may be the case that certain phenomena are more likely to occur in a particular special state, but that is not to say that the state is responsible for the phenomenon. To assign a causal function to a state risks tautology (Spanos, 1970a): How does one know that a subject is hypnotized? Because the subject is hallucinating. Why is the subject hallucinating? Because he or she is hypnotized. In fact, however, the risk of tautology is not particularly great, as Tellegen (1970) has argued in a response to Spanos (for a rejoinder, see Spanos, 1970b). While it may be possible to define, as Tellegen (1978–79) does, hypnosis as an organismic state (or states) that enables or facilitates response to hypnotic suggestions—that is, as something which causes hypnotic behavior—it seems preferable to follow Hilgard (1973a, 1977b) and Orne (1977), by defining hypnosis as a state in which certain

phenomena are known to occur. If a hypnotizable individual has volunteered for hypnosis and received a hypnotic induction procedure, and then proceeds to respond positively to suggestions offered by the experimenter for hallucinations, anesthesias, paralyses, amnesia, and the like, then we may say with some confidence that he or she has been hypnotized. Similar diagnoses could be made in the case of other possible special states, such as sleep, dreaming, and so forth. Our principal objection to assigning a causal function to a special state is that it does nothing to promote scientific understanding. We want to determine the cognitive (or psychobiological, or social) processes responsible for the phenomena categorized under the rubric of a particular special state of consciousness.

STEPS TOWARD A TAXONOMY OF MENTAL STATES

This chapter is concerned with unconscious mental processes—a topic which may strike many readers, as it did James (1890), as involving a contradiction in terms. James vigorously argued against the notion of unconscious thought, although he did agree that there are brain processes associated with mental activity of which we might not be aware. As if in warning to Freud and the psychoanalysts who were shortly to follow, James asserted that the concept of unconscious states of mind "is the sovereign means of believing what one likes in psychology, and of turning what might become a science into a tumbling-ground for whimsies" (1890, p. 163). But the Freudian psychology which was to come shared the force of James's critique with other trends in the psychology of his time, such as those which implicated unconscious inference in perception and judgment. He argued that the allegedly unconscious thought was rapidly forgotten; that it represented a revision of an earlier thought; or that it was not a *thought* at all, but merely an innate or habitual brain process. For James, clearly, thought and consciousness were identical.

The Concept of Unconscious

Arguably a person who is unconscious, as for example a victim of concussion or coma, has no mental processes at all: there is virtually no electrical activity recorded rrom the cortex, little or no response to environmental stimulation, and no memory of events occurring during the state if the patient should be so fortunate as to recover. Something else, then, must be meant by the concept of unconscious mental processes. Useful coverage of the various meanings assigned to the term "unconscious" are provided elsewhere (English & English, 1958; Klein, 1977; Whyte, 1960), and there is no need to review this material here. Evidently what the editors of this book, and most other psychologists as well, have in mind when they use the term are those cognitive contents and processes, existing in the cognitive system at some point in time and actively influencing ongoing cognition and action, of which the person is not aware. But in the final analysis even this is too broad: there are many objects and events available in the

perceptual field and in memory storage of which we are not presently aware, but which we could bring into awareness by the simple expedient of turning our attention to them. It seems inappropriate to label these as unconscious.

It was for just such cases that Freud (1900–1901) developed his tripartite division of the mind into the conscious, preconscious, and unconscious systems.

> Thus there are two kinds of unconscious, which have not yet been distinguished by psychologists. Both of these are unconscious in the sense used by psychology; but in our sense one of them, which we term the *Ucs,* is also inadmissable to consciousness, while we term the other the *Pcs* because its excitations...are able to reach consciousness. (pp. 614–615)

Unfortunately, as Chomsky (1980) has noted, Freud's use of the distinction between Psc and Ucs was inconsistent. At times he asserted that material in the Ucs was inaccessible in principle; at other times he conceded that the material might be accessible under certain special conditions. Chomsky, like many other contemporary cognitive psychologists (e.g., Anderson, 1982a; Nisbett & Wilson, 1977; Pylyshyn, 1981; Rozin, 1976), appears to identify unconscious mental contents and processes with those that are inaccessible *in principle.* We can acquire knowledge of their presence and activity by inference, but not by means of direct, immediate introspective awareness. This definition is preserved in the present essay: the term "unavailable" is used to characterize knowledge that is not represented in the cognitive system at all; by contrast, the term "unconscious" is used to characterize knowledge which resides in the mental system, and is actively employed in the service of ongoing cognitive processing, but which is incapable of being brought into phenomenal awareness and placed under voluntary control. We know the unconscious contents of the mind only by inference, never through direct introspection.

Far from rejecting the possibility, as James did, cognitive psychologists now believe that such unconscious contents compose a large portion of the mental system. Even the notion of unconscious inference, so scorned by James, appears to be necessary in order to account for elementary perceptual phenomena (Kaufman, 1974; Rock, 1975). Shevrin and Dickman (1980) have attempted to reconcile the conception of the unconscious offered by contemporary cognitive psychology with that held by Freudian psychoanalysis. They are able to show that the two conceptions have two features in common at the abstract level: in both cases, the unconscious is active rather than latent; and in both cases, unconscious mental processes operate on different principles than conscious ones. The attempt ultimately fails, however, because the nature of these unconscious contents, and the principles of their operation, are so radically divergent from the proposals of psychoanalysis. The information represented in the unconscious knowledge structures of cognitive psychology is very different from that conceived by Freud, who restricted it to primitive sexual and aggressive impulses, and those repressed memories and ideas which are associated with them. Nor do the unconscious contents of cognitive psychology

operate according to the irrational "primary process" principles associated with the Freudian unconscious, as opposed to the rational "secondary process" principles of the Freudian ego. Moreover, the contents of the cognitive unconscious do not achieve their status by virtue of defensive maneuvers motivated by anxiety, as the contents of the Freudian unconscious do.

The Concept of Subconscious

While rejecting the concept of *unconscious* thought, James did admit that under some circumstances "the total possible consciousness may be split into parts which coexist but mutually ignore each other, and share the objects of knowledge between them" (1890, p. 206; see also Hilgard, 1969b). Following Janet and Binet, from whom he drew his examples, James referred to this phenomenon as representing "secondary" consciousness, rather than "unconsciousness." Prince (1939), in the same vein, referred to "co-consciousness." This phenomenon, which Janet, Prince, and their associates referred to as "dissociation," was a cornerstone of an important but almost-forgotten school of thought within turn-of-the-century psychology and psychiatry.

It is commonly thought that the concepts of nonconscious mental processes and of the psychological causation of mental illness both trace their origins to Freud and the theory of psychoanalysis. To the contrary, as Ellenberger (1970; see also Hilgard, 1973a) has shown, both ideas have a long history before Freud. In 1775, with the appearance of Mesmer on the European medical scene, speculation about nonconscious states combined with rationalized, materialistic versions of primitive psychotherapeutic procedures to form the First Dynamic Psychiatry, whose inspiration came from such French neurologists and psychiatrists as Charcot, Liebeault, and Bernheim. This psychiatry was concerned with demonstrable "functional," as opposed to "organic," mental illnesses—that is, those pathological syndromes which appeared not to be associated with brain insult, injury, or disease. It attempted to account for a wide range of phenomena, including hysteria, fugue (then called ambulatory automatism), and multiple personality; the "magnetic diseases" of catalepsy, lethargy, and somnambulism (so named because of their resemblance to certain phenomena of animal magnetism, a precursor of hypnosis); spiritistic practices such as automatic writing and crystal-gazing; hypnosis; and suggestibility in the normal waking state. Each of these phenomena, the school held, represented the power of ideas to engender action (one of the meanings of "dynamic" in the psychological sense); and each seemed to reflect a change in consciousness, as thoughts and actions occurred outside of phenomenal awareness and voluntary control.

The First Dynamic Psychiatry, with its emphasis on unconscious mental processes, invoked one or the other of two explicit models of the mind (Ellenberger, 1970). The point of view known as *dipsychism* held that the mind consisted of two layers, each of which in turn consisted of chains of associations. The "upper consciousness" was active in the normal waking state, while the "lower consciousness" was active in such phenomena as dreams, hysteria, and

hypnosis. According to *polypsychism*, each segment of the anatomy was served by its own mental structures, called *egos*, each of which was capable of perception, memory, and thought. These structures, in turn, were subject to the control of a superordinate structure which was identified with normal consciousness. When the link between subordinate and superordinate egos was broken, certain aspects of cognition and action were carried out subconsciously.

The issues confronted by the First Dynamic Psychiatry were subsequently taken up by another French psychiatrist, Pierre Janet (1889, 1907; see also Perry & Laurence, this book). Following the principle of analysis-then-synthesis familiar in physiology, Janet began by considering the elementary parts of the mental system. Instead of following the lead of the earlier faculty psychology or the chemical analogies of the structuralists, he argued that the elementary structures of the mind were *psychological automatisms:* complex acts, tuned to environmental and intrapsychic circumstances, preceded by an idea and accompanied by an emotion. Each of these psychological automatisms, by combining cognition, conation, and emotion (Hilgard, 1980b) with action, represented a rudimentary consciousness. According to Janet, all of these elementary automatisms were bound together into a single, united stream of consciousness, and normally operated both in awareness and under voluntary control. Under certain circumstances, however, one or more of these automatisms could be split off—Janet's term was *disaggregation*—from the rest, functioning outside awareness, voluntary control, or both. Janet's concept of psychological automatism appears to anticipate Bartlett's (1932) appropriation of the schema concept to refer to organized knowledge structures containing both declarative and procedural information (Hastie, 1981; Neisser, 1976).

This dissociation view of the unconscious, as distinct from the repression view elaborated by Freud and his followers, was further developed by the American psychologist and psychiatrist Morton Prince (1906, 1914, 1939). Prince, following the practice of his day as exemplified by James's (1890) ten arguments against the existence of unconscious thoughts, reserved the term "unconscious" for the dormant traces of forgotten memories and unattended perceptual inputs as well as the strictly neurophysiological processes associated with mental activity. Instead, he offered the term *co-conscious,* referring to mental activity which takes place outside phenomenal awareness. Prince preferred this term because it connoted mental activity rather than the lack of mentation (as in the standard conception of unconsciousness associated with concussion or coma); and because it permitted the division of consciousness into parallel streams without one or more of these being outside of awareness. Co-conscious mental activities performed outside awareness, together with unconscious mental contents and brain processes, form the *subconscious.*

This conceptualization of consciousness was very popular on both sides of the Atlantic, featured prominently in the pages of the new *Journal of Abnormal and Social Psychology* (founded and edited by Prince), and was the chief alternative within dynamic psychiatry to Freudian psychoanalysis. However, it was a

conceptualization that was short-lived (Hilgard, 1973a, 1977a, 1980a). The eventual dominance of psychoanalysis in clinical psychology and scientific personology led investigators to be interested in different syndromes and phenomena, a different model of the mind, and the eventual replacement of dissociation by repression as the hypothetical mechanism for rendering mental contents unconscious. At the same time, the behaviorist revolution in academic psychology removed consciousness (not to mention *the unconscious*) from the vocabulary of the science. At fault as well were the dissociation theorists themselves, who often made extravagant claims for the centrality of the phenomenon and whose investigations were often methodologically flawed. The final blow to the concept stemmed from the interpretation that dissociated streams of consciousness, because they were ignorant (Janet's term) of each other, should not influence each other. Numerous demonstrations of mutual interference between ostensibly dissociated tasks (e.g., White & Shevack, 1941) showed the contrary, and reference to dissociation gradually disappeared. The following taxonomic exercise shows that the phenomena of mental life include subconscious as well as conscious and unconscious mental processes, and call for a revival of the concept of dissociation.

Brain Processes

In an attempt at a rough, tentative classification of mental states, we begin with the observation that we are not aware of the activity of the central nervous system that forms their biological substrate. We do not perceive the firing of individual neurons, or even masses of them, in the same way that we perceive heartbeat, muscle tension, and bladder distension. Nor do we have voluntary control over the activity of individual neurons or larger brain structures. However, results apparently contradicting this conclusion have been described in a literature emerging over the past few years on EEG biofeedback. For example, Kamiya (1969) reported that subjects apparently could learn to identify periods of high-density EEG alpha activity, and that such periods were associated with a distinctive mental state; and he and others (e.g., Mulholland, 1968) reported that subjects apparently could learn to increase or decrease alpha activity at will. Both claims have aroused considerable controversy (for reviews see Black, Cott, & Pavlovski, 1977; Hardt & Kamiya, 1976; Orne & Wilson, 1978; Plotkin, 1976a, 1976b, 1981). In general, however, it appears that the phenomenon of "discriminative awareness" is largely an artifact of response bias, and that there is no mental state uniquely or probabilistically associated with a high density of alpha in the EEG. Furthermore, the changes in alpha density observed in biofeedback appear to reflect either disinhibition of alpha blocking (rather than a genuine increment of alpha above baseline), or else an artifact or adventitious consequence of voluntary oculomotor activity. Awareness and/or control of other EEG patterns has been reported in the literature from time to time, but these phenomena have not yet been studied with the same rigor as the alpha

phenomenon. For the present then, brain activity can remain classified as unavailable, in the sense that it is not represented in the cognitive system, is inaccessible to phenomenal awareness, and is not amenable to voluntary control.

The Right Hemisphere

Perhaps the most dramatic and compelling demonstration of nonconscious mental processes is provided by patients who have undergone cerebral commissurotomy for treatment of severe epilepsy (Gazzaniga, 1970, 1972; Gazzaniga & LeDoux, 1978; Sperry, 1968, 1969). While most of the research on the "split brain" syndrome has been devoted to the topic of hemispheric specialization (Segalowitz, 1983; Springer & Deutsch, 1981), some of the experiments have dealt with the problem of interhemispheric communication. These studies take advantage of the fact of contralteral projection, whereby stimuli occurring in the right sensory field are first represented in the left hemisphere, and vice versa; the anterior commissure and corpus callosum then transfer information held in one hemisphere to the other, so that each contains a complete representation of the perceptual field. When the commissures are severed, this communication no longer takes place, so that patients are typically unable to verbally describe objects presented to the left visual half-field (which projects to the right hemisphere). Nor, when responding to stimuli presented to their right hemisphere, are they able to give an account of their own behavior. Under appropriate testing conditions, these relationships can be reversed, so that neither hemisphere seems to know what the other one is doing.

Although Sperry himself was quite careful to speak of this phenomenon in terms of a disruption in the unity of consciousness, some others have tended to identify consciousness with the linguistic processing of the left hemisphere (e.g., Eccles, 1965, 1973; Popper & Eccles, 1977). Galin (1974), drawing on studies of hemispheric specialization in intact subjects as well as commissurotomy patients, identified the right hemisphere with the Freudian *System Ucs* and primary-process thinking. This suggestion received additional support when Galin and his colleagues (Galin, Diamond, & Braff, 1977) found a statistical tendency for hysterical hemianesthesias and hemiparalyses to be located on the left side—that is, with processing controlled by the right hemisphere. With respect to the commissurotomy data, it should be noted, with Corballis (1980), that a more parsimonious explanation is that the right hemisphere is fully conscious in its own way, except that its disconnection from the left hemisphere precludes verbal expression. All the other requirements for consciousness—attention, perception, memory, judgment, categorization, and action planning—are shown by the right hemisphere. The hysteria data are interesting, but the effect is weak in a highly selected sample: there were also many patients with symptoms isolated on the right side, and even more with bilateral symptoms. A more parsimonious explanation, one considered and rejected by Galin et al. (1977), is that the symptoms are lateralized where they will do the least harm. Commissurotomy may represent a division in consciousness, somewhat along the lines of an

organic (as opposed to functional) dissociation, but this is not the same as restricting awareness and voluntary control to the dominant, verbal hemisphere.

Consciousness in the Multistore Model of Memory

Cognitive psychologists have proposed a number of different conceptualizations of the memory system. The most popular of these has been a multistore model consisting of a variety of different storage structures and a number of control processes which transfer information from one storage structure to another, transforming it variously along the way (e.g., Atkinson & Shiffrin, 1968; Bower, 1975; Newell & Simon, 1972; Waugh & Norman, 1965). A generic representation of such a system is presented in Figure 4.2. A pattern of energy radiating from stimuli in the external or internal environment impinges on sensory surfaces, and is transduced into a neural impulse which is carried along a tract of sensory nerves to a particular projection area in the brain. According to the theory, incoming sensory information first makes contact with the higher mental processes involved in perception, memory, thought, and language when it is encoded in memory structures known as the sensory registers. From this point on, the type of processing received by the stimulus information determines whether it will become conscious.

According to classic information-processing theory, the sensory registers contain a complete, veridical representation of the physical characteristics of the stimulus—for instance, its shape or pitch—but nothing of its meaning. Although
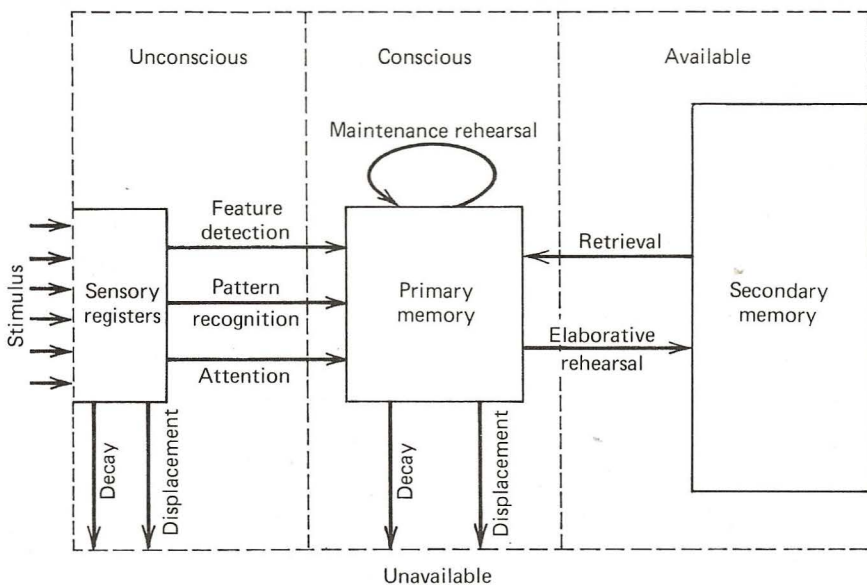
Figure 4.2. Conscious and unconscious mental contents and processes viewed within the framework of a multistore model of memory (after Atkinson & Shiffrin, 1968).

in principle there is one register for each sensory modality, only the visual and auditory registers—the *icon* and the *echo* respectively (Neisser, 1967)—have been studied in any detail (for reviews see Crowder, 1976). Information held in these registers is subject to extremely rapid decay; alternatively it can be effectively erased by newly arriving information—the phenomenon of backward masking. Until it decays or is displaced, the information is subject to analysis by a variety of feature-detection and pattern-recognition processes, which endow the preattentive representation with some measure of meaning.

Once there has been some preliminary analysis of the meaning of the pattern held in iconic memory, another control process, attention, selects some of the material for further processing. By virtue of paying attention, some information is copied into the next storage structure, variously called primary or short-term memory. Following James (1890) and Crowder (1976), we may identify primary memory as that structure which contains the psychological present, including the very recent past. Primary memory is different from sensory memory in that the information represented therein can be extracted from either the perceptual field (via the sensory registers) or retrieved from records of the distant past stored in secondary (long-term) memory. Primary memory is commonly identified as the major workspace of the memory system: it is here that information is maintained in an active state while further perceptual-cognitive operations take place. This occurs by means of yet another control process, maintenance rehearsal. Unrehearsed material may be lost through decay over time, but the most important factor determining forgetting appears to be interference. Primary memory is a limited-capacity structure, and newly arriving information, if it is to be maintained, must displace older material. If the information is not encoded into secondary memory before decay or displacement takes place, it will be permanently lost. Once new information has been copied into secondary memory, information-processing theory holds that it is permanently retained; but, of course, it must be retrieved, and copied back into primary memory, before it can be put to any use.

New information is copied into secondary memory by means of elaborative rehearsal. According to Anderson's (1976, 1982b) ACT model of memory, for example, encoding an episode involves activating nodes in a preexisting associative network representing particular concepts related to the event, linking them together associatively to form a proposition, and linking this proposition with others representing the context in which the event took place. Retrieval begins with a query to the memory system. Nodes corresponding to information provided by the query are activated, and activation spreads out along the various associative pathways. Where activated pathways intersect, the proposition (or part thereof) is checked against the specifications of the query. Where there is a match between cue and trace information, the proposition (or part thereof) is retrieved. The retrieval process is held to be highly dependent on the presence of a rich associational structure uniting the various propositions stored in memory, sufficient cue information in the query to guide the search, the nature of the search plan employed, and the availability of a suitable point of entry into the

memory network. The matching process involves testing the various properties and contextual features of a candidate item against criteria specified in the original query to the memory system.

The classic multistore, information-processing view of memory, as represented by the generic version outlined above, generally identifies consciousness with focal attention and primary memory. Anything that is not in focal attention and/or primary memory, then, is almost by definition not conscious. Similarly, what is being attended to is conscious, by virtue of the fact that it resides in primary memory. Obviously, stimulus information which fails to fall on the sensory surfaces never has the opportunity to be processed within the cognitive system. Less obviously, the cognitive system is oblivious to stimulation which falls on the sensory surfaces, but which fails to be transformed by the preattentive processes of feature detection and pattern recognition. While such information is represented in the sensory registers, it is unconscious; if it decays or is displaced before receiving any preattentive processing, it becomes permanently unavailable. Even if it has been subject to some preattentive processing, the information remains unconscious until it has been processed further and brought into primary memory by means of attention. Once in primary memory, items that decay or are displaced from this storage structure before they can be encoded in secondary memory are rendered permanently unavailable. While the model is not expressly clear concerning the status of the control processes themselves, later developments in the theory (e.g., Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977) suggest that they are unconscious, unless the processing task is very demanding.

Items that are held in primary memory are conscious by definition, and this holds for information which has been retrieved from secondary memory as well as that which arrives from the sensory registers. What is retrieved is a copy of the trace in secondary memory, so when decay or displacement occurs, as it ultimately must, it is only the item as *reconstructed* that becomes unavailable— unless, of course, this new version is also encoded in secondary memory by means of elaborative rehearsal. According to the classic theory, information is not lost from secondary memory, although various processes such as decay and interference can impair its retrieval. Nevertheless, such items are not themselves conscious unless they have been retrieved; but it will not do to call them unconscious, because they are in principle accessible to phenomenal awareness and voluntary retrieval. Following Tulving and Pearlstone (1966), it seems best to characterize these permanently stored traces as *available* to consciousness. Freud's concept of *preconscious* may also serve to describe this material.

Consciousness in a Unistore Model of Memory

According to the classic theory, unattended inputs do not become conscious. At this point a serious question arises: *are* there any unattended inputs? Since the earliest theories of attention posited by Cherry (1953) and Broadbent (1958), it has been common to describe attention as a filter which screens out information

on the basis of criteria set by higher mental processes. From the beginning, however, it has been clear that this filter was very leaky indeed. Thus Cherry and Broadbent found that certain physical attributes of unattended inputs, but not their meaning, could be represented in consciousness. Later, Moray (1959) and Triesman (1960) found that more abstract features, such as meaning, could also be processed through to primary memory under certain conditions. Triesman (1969) characterized attention as an attenuator, rather than a filter, which could be tuned to various properties of the stimulus depending on the goals and intentions of the perceiver. Unattended inputs were apparently analyzed outside of consciousness, and were brought into awareness if they met criteria relevant to the ongoing cognitive task. Later Deutsch and Deutsch (1963) and Norman (1968) argued that all inputs were analyzed to some degree along all dimensions, regardless of task demands, before attention is directed to them. This processing is performed automatically as the information enters the cognitive system. Attention is not so much a matter of passing inputs further into the cognitive system for deeper or more complicated analysis as it is a matter of selecting those inputs, after they have been processed, according to their pertinence to the task at hand. In the course of perceptual processing, all inputs make contact with their corresponding preexisting representations in secondary memory. Those that are pertinent become conscious; the others do not. Thus consciousness is still identified with attention, although the scope of preattentive processing has been expanded considerably and attention is now located late rather than early in the cognitive sequence. All active traces which are not in focal attention may be thought of as *preconscious* (Dixon, 1981); as before, the perceptual processes themselves are *unconscious*. The situation is represented schematically in Figure 4.3.

The fact that all inputs activate corresponding representations in secondary memory raises the possibility that even unattended inputs can affect ongoing cognition and action outside of awareness. At stake here, of course, are the kinds of effects variously known as subliminal perception, perceptual defense and vigilance, and the like (for reviews see Dixon, 1971, 1981; Erdelyi, 1974; Erdelyi & Goldberg, 1979; Hilgard, 1962). Despite shortcomings in the early demonstrations of these effects (e.g., Eriksen, 1960, 1962), the case for them seems now to have been made. Even if the empirical support remained weak, the revisionist conception of attention, which permits stimuli to be analyzed for meaning preattentively, and with the focus of attention determined by such considerations as pertinence, *predicts* such effects. We can look forward to a resurgence of the New Look in perception, as a mainstream rather than a vanguard enterprise (Bruner & Klein, 1960; Bruner & Postman, 1949). We are not conscious of all that we perceive. And information that has never reached consciousness can still have observable effects on cognition and action. When activated, preconscious representations may serve to bias the meaning given to a percept, the choice among possible responses, and the like.

The evolution of theories of attention has seriously undercut the multistore model of the cognitive system with which we began. Apparently perceptual
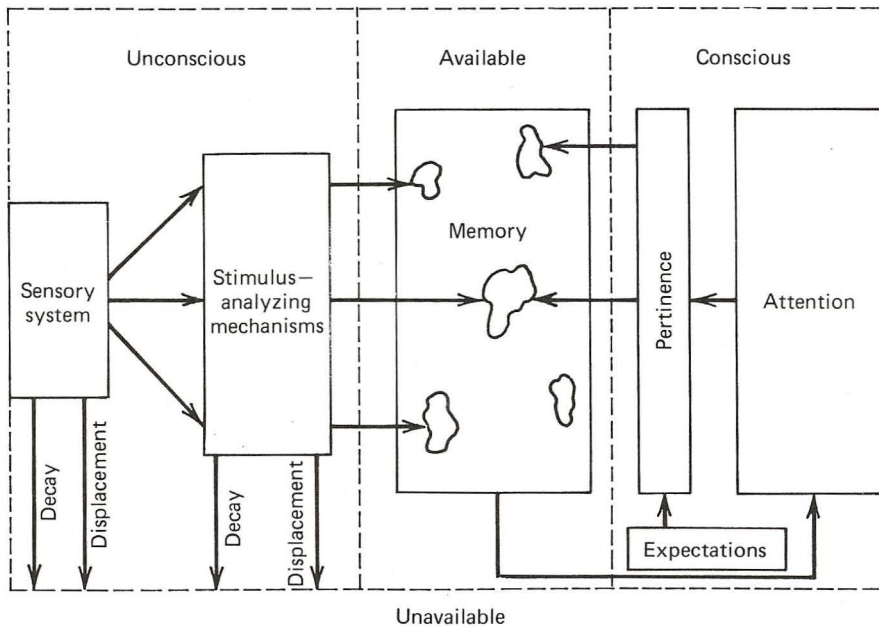
Figure 4.3. Conscious and unconscious mental contents and processes viewed within the framework of a unistore model of memory (after Norman, 1968).

inputs can make contact with secondary memory, the permanent repository of knowledge, without first going through primary memory. In fact, there has long been a dispute in the literature over whether there is a meaningful distinction between primary and secondary memory structures (e.g., Craik & Lockhart, 1972; Melton, 1963; Tulving, 1968; Wickelgren, 1973). Lately, even the existence of the sensory registers as separate storage structures has been questioned (Haber, 1983). In fact, it is possible to postulate a single, unitary memory store. For example, the levels of processing theory of Craik and Lockhart (1972; see also Cermak & Craik, 1979) begins by characterizing the memory trace as the residue of the cognitive processes involved in perceiving and interpreting a stimulus event (see also Bartlett, 1932; Neisser, 1967). This processing naturally involves activating preexisting information stored in memory. At this point, it seems preferable to abandon the terms *primary* and *secondary* memory, and refer instead to *memory* and those portions of it that are active at any particular time. The distinction between primary and secondary memory becomes not one of separate structures, but rather of degree of activation: those memories which are active at any given moment may be said to be represented in consciousness, or potentially so; those that are dormant are not, although they are available to consciousness (Anderson, 1982b).

While items lost from the sensory registers are forever consigned to oblivion, items lost from active memory may be restored to consciousness through the process of reactivation during memory retrieval. This raises the question of whether information can be truly forgotten from memory, and thus rendered

unavailable in this way. One point of view, which actually antedates the multistore, information-processing model, holds that all memories are subject to decay and/or interference (Keppel, 1968; Postman & Underwood, 1973). The other view is that these memories remain permanently available in storage, although they may be inaccessible under certain conditions (Tulving, 1974). Implicit in this latter view is the possibility that all material available in memory is potentially accessible, if only the right cues were used. Levels of processing theory, as elaborated by Craik and his colleagues (Craik & Lockhart, 1972; Jacoby & Craik, 1979; Lockhart, Craik, & Jacoby, 1976), holds that the accessibility of a memory is determined principally by the degree to which it was elaborated with respect to preexisting memories at the time of perception (see also Anderson & Reder, 1979). Memories that have been subject to much elaboration, and which thus have been rendered distinctive, are more easily retrievable compared to impoverished memories. However, even very impoverished memories are retrievable under the right conditions: soon after encoding has occurred, for example, while the trace is still relatively active; or if the query or cue which initiates the retrieval process is rich enough to compensate for the poverty of the trace. However, sheer quantity of trace or cue information is not enough to guarantee retrieval. According to the encoding specificity principle of Tulving and Thomson (1973), the most important factor determining the success of a retrieval attempt is the amount of *overlap* between information supplied by the query and information contained in the trace. Even a very rich cue will not contact a memory unless it contains the right type of information.

If, as Tulving (1974) holds, retrieval is more dependent on the nature of the cue than on the nature of the trace, forgetting is not permanent. Given the proper cues, any memory can be retrieved and be brought into consciousness. It has long been recognized, for example, that the results of a single query may not fairly represent all the items that are available in a subject's memory (Brown, 1923; Buschke, 1973; Tulving, 1967). Cued recall and recognition procedures may produce items that were inaccessible to free recall. Even without a change in the type of memory test, once-forgotten memories may be recovered. When subjects are allowed repeated recall attempts, as in the Recall-Test-Test (RTT) paradigm, they will often remember on later trials items that appeared to be forgotten on earlier ones. Often such recovered items are traded for others that are recalled on earlier trials but forgotten on later ones, so that overall levels of recall remain fairly stable. Under other circumstances, however, intertrial recovery can exceed intertrial forgetting, so that there occurs a net increment in recall over time (Ballard, 1913; Erdelyi & Kleinbard, 1979). Presumably this effect represents the spreading of activation from those items which were strong enough to be recalled on earlier trials, available in memory, to others that were too weak to cross the threshold for conscious representation.

The view that information is permanently stored in the brain, while popular, has recently been criticized by Loftus and Loftus (1980). Their review shows that much of the most dramatic evidence for memory permanence—Penfield's activation of long-forgotten memories by brain stimulation, the forensic use of

hypnosis to enhance the memories of witnesses and victims to crimes, the recovery of forgotten events through fantasy and free association, and so on— has been vastly overstated. While they do not doubt the shifts in accessibility that are obtained under carefully controlled laboratory conditions by shifting from free recall to cued recall or recognition tests, or by allowing reminiscence to occur, they correctly argue that these effects do not prove that all memories are permanently stored. Moreover, some memories, known to have been adequately encoded at some earlier time, are not retrievable despite the use of extremely rich, appropriate cues.

Perhaps their most telling argument is based on studies of leading questions and eyewitness reports (e.g., Loftus, 1975, 1979). In a typical experiment, a subject who has viewed some event is led by a biased interrogation to testify to something that he or she did not actually witness. Later testing under unbiased conditions shows that memory favors the biased reconstruction over the original perception, and even careful, systematic inquiry typically fails to yield any recollection of the veridical memory. The problem is the classic one of the locus of interference, as in paired-associate learning. One possibility is that traces of both the original percept and the reconstructed event are available in memory, but that retrieval favors the latter over the former (Hintzman, 1972). Loftus and Loftus (1980) suggest that the newly reconstructed version of the event is written over the older version, so that the former is permanently lost. It seems, then, that even well-encoded "permanent" memories may be subject to decay or displacement, so that they become completely inaccessible (functionally unavailable) to retrieval, if not actually unavailable in storage.

The memories classified as functionally unavailable, if indeed they exist at all, are not unconscious in the sense used in this chapter, because they do not interact with other ongoing cognitive processes. Those memory elements activated during perceptual processing, but not brought into focal attention by virtue of their pertinence for the task at hand, also do not classify as unconscious because in principle they can be brought into awareness by a simple redeployment of attention. From a narrow view of memory, the only mental contents that can be characterized as unconscious are the products of early, automatic phases of perceptual processing. From a wider view, however, memory contains much more than this (Hastie & Carlston, 1980). Memory contains stored representations of knowledge, and cognitive psychologists find it useful to maintain two somewhat independent distinctions within the memory system: between declarative and procedural knowledge (Winograd, 1975), and between episodic and semantic memory (Tulving, 1972). Declarative knowledge consists of facts concerning the nature of the physical and social world; procedural knowledge consists of cognitive skills by which the person manipulates and transforms declarative knowledge. Episodic memory concerns specific personal experiences, and is marked by self-reference and the spatiotemporal context in which the event occurred; semantic memory comprises the "mental lexicon" of abstract, categorical information. Roughly speaking, all episodic knowledge is declarative in nature; semantic knowledge may be either declarative or procedural.

From this point of view, fully processed traces of perceived objects and events—declarative knowledge—are available to consciousness, in the sense that they can be brought into awareness by an appropriate deployment of attention. We can define the words in our vocabularies, describe, name, and categorize the objects and events that we perceive, tell the stories of our lives, express our ideas, emotions, and goals, and reflect on our experiences. However, it appears that a great deal of procedural knowledge is unconscious, in the strict sense that we have no awareness of or control over it. Procedures are instantiated by appropriate inputs, run themselves off, and deliver appropriate outputs automatically. A case in point is the knowledge by which we generate and interpret linguistic utterances (Chomsky, 1980). We have no introspective access to the rules of transformational grammar that yield surface structures from deep structures. Other examples may be found in the procedures involved in skilled motor routines, such as touch typing, piano playing, and (for sailors and scouts) knot tying. Novices perform these tasks consciously, and with a great deal of cognitive effort; experts perform them automatically and effortlessly. Similarly, we have no access to the basic processes involved in feature detection, pattern recognition, perceptual recoding, and meaning analysis (Mandler, 1975b; Neisser, 1967), or to the kinds of rules and strategies involved in perceptual inference and problem solving (Hochberg, 1978; Kaufman, 1974; Rock, 1975). We know these processes only indirectly, by inference. This principle, which seems to apply broadly to the kinds of cognitive skills involved in perception, memory processing, communication, and motor response, has recently been extended to the higher mental processes involved in thinking and judgment. Based on the results of a series of studies, Nisbett and Wilson (1977) have argued that people are largely unaware of stimuli that have influenced their behavior, that their appraisal of some situation, or of the considerations that led them to respond as they did to some situation, has changed. People may *think* that they know these things, but in fact they do not. The Nisbett-Wilson position is a strong one, perhaps excessively so (see Bowers, this book). Certainly, it seems a mistake to reject the possibility of a person having any privileged self-knowledge (Cantor & Kihlstrom, 1983; Kihlstrom & Cantor, 1983). But insofar as it applies to procedural knowledge, their position is consistent with observations in other cognitive domains such as reading and speech perception. We have no direct introspective access to the skills by which declarative knowledge is acquired, organized, stored, retrieved, manipulated, and transformed.

Thus in the final analysis, the taxonomy of cognitive contents may be represented as in Figure 4.4. Incoming stimuli are first processed by the sensory-perceptual system. The operation of this system is unconscious, in the sense that it is involuntary and the perceiver has no direct introspective access to it. Similarly, the stored procedural knowledge which guides this perceptual processing is unconscious. The physical and semantic attributes produced by feature analysis activate their corresponding representations in the preexisting network which comprises the storehouse of declarative knowledge. In a similar manner, some elements in the network are activated by attentional processes,
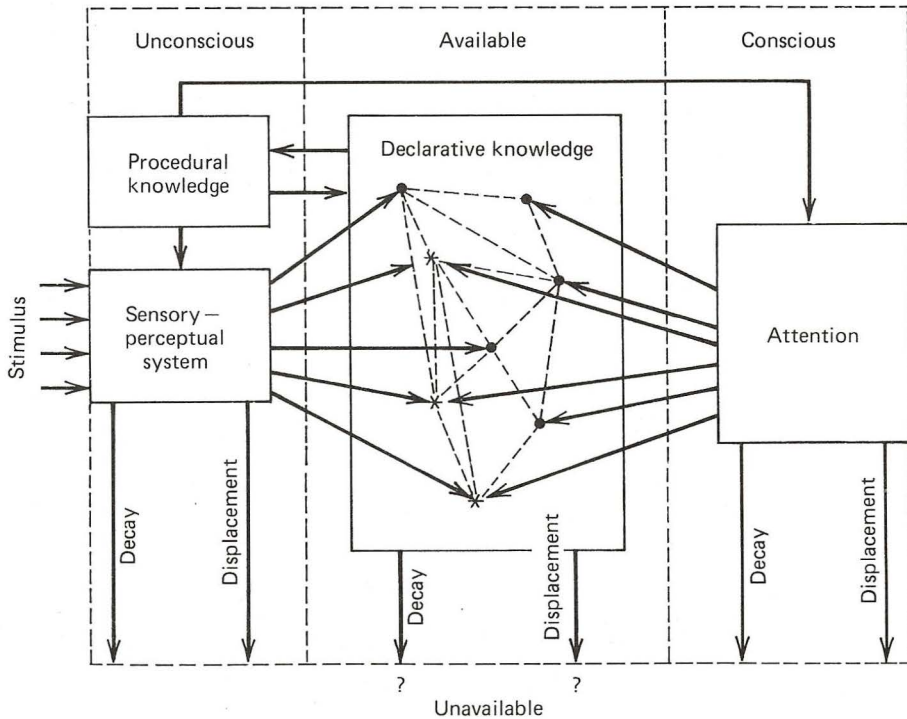
Figure 4.4. Conscious and unconscious mental contents and processes viewed within a revised unistore model of memory, permitting activation to spread within an associative network.

corresponding to the perceiver's expectations. Activation spreads out from both types of nodes, and those concepts and propositions which cross a threshold of activation form the full perceptual construction (or memorial reconstruction) of the object or event. This conscious percept is the product of the interaction between data driven ("bottom-up") and conceptually driven ("top-down") cognitive activity. Not all of the declarative knowledge available in memory is activated and thus represented in consciousness; but what is accessed and brought into consciousness is determined by contributions from both the perceiver and the perceptual world. Again, however, the procedures guiding this (re)constructive activity are unconscious, unless the cognitive task is especially demanding.

Note that the final conscious product of cognitive processing may be influenced by declarative (as well as procedural) structures that are not themselves represented in phenomenal awareness. Ordinarily action is determined by what is consciously perceived. However, in a manner analogous to sensory signal detection, there may be (within broad limits) no absolute threshold that activation must cross before cognition and action occur. If this is so, then there may be some circumstances—such as highly ambiguous stimulus situations—where action is determined by mental structures that are themselves not represented in awareness. Under these circumstances, perceivers may very

well not know what stimulus they are responding to, or why they acted as they did. Thus this model of the mind affords the possibility of the sorts of preconscious influences on thought and action considered so important by New Look theorists, old (Bruner & Postman, 1949) and new (Nisbett & Wilson, 1977) alike.

The model also suggests a mechanism for repression, in the psychodynamic sense of a motivated failure to perceive or remember unpleasant or threatening objects or events. In classic psychoanalytic theory, Freud made a distinction between primal repression—the blocking of such stimuli from ever entering consciousness—and repression proper—the afterexpulsion of memories of events that had been consciously perceived. The classic theory confined repression to ideas and memories associated with primitive sexual and aggressive impulses, but there seems no reason not to liberate the concept from the theory of infantile sexuality and other Freudian trappings (Kihlstrom, 1981a). In principle, it would seem an easy matter to assimilate repression to contemporary cognitive theory by construing it as a special instance of selective attention and retrieval (Erdelyi & Goldberg, 1979; Mandler, 1975b). Conceptually, however, repression differs from suppression in that the former is an unconscious process, so that repressors are not aware of their selective cognitive processing. It might be possible to solve this problem by postulating that repressors selectively attend to the fact that they are selectively attending, but the possibility of infinite regression is an unattractive one. Another tact, however, is offered by recent analyses of the development of procedural knowledge. Anderson (1982a), working within the ACT model, has proposed that all procedures begin as declarative structures—as facts *about* the procedures. This factual knowledge permits the individual to enact the desired process—deliberately, consciously, and crudely. As the person practices the activity, Anderson suggests that a process of "knowledge compilation" takes place, in which the declarative knowledge is converted into procedural form. At this point, the activity is highly skilled; but it is also performed automatically and unconsciously. In this way, repressors may begin by deliberately avoiding unpleasant material, and after much practice develop a repressive cognitive style that is "natural," unconscious, and difficult to modify.

PHENOMENA INVITING A CONCEPT OF DISSOCIATION

The evolution of thinking in cognitive psychology has gradually led to a theoretical conception of the mind that has a place for both conscious and unconscious knowledge and mental processes. However, conspicuously absent from these models is any place for *subconscious* mental processes of the sort that concerned the proponents of the First Dynamic Psychiatry. At first glance, this does not seem so bad. After all, the models do provide a decent theoretical account of most of the phenomena observed in the psychological laboratory, and doubtless many that occur in the ordinary course of everyday living as well. The

phenomena that interested Charcot, Janet, and Prince were mostly observed in disturbed individuals, were not subject to rigorous empirical scrutiny, and in any case are rarely observed today. Reasonable people could conclude that these phenomena are somehow beyond the pale, and that cognitive theory need not take them seriously. Thus it seems important to reexamine the phenomena of dissociation, in order to determine how much consideration they actually warrant. Space permits only brief and selective coverage (for another review, see Hilgard, 1977b).

"Hysteria," Fugue, and Multiple Personality

Among the syndromes of neurosis are a variety of patterns that center around dramatic symptoms paralleling those of organic brain syndrome (Abse, 1959; Nemiah, 1967, 1969, 1979; West, 1967). These subsume motor disturbances of various sorts, including paralyses in the extremities (limpness or sustained contracture), astasia and abasia, and aphonia; sensory disturbances, including anesthesia (often accompanied by paralysis), blindness, and deafness; and amnesia for specific events, experiences, or periods of time. While the presenting symptoms typically represent the apparent loss of normal cognitive and behavioral functions, positive symptoms are also occasionally reported, in the form of hallucinations (typically visual), or "somnambulistic" states in which the person is observed to carry out complex activities over an extended period of time, with no concurrent responsiveness to environmental events and no subsequent recollection of the episode. As noted by Davison and Neale (1982), these syndromes differ from the other neuroses in that anxiety is not a prominent part of the clinical picture. However, the symptoms often seem to be precipitated by traumatic events, or emerge after a period of acute emotional stress. Neurological examination yields no compelling evidence of organic brain syndrome—or, at least, no insult, injury, or disease sufficient to account for the symptoms.

Interestingly, patients who complain of these symptoms typically display behavior which is inconsistent with their claims, and which demonstrates that the affected subsystem is in fact operating properly. For example, the hysterical patient who walks with a staggering gait rarely falls, and if the person is bilingual, the aphonia may be restricted to one language. The patients may also display *la belle indifference,* a complacent and unconcerned attitude toward both their ostensibly debilitating symptoms and their apparently paradoxical behavior.

These functional disturbances were diagnosed quite frequently around the turn of the century, and Janet (1907) has left us with a classic account of their clinical picture. Although such cases are still seen with some frequency (Templer & Lester, 1974), especially by general practitioners and neurologists, almost none have been subjected to any kind of laboratory investigation. Hilgard (cited in Hilgard & Marquis, 1940) showed that a patient with anesthesia and paralysis in one arm could acquire a conditioned finger-withdrawal response, and used such a procedure in an early form of behavior therapy. Perhaps the most controversial

case is one of functional blindness reported by Brady and Lind (1961), and subsequently reanalyzed by Grosz and Zimmerman (1965). In an elegant study employing the technology of instrumental conditioning, Brady and Lind showed that the person was responsive to visual stimulation despite his denial of the experience of sight; like Hilgard, they used their procedure as the basis for a successful therapeutic regime. Grosz and Zimmerman extended these findings by showing that response to a visual stimulus reverted to baseline levels when the patient was informed of how a truly blind person would perform on the task. They suggested that the case was one of malingering rather than functional blindness, but Brady (1966) offered additional evidence favoring the original diagnosis. Occasionally, other case studies of a similar nature have appeared, again pointing out the contradictions between the deficit claimed and objective performance on laboratory tasks (for a review see Sackeim, Nordlie, & Gur, 1979).

Fugue

A dramatic, generalized form of functional amnesia appears to cover the individual's entire personal history: the victim has no knowledge of his or her identity or autobiography, or even any access to relevant clues; however, the general fund of information about impersonal matters is retained. Such losses of personal identity are often accompanied by wandering, which feature gives the syndrome its name. The state ends either with a sudden awakening to one's original identity, or to an awareness that identity has been lost. Recovery of normal identity often is followed by an amnesia for the period of the fugue. The corpus of published case histories is very large (e.g., Berrington, Liddell, & Foulds, 1956). Recently Schacter and his colleagues (Schacter, Wang, Tulving, & Freedman, 1982) reported the only known experimental study of a case of functional amnesia. The patient, P.N., complained of a failure to remember any personal information. When tested for his knowledge of public figures (semantic memories), he performed as well as a nonamnesic control subject both before and after the fugue. When asked to retrieve specific personal experiences related to verbal cues (episodic memories), however, those recovered were primarily drawn from the period since the onset of the fugue, whereas after recovery the memories spanned a much longer period of time, comparable to that shown by the control patient on both test and retest.

Multiple Personality

This syndrome is diagnosed when two or more distinct patterns of personality appear to coexist, alternating in their influence over overt behavior and subjective experience. Typically there is some measure of autonomy between the personalities, and some degree of amnesia separating them. A large number of such cases have been reported in the clinical literature (for reviews see Greaves, 1980; Sutcliffe & Jones, 1962; Taylor & Martin, 1944), mostly in the nineteenth century—although the incidence appears to be on the upswing again. Interestingly, there is no clear pattern of normality and pathology in these cases:

sometimes the subconscious personality—that is, the personality which departs from the usual way in which the patient identifies himself or herself, and is identified by others—is better adjusted than the conscious one. Sometimes the various personalities "cooperate" with each other, when one has a resource that another one needs (e.g., Ludwig, Brandsma, Wilbur, Bendfeldt, & Jameson, 1972). The majority of cases are of dual personality, and in most of these the amnesia is mutual, with each personality ignorant of the existence and operation of the other. Especially in cases of more than two coexisting personalities, the amnesic barrier is often asymmetrical.

Only a few cases of multiple personality have been subjected to rigorous clinical and experimental analysis and only one of these—Jonah—has included systematic tests of cognitive function that bear on the problem of dissociation (Ludwig et al., 1972). Jonah presented five personalities: Jonah ("the square"; primary), Sammy ("the lawyer"), King Young ("the lover"), Usoffa Abdullah, the Son of Omega ("the warrior"), and De Nova, a newly developing personality. Jonah had no knowledge whatsoever of Sammy, King Young, and Usoffa Abdullah; and he alone had knowledge of De Nova. Sammy, King Young, and Usoffa all had knowledge of Jonah, in that they had access to his thoughts and feelings; but while these three personalities knew of each others' existence, they had no access to each other's mental life. This pattern of symmetrical and asymmetrical amnesia was largely confirmed with a series of laboratory tests involving transfer of training. Interestingly, tests of semantic (as opposed to episodic) memory and skill learning showed no differences, and even some evidence of practice effects.

Depersonalization, Derealization, and Other Anomalies of Memory

The cardinal symptom of these disorders is a subjective awareness or feeling of change in oneself—depersonalization—or in the surrounding world—derealization (Roth, 1960; Sedman, 1970). Surveys of college students indicate that depersonalization and derealization occur spontaneously in one-third to one-half of normal subjects, during periods of fatigue, illness, anxiety, or sadness; it can also be induced by looking in a mirror. It has been experimentally induced by marijuana, sensory deprivation, and LSD, and is frequently reported as a response to life-threatening danger (Noyes & Kletti, 1977). These last experiences are particularly remarkable for their reports of panoramic memory and out-of-body experiences. While not strictly an amnesia, depersonalization is certainly an anomaly of memory functioning, consisting at base of a failure to recognize oneself or one's environment (Reed, 1972, 1979). Apparently, affected individuals retain an unimpaired ability to remember factual knowledge about themselves and their world, but are not able to match their current experience to these memories. The result is a sense of unreality similar to that which occurs when one encounters a familiar room whose decor has been changed. The functional isolation of preexisting memories from encodings of current experience marks depersonalization and derealization as essentially dissociative in nature.

Depersonalization and derealization represent a transition between the frank amnesias of hysteria, fugue, and multiple personality, and other disorders of memory which do not properly classify as amnesia: *déjà vu,* the compelling sense of having been in a place before, coexisting with the knowledge that this is not the case; *jamais vu,* perhaps a less generalized form of derealization, in which there is no feeling of familiarity despite the knowledge that the situation has been experienced many times in the past; and cryptomnesia, unconscious plagiarism, in which an idea or a memory is attributed to oneself when in fact its origins lie elsewhere. Of these phenomena and their close relatives, only *déjà vu* has been the subject of systematic inquiry. A study of medical patients, interestingly, indicates that *déjà vu* is most common in those individuals who have had at least a secondary education, and infrequent in those who have never travelled far from home. Like depersonalization, *déjà vu* also appears to involve some disruption of the recognition process (Reed, 1972, 1979).

> In July 1976, while attending a scientific meeting, I visited the Philadelphia Museum of Art with Ken and Pat Bowers to view its Bicentennial exhibit of American painting and sculpture. While standing in one of the galleries I had the strong impression that I had been there before. Of course, I had been in the room before, many times, in the five years that I had lived in Philadelphia as a graduate student; but my feeling was that this particular room, with the exhibit in place, was familiar. It was not until November of 1977, sitting in the Stanford medical library preparing a lecture on the anomalies of memory, that I solved the puzzle: in fact I had seen the entire exhibit the previous May, when I had visited Philadelphia to witness the marriage of some friends. I knew this even in July, because I had encouraged the Bowerses to see the show on the basis of my previous visit; but for those moments in the gallery, and for the 16 months thereafter, I never made the connection.

While the clinical and subclinical phenomena of hysteria, fugue, and multiple personality originally gave rise to the concept of dissociation, they are so rare that few cases have been subjected to rigorous scrutiny even in the clinic, let alone the psychological laboratory. Moreover, the cases are contaminated by possible organic brain syndrome and—equally important—clear secondary gains from the "sick role" (Sarbin & Coe, 1979; Szasz, 1961). Accordingly, it seems important to search for other instances of dissociation manifested by normal subjects in the ordinary course of everyday living, or under controlled laboratory conditions. Such phenomena are often found in individuals who are asleep, drugged, or hypnotized.

Cognitive Activity During Sleep

Superficially, sleep may seem to represent an interruption of waking consciousness: the sleeper is typically hard to arouse, and he or she typically remembers little or nothing about the events of the past night's sleep. However, we also know that appearances in this case are deceiving: sleep is characterized by a continuous flow of many types of mental activity (Arkin, Antrobus, & Ellman, 1978). This

activity qualifies as dissociated because it is not under voluntary control, and because it is not represented in memories accessible to the person during the normal waking state.

Dreams

Of course, the most familiar form of mental activity during sleep is the dream. Given the unusual content of most dreams, the apparent frequency with which they occur during the night, and their vivid hallucinatory quality, it is somewhat surprising that the typical person recalls at best only a single dream the next morning. A number of factors may contribute to this forgetting (Cohen, 1974, 1976, 1979; Goodenough, 1967, 1978; Koulack & Goodenough, 1976). From the point of view of the multistore model of memory, for example, it has been suggested that the dream is never consolidated in secondary memory, and is lost from primary memory shortly after the REM state ends. We remember a dream in the morning, according to this hypothesis, only if we awaken out of REM, permitting us to retrieve the dream directly from primary memory. A similar account can be constructed from the point of view of levels-of-processing theory, assuming a unitary memory system: because very little attentional effort is devoted to the dream as it occurs, the dream is not encoded in memory in such a way as to permit it to be accessible at a later time. From either point of view, upon awakening then, the dream is either not represented in the cognitive system at all (unavailable), or it is represented in such a way as to be inaccessible under ordinary conditions (functionally unavailable).

Another point of view holds that the dream is accessible in memory, but that various factors familiar in normal memory, such as salience and interference, diminish its retrievability. Repression is probably not a factor in dream recall: there is no recall disadvantage for dreams dreamt after viewing a highly threatening presleep film. It is possible, of course, that dream-recall failure represents an instance of state-dependent retention: that the dream is fully encoded and available in memory, but only when the person is in Stage REM. Unfortunately, difficulties in interviewing sleeping subjects preclude rigorous testing of this hypothesis. It may be possible to approach the problem of the availability of dream content in another way, however. REM awakenings typically yield a dream report, but not all of these dreams are remembered by the subject in the morning upon final awakening. This raises the possibility of conducting a recognition test for unrecalled dreams, by presenting each subject with a set of his or her own dreams, collected on line, along with distractor dreams contributed by a control subject. Provided that obvious identifying information has been removed, successful recognition would constitute evidence that dreams were encoded in memory—available in storage, but not usually accessible (Johnson & Raye, 1981).

Sleepwalking, Sleeptalking, and Sleeplearning

Dreams, and the thoughtlike mentation that accompanies Stage NREM, may be characterized as endogenous mental activities, in the sense that there is no direct, sustained interaction with the external environment at the time that the thoughts

occur. Thus it might be said that if sleepers are not strictly unconscious, at least they are not conscious of events in the outside world. In fact, however, both REM and NREM mentation can be affected by stimuli presented during sleep (Arkin & Antrobus, 1978; Williams, 1973), and a little reflection on ordinary experience shows that this characterization of sleepers as cognitively isolated from their environment is incorrect. For example, we do not typically fall out of our beds, even unfamiliar ones, despite a considerable amount of body motility during the night. Moreover, many sleepers show selective arousal from sleep in response to their names or other significant stimuli; this appears to be especially true of the parents of infants. Finally, some people appear to be able to awaken at a predetermined time, without benefit of alarm clocks. While this evidence is largely anecdotal at present, rigorous laboratory studies confirm that people continue to respond to environmental events even while asleep.

Somnambulism is a prototypical example of dissociation, whether it occurs in hysteria or normal sleep. The sleeper rises from bed and engages in some activity resembling that of waking life, such as wandering around the room, the house, or even outside, turning lights or household appliances on and off, fumbling with objects, sometimes accompanied by incoherent talking or mumbling (Kales, Paulson, Jacobson, & Kales, 1966; Jacobson & Kales, 1967). The phenomenon is fairly common among children, and is reportedly common among campers, military recruits, and others who are under conditions of stress. The behavior seems purposeless, and not very dextrous. It can be induced in children with a prior history of sleepwalking by the simple procedure of gently sitting the subject up in bed. Similarly, in somniloquy the sleeper utters speech or other psychologically meaningful sound during sleep—in extreme cases a rambling monologue or one side of an extended conversation will ensue (Arkin, 1966, 1978, 1982). Whereas episodes of sleepwalking can last for 15 to 30 minutes, bouts of sleeptalking are typically brief. The phenomenon is so common that it can be difficult to find people who have *not* been told that they talk in their sleep, although again it is more prominent in children than adults. It is sometimes possible for an observer to enter into conversation with a sleeptalker, once the episode has begun. The topics of sleepspeech mostly revolve around everyday concerns, though very few secrets have been betrayed in this way. Both sleepwalking and sleeptalking have been studied in the laboratory—in the former case, with the aid of very long and light electrode leads or radiotelemetry; there is no doubt that the individuals involved are asleep at the time of the episode. Since sleepwalking and sleeptalking are typically observed in Stage NREM, they do not appear to represent acting out, or talking about, dreams.

Unlike somnambulism and somniloquy, hypnopaedia has proved difficult to document in the laboratory (Aarons, 1976; Evans, 1979a; Simon & Emmons, 1955). The overwhelming evidence for cognitive activity during sleep, as indicated by the phenomena discussed earlier, suggests that people may be able to acquire new information while asleep, and retrieve it in the morning, but the evidence is unconvincing. The most dramatic claims have come from the Soviet Union and Eastern Europe, where sleep is typically diagnosed by overt behavior

and autonomic activity rather than the EEG (Hoskovec, 1966; Hoskovec & Cooper, 1967, 1969). When the EEG is used, the outcome of sleeplearning appears directly related to the density of EEG alpha activity—that is, to the degree that the subject is still awake. There have been some well-documented successes when subjects have been selected for high hypnotizability or given a presleep set that learning will occur, and when the material is presented in Stage REM as opposed to NREM. Of special interest are indications in the Soviet studies that information successfully retained from sleeplearning sessions pops into the mind when appropriate questions are asked, with the subjects unable to account for their knowledge of the answers. Nevertheless, the conclusion seems inescapable that sleeplearning, while perhaps possible, is not particularly efficient. As is the case with dreams, it is not yet clear why this is so. Perhaps the failure of sleeplearning reflects a failure to encode the items deeply enough to be retrieved (functionally unavailable). On the other hand, the amnesia may be an instance of state-dependent retention, with the memories accessible only during sleep. Some data collected by Evans (1979a), discussed below, support this possibility—although the hypothesis, if confirmed, would not lead people to be particularly optimistic about the utility of sleeplearning procedures.

State-Dependent Retention

State-dependent retention is said to occur when the memorability of an event is controlled by the congruence between the organismic state in which the memory was initially encoded and that in which retrieval is attempted. In the apocryphal example, an event that occurred while an individual was intoxicated is forgotten while sober, but accessible during a later drinking bout. The phenomenon was originally documented in nonhuman animals (Overton, 1964, 1968); but it has been produced in human subjects as well, by substances as diverse as alcohol, amphetamine, general anesthetics, barbiturates, marijuana, and physostigmine (for reviews, see Eich, 1977, 1980). Analogous congruence effects have been observed with shifts in mood state (e.g., Bower, 1981), and environmental context (Godden & Baddeley, 1975; Smith, Glenberg, & Bjork, 1978). In animals given sublethal doses of barbiturate, state-dependency can be substantial indeed, resulting in a complete failure of transfer from one state to the other. In humans, however, the effects are typically weak, and can be abolished by the use of rich retrieval cues such as those found in recognition as opposed to recall tasks. Perhaps this is because the manipulations are also relatively weak: in animals, state-dependency shows a clear dose-response curve.

Nevertheless, the literature does contain several examples of complete state-dependent retention in humans, or virtually so. Swanson and Kinsbourne (1976), for example, found a strong congruence effect of amphetamine on paired-associate learning (cued recall) in hyperactive, but not normal, children. Something closer to complete dissociation has been observed in the phenomenon of sleep suggestion (Evans, 1979a). Evans and his colleagues administered simple motor suggestions to subjects during alpha-free Stage REM sleep. Appropriate

responses to the cues were elicited in about half the subjects, although the overall response rate was low. Responding persisted during subsequent REM periods the same night, the next night, and on six-month followup, without any further reinforcement of the suggestion. However, when interviewed in the waking state, the subjects typically were unaware that suggestions had been given; nor did they respond appropriately to the cues embedded in a word-association test.

A number of theories have been offered concerning state-dependent retention in humans and other animals (for reviews see Eich, 1980; Overton, 1977). Within the animal-learning community, so influenced by the behaviorist ethos, it is common to construe the drug state as a discriminative stimulus for a particular response. The major evidence for this hypothesis is that animals can discriminate among dosages of the drugs in question, making the classic phenomenon appear to be an extreme example of drug-discrimination learning. A more dissociative hypothesis, such as that suggested by the sleep-suggestion studies, is hard to test in nonhuman animals, because they cannot report on their thoughts; and in humans, too, because the effects of drug manipulations are necessarily weak. So far as nonverbal animals are concerned, consider an experiment in which rats are trained in a sunburst maze to enter one arm when drugged, and another when in the normal waking state. If subsequent testing reveals no generalization across states (i.e., state-dependent retention), then the alley appropriate to the animal's current drug state is blocked, preventing it from making its preferred response. A stimulus-generalization theory might predict that the animal would show a bias to enter the arm learned in the opposite state: if the animal is aware of both options and making a choice between them, then the other arm may be its best guess. On the other hand, if the animal is aware of only the response learned in its current state, its subsequent behavior might be more random. Turning to humans, the current results appear to exemplify the encoding specificity principle: without appropriate retrieval cues, items available in memory may be inaccessible to attempts at retrieval (Eich, 1980). This principle may form the basis for a cognitive approach to dissociative phenomena in general.

Phenomena of Hypnosis

The proponents of the First Dynamic Psychiatry studied hypnosis both clinically and experimentally because of the apparent parallels between the phenomena of hypnosis and the symptoms of hysteria. The phenotypic similarities were taken to imply genotypic similarities, resulting in the development of psychogenic theories of the etiology of psychopathology as correctives to the somatogenic theories that prevailed at the time. The analogy should not be pressed too far, because individuals who can experience hypnosis do not show the impairments in general functioning that are characteristic of mental patients. Nevertheless, the phenomena of hypnosis do seem to involve divisions in consciousness of the type associated with the concept of dissociation. Because these alterations in thought and action can be easily and reliably induced in normal individuals under controlled conditions without any trauma or hazard, the phenomena of hypnosis

may serve as convenient laboratory models for the study of basic psychological processes highly relevant to psychopathology (Kihlstrom, 1979).

Posthypnotic Suggestion

Since the time of Freud, posthypnotic behavior has served as a prime example of nonconscious mental processes at work (Sheehan & Orne, 1968). The central feature of posthypnotic behavior is the eruption of an irresistible, compulsive act, whose motivational source is unknown to the subject. The action appears to break into the usual stream of behavior: the subject suddenly does something that is not integrated with the rest of his or her action; and it appears to be outside of the subject's volitional control. In the classic case, the individual is unaware that he or she is, in fact, doing anything unusual; in any event, the hypnotic origins of the behavior are often obscure for the subject. If his or her attention is drawn to the unusual behavior, and the subject is pressed for an explanation, he or she may infer its hypnotic origins—but this is far from direct, personal recollection. Posthypnotic suggestions have been reported to persist for well over a year in both experimental and clinical situations.

The compulsive, quasiautomatic, involuntary nature of posthypnotic behavior has been demonstrated in a number of experiments. For example, Nace and Orne (1970) showed that hypnotizable subjects who failed to respond to a posthypnotic suggestion at its initial test manifested a persisting tendency to perform the behavior at a later time. On the other hand, Fisher (1954) showed that posthypnotic suggestions were not acted upon outside the experimental context in which the subject expected them to be tested. However, a better designed experiment by Orne, Sheehan, and Evans (1968) did demonstrate a high level of response even when the cues were offered in a situation that was clearly perceived by the subjects to be outside the experimental context; simulators did not give posthypnotic responses under these conditions. Two other studies on the persistence of posthypnotic behavior make the same point in a different and superficially paradoxical way. In an experiment by Bowers (1975), subjects received a posthypnotic suggestion to express a preference for a style of painting that had previously been nonpreferred, covered by amnesia; then half the subjects were placed in a verbal-conditioning procedure where the experimenter additionally shaped this preference by means of appropriate contingencies of reinforcement. Then the reinforcement contingencies were eliminated, and the subjects in both groups were tested again by a new experimenter. The subjects who received only the posthypnotic suggestion continued to express their new preference, while those who had also received the verbal-conditioning regime reverted to their original preference. Two motivational sources, one internal and the other external, were not better than one. Finally, Damaser (1964; see Orne, 1970) asked hypnotizable subjects to mail the experimenter one postcard per day, and were dismissed from the experiment with a stack of cards to take home. One group received the request as a posthypnotic suggestion, covered by amnesia; for another group, the request was made in the normal waking state; a third group received both the posthypnotic suggestion and the waking request. This time, the

behavior persisted longer for those who received the waking request and those who received both conditions, compared to those who received only the posthypnotic suggestion.

Despite the apparently conflicting results, all of this research converges on the conclusion that posthypnotic behavior represents a subjectively compelling, intrapsychic urge to carry out certain actions. For example, the subjects in the Orne et al. (1968) experiment were clearly responding to something besides the demand characteristics of the testing situation; and in the study by Nace and Orne (1970), it would have been much easier for highly motivated, compliant subjects to execute the suggestion at their first opportunity and be done with it. The case is strengthened by an analysis of posthypnotic persistence in terms of attribution theory (Bowers, 1973). According to attribution theory, subjects who perceive that their behavior is controlled and constrained by external environmental contingencies will show a diminution in that behavior if the contingencies disappear; by contrast, those who perceive their behavior as self-determined will show persistence despite changes in the situational context (Harackiewicz, 1979; Lepper, Greene, & Nisbett, 1973). In the Bowers (1975) and Damaser (1964) studies, the subjects behaved as if intrinsically rather than extrinsically motivated. This is clear enough in Bowers, but interpretation of the Damaser experiment is more conjectural. Apparently, those who agreed to the waking request felt committed to carrying it out; those who received the suggestion acted on it only so long as they felt inclined to do so. Interestingly, those who received both suggestion and request behaved like Lepper et al.'s (1973) overjustification subjects, discounting the internal sources of their own behavior.

Posthypnotic Amnesia

Following the termination of hypnosis, many subjects find that they cannot remember the events and experiences that transpired while they were hypnotized (for reviews, see Kihlstrom, 1977, 1978, 1982, 1983; Kihlstrom & Evans, 1979). Later, after the hypnotist has administered a prearranged cue, these memories seem to flood back into awareness, and the same subjects who showed such difficulty in remembering a few moments before now are able to remember the events of hypnosis vividly and clearly. This amnesia does not occur unless it has been explicitly or implicitly suggested, and it may be reversed by administration of a prearranged cue (although some measure of residual amnesia may persist for at least a time), thus distinguishing posthypnotic amnesia from state-dependent retention.

The dissociation of episodic memory occurring during posthypnotic amnesia seems to involve both the monitoring and controlling aspects of consciousness. In the first place, there is a frank failure of memory, as seen in the subject's inability to recall, or even to recognize, events that occurred or items that were learned while he or she was hypnotized (Kihlstrom, 1980). In the most dramatic display of this failure yet, McConkey and Sheehan (1981; McConkey, Sheehan, & Cross, 1980) found that the amnesia remained robust in some subjects even when they were shown videotapes of themselves taken during the hypnotic

session; simulating subjects behaved rather differently. Even when hypnotizable subjects are able to successfully remember some of the critical material, a loss of control over the processes of retrieval and reconstruction may be observed in their failure to strategically organize recall around normally salient structural features of the material. In one set of studies, for example, partially amnesic subjects often listed those few events which they were able to recall in an order which did not reflect the actual chronological sequence of events, even when they were specifically instructed to do so (Kihlstrom & Evans, 1979). Moreover, subjects who have successfully recalled a fragment of an experience may not be able to flesh out their recollection, by adding other relevant features, so that it forms a full and complete representation of the event.

Despite these difficulties with awareness and control, there is abundant evidence that these memories remain available and active within the cognitive system. For example, relearning of a skill whose acquisition is covered by posthypnotic amnesia takes place more rapidly than if that skill had never been acquired at all (Hull, 1933); retroactive inhibition is not eliminated by a suggestion for amnesia for the interpolated list in the ABA paradigm; and the priming received by underlying semantic representations during learning is not diminished by amnesia. In the phenomenon of posthypnotic source amnesia (Evans, 1979b; Evans & Thorn, 1966), some subjects, otherwise densely amnesic for their hypnotic experiences, are able to answer questions concerning new factual material acquired during hypnosis; however, they are unable to give a satisfactory account of the circumstances under which they learned this information. Subjects simulating hypnosis and amnesia do not produce this effect. The paradox of posthypnotic amnesia—one which reveals its essentially dissociative quality—is that amnesic subjects make use of memories that they do not know they have.

Posthypnotic amnesia qualifies as dissociative because the person cannot retrieve memories that are available and, under normal conditions, would be accessible. Nevertheless these memories continue to influence ongoing thought and action, outside awareness, and can be recovered upon administration of the reversibility cue. In this case, the dissociative split occurs between the episodic and semantic components of memory. According to models such as ACT, learning a list of familiar words involves activating a preexisting semantic representation of the item and then linking it associatively with other concepts specifying the spatiotemporal context in which the item was encoded. In amnesia it appears that the underlying semantic memory remains active and linked to the remainder of the organized mental lexicon, but becomes detached from its contextual features and, correspondingly, the continuous record of autobiographical memory. This results in partial or full failure on episodic memory tasks, which ultimately demand reconstruction of the spatiotemporal context in which the event occurred, but spares performance on semantic memory tasks, which have no such requirement (Kihlstrom, 1980). Similar accounts can be given for a wide variety of amnesic states, including the organic amnesic syndrome (Schacter & Tulving, 1982) and infantile amnesia (Schacter &

Moscovitch, 1983; White & Pillemer, 1979). The hypnotic case is somewhat different from these, however, in that the amnesia is temporary and reversible, implying that the connection between semantic and episodic components remains somehow represented.

Perceptual Alterations and Trance Logic

Various changes in perceptual experience also offer an opportunity to study dissociative processes in hypnosis. In the positive hallucinations, for example, the person perceives objects and events that are not actually present in the environment; and in negative hallucinations, the person fails to perceive objects and events that are present. In age-regression, the person takes on a childlike demeanor and appears to relive an experience associated with some period in his or her past life. Superficially, all of these experiences involve changes in phenomenal awareness and control of the kind that raise the question of dissociation. In the negative hallucinations, there is a loss of normal awareness; in the positive hallucinations, the subjects do not perceive that they are constructing mental images for themselves (Hilgard, 1977b; Jaynes, 1976; Johnson & Raye, 1981; Kihlstrom, 1981b; Neisser, 1976); age-regression combines both features, in that the individual loses awareness of his or her true age, and does not realize that he or she is actively constructing a hallucinatory experience of being younger (Kihlstrom, 1982; Orne, 1951).

These changes in perceptual experience are subjectively compelling: for example, Spanos and Barber (1968) found that reports of visual hallucinations were not diminished when the subjects were administered strong honesty demands (see also Bowers, 1966, 1967; Hilgard, Macdonald, Morgan, & Johnson, 1978). Nevertheless, subjects experiencing these phenomena display paradoxical features conceptually similar to those seen in amnesia (and, as described below, analgesia). For example, hypnotically deaf subjects continue to manifest speech dysfluencies when subjected to delayed auditory feedback (Scheibe, Gray, & Keim, 1968; Sutcliffe, 1961); and when shadowing in a dichotic listening paradigm, they show substantial numbers of intrusions from material presented to their deaf ear (Spanos, Jones, & Malfara, 1982). And age-regressed subjects may continue to display their normal adult skills, as in the case of a subject who, when regressed to preschool age, took dictation of a complicated sentence, in a childlike scrawl, without misspelling a single word (O'Connell, Shor, & Orne, 1970; Orne, 1951).

In a classic paper, Orne (1959) pointed to other such inconsistencies and anomalies of response during hypnosis. In the case of the double hallucination, for example, it is suggested that the subject will see, and interact with, a confederate sitting in a chair which is actually empty. After the hallucination is established, the subject's attention is drawn to the real confederate, who has been quietly sitting outside his or her view. Orne reported that hypnotized subjects typically exhibited confusion as to which was the real confederate, but maintained both the perception of the real confederate and the hallucination. Similarly, many reported that they could see through the hallucinated confed-

erate to the back of the chair. Subjects simulating hypnosis typically manifested neither effect. Orne dubbed this response "trance logic," and indicated that it represented a simultaneous awareness of two mutually contradictory states of affairs without attempting to resolve the contradictions inherent in the experience—a "peaceful coexistence" of illusion and reality.

Orne's original report was impressionistic in nature, and later investigators have attempted to study the effect quantitatively. The first study, by Johnson, Maher, and Barber (1972), reported a failure to confirm Orne's observations. However, a critique and reanalysis by Hilgard (1972; for a reply, see Johnson, 1972) indicated that their results were actually somewhat supportive of Orne's claims. Later experiments have also been supportive, although the magnitude of the effect has not been large (McDonald & Smith, 1975; Obstoj & Sheehan, 1977; Perry & Walsh, 1978; Peters, 1973; Sheehan, 1977; Sheehan, Obstoj, & McConkey, 1976). While most studies have confined themselves to the two canonical tasks described by Orne (1959), Peters (1973) employed a battery of tasks designed to elicit trance logic. When an overall score was calculated by summing the number of items on which trance logic was shown, the difference between reals and simulators was highly significant. Similarly, Obstoj and Sheehan (1977; see also Sheehan, 1977) and Perry and Walsh (1978) found that scores on a battery of trance logic items administered during hypnosis significantly differentiated hypnotizable from insusceptible subjects. The current situation seems to be that trance logic and other incongruities and anomalies of behavior and experience are not defining characteristics of hypnosis, as Orne originally thought them to be. They do not occur in all hypnotized subjects; and they also may occur in states other than hypnosis, such as when hypnotizable subjects are given imagination instructions (Obstoj & Sheehan, 1977). It should be recalled, however, that states such as hypnosis, as natural categories, are not defined in terms of such necessary and sufficient features.

In the present context, trance logic is of particular interest because it seems to represent co-consciousness, or a simultaneous representation in awareness of two independent streams of mental activity—the one involved in constructing the hallucinated experience, the other involved in perceiving reality. In all of the other instances of dissociation discussed in this paper, one such stream of mental activity is denied to conscious awareness, so that the subject does not become aware of his or her contradictory experiences and actions. The experience of multiple simultaneous, mutually contradictory perceptions can be expected to be rather difficult to maintain; it is not surprising that the phenomenon is rare and has been difficult to tame and bring into the laboratory for rigorous study under controlled conditions.

The Hidden Observer

Along with trance logic, the most controversial demonstrations of dissociation within hypnosis have involved the phenomenon of the "hidden observer" (Hilgard, 1973c, 1977b, 1979). The first formal demonstration of the hidden observer effect was provided by Knox, Morgan, and Hilgard (1974) in hypnotic

analgesia. Analgesia is another of those paradoxical hypnotic phenomena, in that hypnotizable subjects who are given appropriate suggestions may report feeling no pain when exposed to normally painful stimulation. Despite their denial of pain, however, analgesic subjects may show normal psychophysio-logical responses to the pain stimulus. Thus the pain stimulus is registering in the cognitive system, although it is not represented in the subject's phenomenal awareness (Hilgard & Hilgard, 1974). The hidden observer is a metaphor for this continuing subconscious perception of pain, and the method by which it is accessed. After analgesia has been successfully established, the experimenter attempts to communicate with a "hidden part" of the person which may have recorded the true state of affairs. Under these circumstances, many (but not all) subjects give pain reports comparable to those collected under normal waking conditions (Hilgard, Hilgard, Macdonald, Morgan, & Johnson, 1978; Hilgard, Morgan, & Macdonald, 1975; Knox et al., 1974). Later, these findings were extended to hypnotic deafness (Crawford, Macdonald, & Hilgard, 1979). Other laboratories have replicated this effect in analgesia (Laurence & Perry, 1981; Nogrady, McConkey, Laurence, & Perry, 1983; Spanos, Gwynn, & Stam, 1983; Spanos & Hewitt, 1980).

Reports of the hidden observer have been criticized by those who analyze hypnosis in social-psychological terms as a kind of motivated compliance with the expectations and demands imposed on the subject by the hypnotic situation. For example, Coe and Sarbin (1977) have suggested that the hidden observer instructions give the subject permission to report pain that has been actually felt all along. However, the success of hypnotic analgesia in clinical situations argues against this hypothesis (Bowers, 1976; Hilgard & Hilgard, 1974). Similarly, Spanos and his associates have found that the direction of covert pain reports is influenced by the wording of instructions, leading them to conclude that the hidden observer is a product of social influence rather than a reflection of dissociation (Spanos et al., 1983; Spanos & Hewitt, 1980). These studies may be criticized on both conceptual and methodological grounds (e.g., Laurence, Perry, & Kihlstrom, 1983; for a reply, see Spanos, 1983).

Hypnosis, as an interpersonal phenomenon, is of course not immune to social influence processes such as compliance and impression management. However, there are reasons for thinking that the effect is not entirely a product of them. For example, the hidden observer is typically obtained in only about 50% of the subjects tested, despite the fact that they have all been preselected on the basis of their very high level of response to other hypnotic suggestions. Moreover, a study by Hilgard, Hilgard, et al. (1978) found that the occurrence of the hidden observer was not strongly associated with the subject's expectations following administration of the suggestion. The surprise of many subjects upon discovering that they had a hidden observer, and the disappointment of others when they failed to find one, are inconsistent with an account based solely on strategic social compliance. Perhaps most telling in this respect is the behavior of subjects who have been instructed to simulate hypnosis. Under instructional conditions that explicitly stated that there was such a subconscious registration of sense data,

Hilgard, Hilgard, et al. (1978) obtained hidden observer reports in 50% of their hypnotic subjects, and 75% of their simulators. The difference is nonsignificant, but overreaction to the suggestion is characteristic of simulating subjects, and again argues against hypnosis as merely a case of response to social cues and demands. In a later study employing a weaker suggestion, which indicated only that there might be such covert registration, Nogrady et al. (1983) obtained hidden observers in 42% of their hypnotic subjects and 0% of their simulators. Following the logic of the real-simulator design (Orne, 1979), the research shows that the demand characteristics of the experimental situation are not sufficient to produce the hidden observer response.

Added lawfulness has been brought to the phenomenon by recent successes in predicting which of a selected group of highly hypnotizable subjects will show the hidden observer effect. The two studies yielding the highest incidence of hidden observers (Knox et al., 1974, and Spanos & Hewitt, 1980—both 87.5%; see also Spanos, 1983) employed additional criteria of amnesia and/ or automatic writing or talking, presumably insuring a sample of hypnotizable subjects with a talent for dissociation. The remaining studies employed high hypnotizability as the sole criterion, yielding an incidence averaging 45%. Laurence and Perry (1981) found that the occurrence of a hidden observer in less stringently selected samples could be predicted almost perfectly by the occurrence of duality response on age regression, in which subjects experience themselves simultaneously as child participants and adult observers—a finding strongly confirmed by Nogrady et al. (1983). This inconsistency in response, somewhat reminiscent of trance logic, again suggests a marked capacity for dissociation distinguishing these hypnotic virtuosos from other subjects who may achieve hypnotic experiences via other routes. In any event, the hidden observer, with its covert registration of pain or sound outside of awareness, is a prime example of dissociative processes at work. The stimulus is represented in the cognitive system, but not accessible to phenomenal awareness except under extraordinary conditions.

The Problem of Interference

Amnesia, trance logic, the hidden observer, analgesia, deafness, and other hypnotic phenomena are prime examples of dissociation in the laboratory, but they have also carried the seeds of the concept's destruction by showing that percepts and memories supposedly denied to conscious awareness continue to interact with ongoing cognition and action. Consider, for example, the studies of relearning, retroactive inhibition, and priming during posthypnotic amnesia; the psychophysiological responses to pain stimulation in analgesia; and the effects of delayed auditory feedback in deafness. In each case, the subject denies awareness of a percept or memory that nevertheless has a demonstrable influence on his or her behavior. Such evidence has long been taken as discrediting the concept of dissociation (e.g., White & Shevach, 1942). The argument is that since the ostensibly dissociated percepts and memories continue to interact with other cognitive and behavioral processes, there is no sense in which they have been split off and isolated from the rest of the system. Hilgard (1973a, 1977b) has

persuasively argued, however, that noninteraction is a later importation into the theory, and not an essential property of the original concept of dissociation. Only lack of awareness of adequately registered inputs or adequately encoded memories, and perhaps perceived involuntariness, is essential.

The insistence of both early and late critics on noninterference as well as nonawareness seems to stem from a misunderstanding of James's (1890) metaphor of the stream of consciousness. Following the metaphor superficially, it is held that two streams of water, running parallel to each other but separated by tall banks, should not affect each other. However, if the two streams originate from the same source, each will certainly draw off some of the flow from the other. Interference will also occur if the streams flow into a common outlet. Given a model of attention such as Kahneman's (1973), in which a single source of attentional capacity may be deployed in multiple directions, James's metaphor would certainly lead one to predict some degree of mutual interference between simultaneous, dissociated tasks. This interference would be even more dramatic, of course, if the two streams of mental activity were competing for the same output channel at the response end of the cognitive cycle. Thus some degree of mutual interference among dissociated cognitive tasks is to be predicted.

Only three experiments have studied the mutual interference between simultaneous, dissociated tasks using concepts and methods current in the psychology of attention. In one experiment, Stevenson (1976) compared color naming, always a conscious task, with written arithmetic performed either consciously or subconsciously, by highly hypnotizable subjects. There were actually two arithmetic tasks: counting from one to ten, an easy task; and adding serial 7s to a two-digit seed number, a more difficult one. When the tasks were performed simultaneously they interfered with one another, compared to a baseline condition, with more interference during the more difficult arithmetic task. For both arithmetic tasks, subconscious performance actually created more interference than conscious performance. Similar results were obtained by Knox and her colleagues (Knox, Crutchfield, & Hilgard, 1975), comparing color naming with rhythmic key pressing: there was more interference when the key pressing was subconscious. Bowers and Brenneman (1981) asked their subjects to touch their noses in response to a signal presented during a shadowing task: this time, there was less interference on shadowing when nose touching was subconscious than when it was conscious, but interference still occurred. The results of the three experiments may be arrayed along a continuum representing the attentional demands of the simultaneous tasks. Arguably, serial addition is the hardest, and nose touching the easiest (many of us do this routinely outside of awareness, and without conscious intent), and the counting and tapping tasks fall in between. Thus given the assumption of a single attentional resource, divided according to the demands made by the tasks, the interference results are just what they should be.

But what of the finding that subconscious performance creates more interference than conscious performance does? Stevenson (1976) argued that it consumes more attentional resources to keep something out of consciousness than to permit it to be represented in awareness. While this may well be true, the

argument does not necessarily apply to the cases described here. Consider once more the phenomenon of the hidden observer in hypnotic analgesia and deafness, and reversibility in posthypnotic amnesia. These all entail the creation of two streams of mental activity: one representing phenomenal awareness (or, rather, the lack of awareness) of the stimulus; and the other representing the subconscious monitoring of the true state of affairs; as tapped by the hidden observer procedure or memory reports after the reversibility cue has been administered. Applying this organization to the simultaneous tasks, we see that conscious simultaneous tasks require two streams (one for each task), but subconscious simultaneous tasks require three—the additional stream being required to monitor the subconscious task, and to serve as a potential later link between the two streams of thought and action. With three streams drawing on a single attentional resource, the degree of interference is likely to be increased. The contrary finding by Bowers and Brenneman (1981)—that subconscious nose touching produced less interference—appears to contradict this hypothesis, of course, and poses an interesting problem. Perhaps this anomaly reflects the special nature of their task: because even unhypnotized subjects routinely perform nose touching maneuvers automatically, outside of awareness, it may require extra attentional effort to bring this behavior into awareness. If so, then the subconscious condition restores the normal state of affairs, and reduces interference caused by the instruction to perform both tasks simultaneously.

A MECHANISM FOR DISSOCIATION

The case for dissociation rests on phenomena such as these, plus others observed in the clinic, laboratory, and ordinary life. Each of these instances, viewed in isolation, is somehow problematic. The phenomena of hysteria, fugue, and multiple personality are admittedly rare, and are complicated by the frequent presence of brain damage and the possibility of malingering. Depersonalization, déjà vu, and other anomalies of memory have not yet been studied in enough detail to permit us to draw conclusions about their nature. In the case of mental activity occurring during sleep, since subjects are not able to report on their subjective experiences, an important source of data is lost; and the predominance of psychobiological and psychoanalytic thinking in the area of sleep research has effectively inhibited investigations oriented toward theoretical issues in cognitive psychology. Finally, the phenomena of hypnosis present many of the same difficulties as do the syndromes of hysteria: hypnotic virtuosos, those most likely to achieve hypnotic effects by means of dissociation, constitute at best 10% of the population (Hilgard, 1965); and the interpersonal setting in which hypnosis occurs creates certain difficulties of inference.

Compelling experimental results favorable to the concept of dissociation in any one of these domains would be sufficient to require revision of our concept of the mind in such a way as to permit the possibility of divisions in consciousness and subconscious mental processing. At present, such documentation is lacking, in large part because research in these topics has typically been conducted within

other theoretical frameworks. At the same time, however, the strong family resemblance which these phenomena bear to each other should not be ignored. All of the instances involve deliberate, intelligent, behavioral and cognitive activities of such complexity and extent as to require representation in phenomenal awareness, if not the full commitment of the person's attentional resources, given the assumptions of conventional models of the mind. Yet these very activities appear to occur involuntarily; or the person has little awareness of having engaged in them; or, if the person is aware of them, they are not integrated into the other activities and experiences of which he or she is also aware. These resemblances allow the phenomena, somewhat weak as separate instances, to form a strong case when taken together.

This argument is strengthened further by the observation of dissociative phenomena in the normal waking state, under tightly controlled laboratory conditions. Spelke, Hirst, and Neisser (1976) trained subjects to read a prose passage and take dictation simultaneously; performance was measured in terms of transcription accuracy and scores on a comprehension test. Although the task was difficult at first, with practice the subjects were able to perform it with a high degree of accuracy. While the subjects had good memory for the prose passages, enabling them to pass the comprehension test at a high level, they showed poor recall of the dictated words—despite the fact that during dictation they made rather complicated decisions concerning the semantic and syntactic relationships among the items. (Recognition levels were superior to chance, but not perfect, paralleling findings in posthypnotic amnesia.) A subsequent experiment (Hirst, Spelke, Reaves, Caharack, & Neisser, 1980) substantially replicated these findings. That the subjects were engaged in parallel processing, rather than rapid serial alternation between tasks, was demonstrated by their maintenance of reading speed at control levels, and by their success when reading both redundant and dense prose (see also Neisser, Hirst, & Spelke, 1981). With these kinds of demanding cognitive tasks, parallel processing amounts to Prince's notion of co-conscious mental states; when one stream of consciousness is accessible to recall and the other is not, that is what the concept of subconscious mental activity is all about. Similarly, it has been found that normal subjects can show considerable savings in relearning, even though they cannot consciously remember the original learning experience (Kolers, 1976; Nelson, 1978); and that previous experience can facilitate performance on a subsequent cognitive task even though subjects do not consciously remember what the earlier experience was (Jacoby & Dallas, 1981; Scarborough, Cortese, & Scarborough, 1977). These phenomena are phenotypically similar to those of the dissociative states described earlier, with the difference that the pathological and experimental dissociations can be created with overlearned material, and over short retention intervals. Even so, the underlying mechanisms may prove to be the same.

A Neodissociation Theory of Divided Consciousness

Recently, Hilgard has revived the concept of dissociation under the rubric of neodissociation theory, which acknowledges links to earlier approaches but

seeks to free itself from the excesses and errors of previous formulations. The theory was originally stated as an interpretation of a single phenomenon—hypnotic analgesia (Hilgard, 1973c); later, it was expanded to cover a broad range of phenomena including the clinical syndromes of hysteria, fugue, and multiple personality, dreaming and other everyday experiences, and the whole range of hypnotic phenomena (Hilgard, 1977b, 1979). Neodissociation theory begins with the assumption that the mental apparatus consists of a set of cognitive structures similar to Janet's automatisms and Bartlett's schemata, which monitor, organize, and control thought and action in different domains. Each of these structures can seek or avoid inputs and facilitate or inhibit outputs. The structures are organized hierarchically, so that under ordinary circumstances each is in communication with the others. At the top of the hierarchy is a cognitive structure which exercises executive functions of monitoring and control. As the ultimate end point for all inputs to the system and the ultimate starting point for all outputs, the executive control structure provides the basis for phenomenal awareness and intentionality. Figure 4.5 shows the system in schematic outline.

According to the theory, certain conditions can constrain the operation of the central executive, disrupting the integration and hierarchical organization of the subordinate control structures. For example, the lines of communication
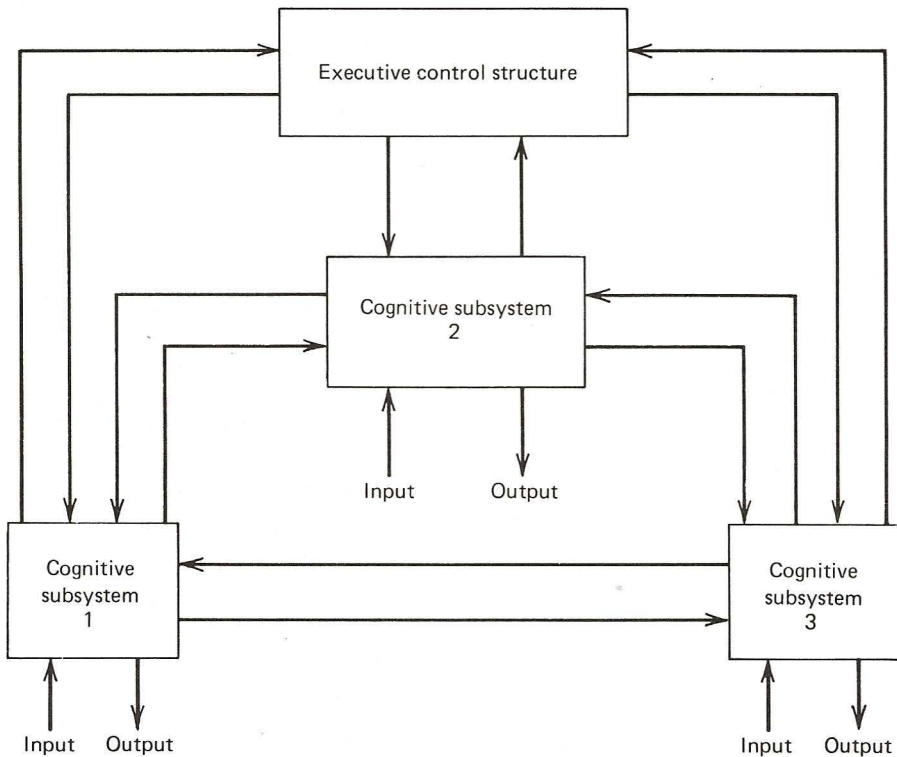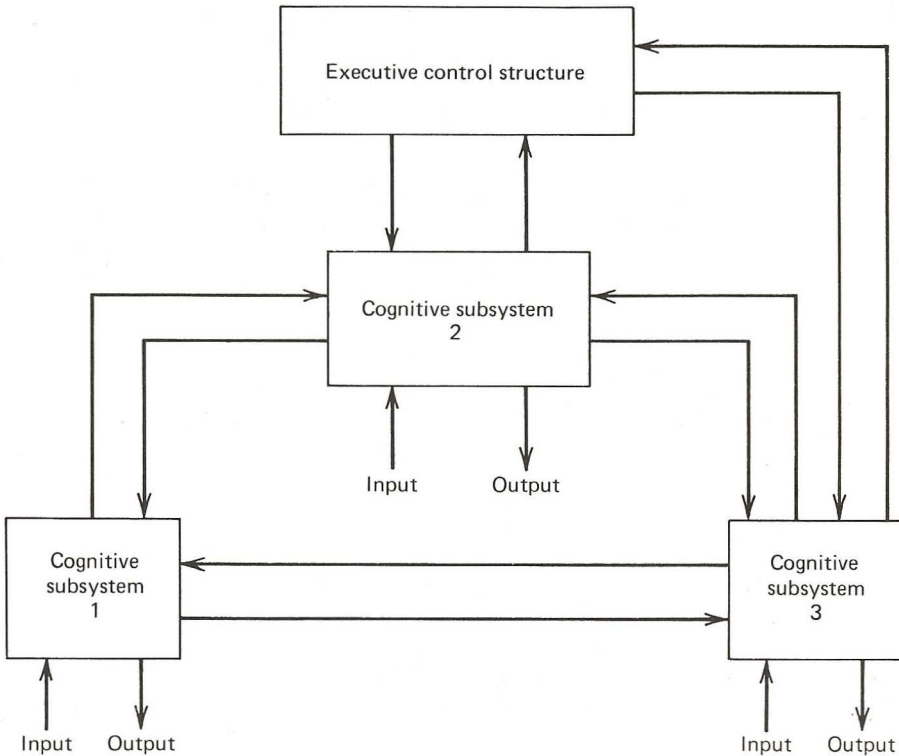

Figure 4.5. A hierarchical system of cognitive controls, with all lines of communication intact (after Hilgard, 1973).
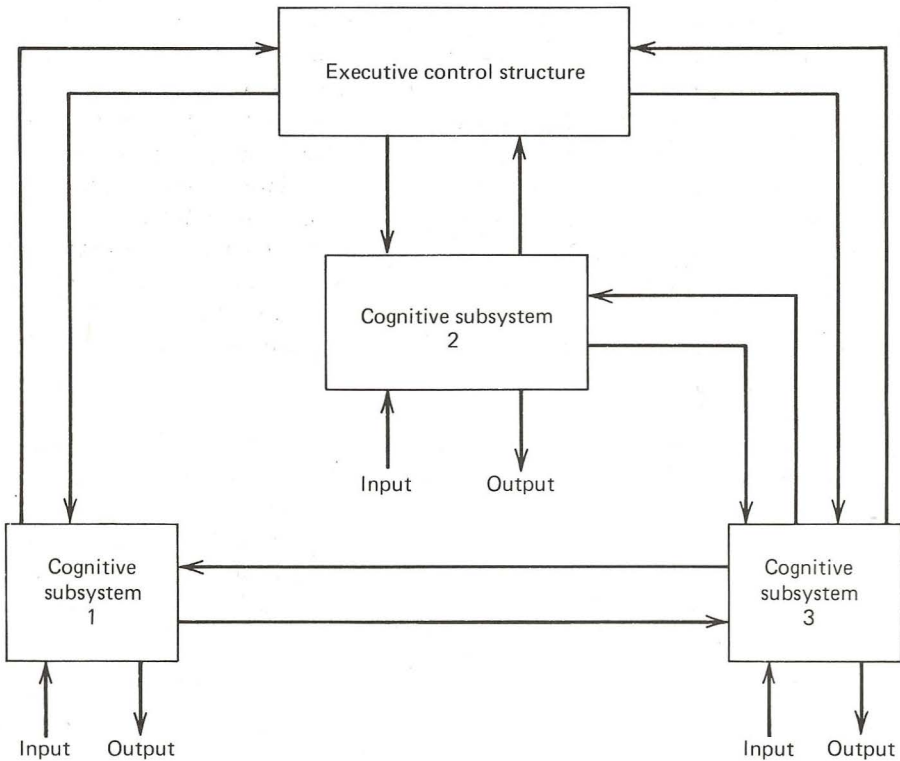
Figure 4.6.   A hierarchical system of cognitive controls, with broken lines of communication between two cognitive subsystems.

between two subordinate controls might be cut, so that each performs its functions (receiving inputs and generating outputs) in the absence of any direct integration between them (Figure 4.6). Alternatively, the communication links between a subordinate control structure and the executive structure might be broken, resulting in a reduction of the normal degree of voluntary control over particular subordinate structures, or a reduction in the normal degree of awareness of what is being processed through them (Figure 4.7). Either case would represent a state of divided consciousness. The latter case, in which percepts, thoughts, and memories fail to be represented in phenomenal awareness, and/or actions are perceived as involuntary, is a classic instance of dissociation. When the constraining conditions are reversed, the reversion to the original integrated hierarchical structure will reinstate normal awareness and voluntary control.

It is important to recognize that in this theory, dissociated control systems need not be completely independent of each other. There may be indirect links between dissociated control structures, passing through other structures with which communication has been preserved. Or, the input or output of dissociated structures may be through a common channel. Finally, each control structure draws from a common attentional resource (e.g., Kahneman, 1973; Neisser,

Figure 4.7. A hierarchical system of cognitive controls, with broken lines of communication between a cognitive subsystem and the executive control structure.

1967, 1976). Thus there is no implication that dissociation will reduce inter-ference among the cognitive and behavioral tasks performed by the affected control structures. This is the most salient difference between neodissociation and the interpretation commonly given to older versions: the extent of interference is an empirical question, rather than a theoretical prediction. The phenomena central to the dissociation concept are awareness and voluntary control, not interference.

Dissociation and Cognitive Theory

In presenting the outlines of neodissociation theory, Hilgard (1977b) noted the relevance of the Deutsch-Norman model of the cognitive system—with a single memory store, automatic semantic analysis, and attention positioned late rather than early in the sequence of cognitive operations—to the phenomena of dissociation. The model is attractive, of course, because it permits information to be processed quite thoroughly before it is brought into awareness—thus allowing for various sorts of preconscious and subconscious influences on thought and action. According to the model, for example, the attentional process is responsible for selecting and integrating activated knowledge structures to form
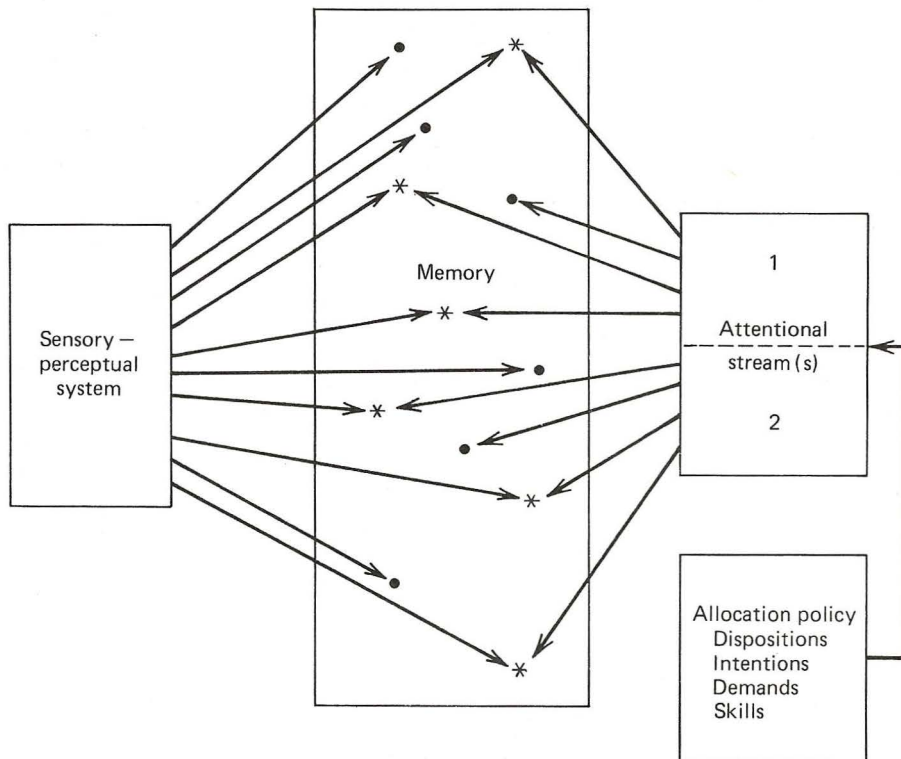
Figure 4.8.   Schematic conceptualization of a memory system permitting the division of attention and co-conscious mental processes (after Norman, 1968, and Kahneman, 1973).

conscious representations of percepts and memories, and to plan and execute actions in accordance with both short-term and long-term personal goals and situational demands. But apparently consciousness can be divided, permitting multiple streams of thought and action to be performed simultaneously. Accordingly, the Deutsch-Norman model needs to be supplemented with a notion such as Kahneman's (1973), which allows the total attentional resource available to be allocated among several tasks at once. In addition to the factors listed by Kahneman as determining allocation policy—enduring dispositions, momentary intentions, and task demands—the Hirst-Neisser-Spelke experiments indicate that the policy is also constrained by the individual's acquired skill at dividing attention. The modified model, then, might look something like Figure 4.8.

Such an arrangement permits activation of multiple simultaneous schemata organizing perception, memory, and action, and thus co-conscious streams of mental activity, but still has no room for subconscious streams. The principal problem for a neodissociation theory of divided consciousness is to indicate how such mental activities can proceed apparently involuntarily, and outside of phenomenal awareness. One possibility is suggested by the intrinsically episodic nature of consciousness. To paraphrase James: Conscious awareness does not
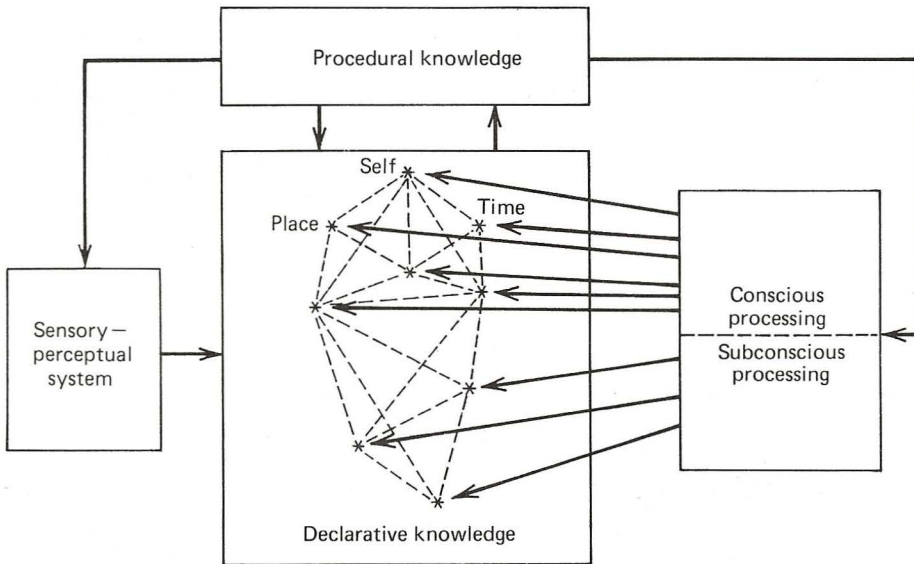
Figure 4.9.   Schematic model of memory permitting the division of attention and subconscious mental processes.

consist in the recognition that "This is happening"; but, rather, "I am doing this, or experiencing this, here and now." Central to the experience of consciousness, then, is linking activated concepts representing percepts, memories, thoughts, and actions with others representing the self as agent and experiencer on the one hand, and the spatiotemporal context of the event on the other. Those encodings that contain self-referential and contextual features become conscious; those that do not remain subconscious, regardless of how much processing is devoted to them. The outlines of such a system are presented in Figure 4.9.

Such a system appears to afford the possibility of all the major phenomena for which dissociation theory must account. The simultaneous allocation of attentional capacity to two or more tasks results in multiple co-conscious streams of mental activity, both represented in phenomenal awareness and perceived as voluntary, as described earlier. The implications of the model for subconscious streams of mental activity are manifold. The items processed in the conscious stream of mental activity will be associated with each other, but also with concepts representing self and context; those processed in the subconscious stream will be associated only with each other. Conceptually, reports of the contents of consciousness are elicited by the query, "What are you doing mentally, here and now?" According to network models of memory such as ACT, the query will activate preexisting concepts corresponding to self, time, location, and whatever other information is available (directly or by inference) from the cue. Activation spreads out along associative pathways, and when these intersect, an item will be retrieved. Such a process, applied to the present instance, will only contact the material processed consciously. Material processed subconsciously will remain available in the memory system, and even

activated, but inaccessible to retrieval because the critical associative pathways have not been formed. A similar argument applies to queries about the past as well as the present—after all, perception simply involves accessing the most recent events stored in memory. The retrieval cue supplies information about the context of the prior event, but the matching contextual features are only to be found in memories for experiences processed consciously. Thus recall, in which activation spreads from the self and context nodes to associated items, and recognition, in which activation spreads from both items and self and context nodes, will succeed for items processed consciously, but not for those processed subconsciously. In cases of retrograde dissociations, as in functional or posthypnotic amnesia, the episodic links are established during encoding but subsequently broken. Such a pathway must remain available in the memory system, however, even if it is temporarily inaccessible, because episodic memory can be subsequently restored.

The fact that subconscious mental contents are not tied into the episodic memory system does not mean that they cannot influence ongoing thought and action. Each stream of mental processing, whether conscious or subconscious, is capable of organizing and executing actions, provided that the limits on processing skills are not exceeded. This state of affairs may lead to some of the inconsistencies and paradoxes observed in both hysterical and hypnotic phenomena. And even if there is no output channel available to contents being processed subconsciously, the items may still influence ongoing cognitive activity, and so indirectly affect behavior. So, for example, if a subject is run in the A-B, A-C retroactive inhibition paradigm, with the latter list covered by amnesia suggestions, the A-C associations may well remain intact, and interfere with reproduction of the A-B list. Moreover, when underlying semantic representations are activated during list learning, they will retain that activation even if they have been separated from the contextual features that mark the event as an item in episodic memory. Thus priming effects will facilitate perceptual recognition and similar tasks even though the subject does not remember what he or she learned. Finally, skills acquired during hypnosis, with the learning covered by amnesia, will still remain accessible in declarative memory, or procedural memory if knowledge compilation has begun, even though the loss of reference to self and context will mean that the person is unaware that he or she possesses them (i.e., lacks metaknowledge) and—if persuaded by events to acknowledge this fact—of the circumstances under which they were acquired.

The sparing of semantic memory representations may also lead to above-chance performance on certain *episodic* memory tasks. In recognition, for example, subjects are asked to indicate whether a test item has been presented before—clearly an episodic task requiring recovery of the spatiotemporal context in which the item occurred. In terms of a network model such as ACT, episodic retrieval activates nodes corresponding to item and context information provided by the query, activation spreads out from each node along associative pathways, and cognitive units formed by intersecting pathways are checked. If, as suggested earlier, dissociation is mediated by a disruption in the links between

semantic representations and their contextual features, then recognition should fail: the critical item-to-context link cannot be formed. However, subjects may base their recognition decisions on feelings of familiarity as well as on direct reconstruction of episodic context: under appropriate conditions the mere fact that a test item "rings a bell" may be sufficient to lead a subject to call an item old rather than new. Such guessing strategies are found in sensory-perceptual tasks, and are familiar in the literature on signal detection theory. In memory, this effect can come about when the retrieval process adds activation to nodes that have already been activated (primed) during acquisition. A guessing strategy based solely on level of activation will, therefore, lead to a great many hits and very few false alarms. The failure to recover the item's episodic context, however, may be manifested in poor performance on tasks involving list differentiation, in which test items come from several lists, and the subject must assign recognized items to their correct contexts. In much the same way, residual activation may lead to savings in relearning, and the guessing strategy may lead to successful cued recall. However, free recall—in which activation must flow from context nodes to item nodes, should always be impaired.

Neither available space, nor available knowledge, permit systematic application of these ideas to the phenomena of dissociation. The theory is stated as a guide to, rather than a summary of, research. Most of the examples cited deal with posthypnotic amnesia, both because it is the most thoroughly investigated dissociative phenomenon and because the conceptual model, being a theory of memory, most easily addresses itself to problems of remembering and forgetting. Because the memory system supplies the knowledge base for perception and action, however, it seems reasonable to expect that the interpretative framework advanced here will be applicable to the other dissociative effects on perception and memory as well. And as research accumulates on other hypnotic phenomena, and on other special states of consciousness, the opportunity will arise to explore the model's generalizability. In principle, the network model of memory outlined here shows how dissociative phenomena can be construed in a familiar artificial intelligence system. While it very well may be possible to program a computer to dissociate, and determine if its behavior resembles dissociation as it occurs in patients and normals, the more important justification for the modeling enterprise is that it forces the theorist to define concepts and principles more clearly and rigorously than otherwise.

The model of dissociation tentatively advanced here centers on the weakening, fracturing, or breaking of the associative links between semantic representations of percepts and memories, and episodic representations of the self in spatiotemporal context. As such, it is placed within the framework of a model of the manner in which declarative knowledge is organized in memory. However, memory contains cognitive skills as well as factual information. The nature of this procedural knowledge, and the manner in which it is organized and brought to bear on ongoing cognition and action, is equally important. First, it is clear that dissociative processes such as those described here affect declarative but not procedural knowledge, and only those declarative knowledge structures that are

episodic in nature. Like semantic knowledge, procedural knowledge does not contain reference to the episodic context in which it was acquired—thus adding support to the hypothesis that episodic features are critically involved in dissociation. More important, it is clear that the dissociative processes them-selves—the processes by which episodic features are separated from, and later returned to, semantic representations—form part of the individual's repertoire of procedural knowledge. Thus once the declarative aspects of dissociation have been mapped out satisfactorily, inquiry should move to a different set of questions: What is the nature of dissociative procedures? How are these skills distributed in the population? Are individual differences in these skills innate or acquired?

Some preliminary answers to these questions are available from what we already know about the special states of consciousness involving dissociation. For example, all of us appear to have the capacity to dissociate, as in the case of dreams and other aspects of sleep. This level of dissociative skill appears to be innate, much like certain perceptual-cognitive and linguistic capacities. At the same time, however, some of us are more prone to dissociate than others, perhaps rendering us vulnerable to hysteria, fugue, multiple personality, obsessions, and compulsions at times of stress. And some of us have voluntary control over dissociative processes, an attribute that may differentiate hypnotic virtuosos from the rest of the population. The ultimate problem of dissociation concerns the nature of these cognitive skills, how they interact with declarative knowledge, how we acquire them, and how some of us gain access to and voluntary control over them.

THE PROMISE—AND CHALLENGE—OF DISSOCIATION

Understanding the nature of dissociation is important because the subconscious of neodissociation theory is rather different from the unconscious as it is conceptualized by other schools within psychology. Neodissociation theory differs from psychoanalysis, for example, because the subconscious is not restricted to primitive sexual and aggressive impulses and those memories and ideas associated with them. Nor do subconscious mental processes operate according to the irrational "primary process" principles associated with the Freudian unconscious. If anything, they seem to follow the rational, "secondary process" rules of the System Cs. Dissociated percepts and memories can be closely tied to objective reality; and dissociated ideas can be rational and even creative. Equally important, rendering something subconscious is not necessarily motivated by defense against anxiety, as is the case with Freudian repression. It can simply happen, as is the case in hysteria, fugue, or multiple personality (or, for that matter, in sleep); or it can be done for entirely adaptive purposes, voluntarily, as in the case of subjects who enter hypnosis or people who go to a movie precisely because they know that they will temporarily lose themselves in the action on the screen.

The subconscious of neodissociation theory also differs in important ways

from the manner in which unconscious mental contents and processes are construed, implicitly or explicitly, in classical theories of human information processing. Thus the subconscious of neodissociation theory is not restricted to the procedural knowledge by which we detect features of perceptual stimuli, encode and decode language, retrieve memories, make elementary judgments, perform routine motor tasks, and so forth. It can also involve complex factual knowledge, both semantic and episodic in nature, concerning the existence of certain objects and the occurrence of past events; and it can include an extensive and organized autobiographical record. Nor is it restricted to the simple, automatic, and routine: complex cognitive and behavioral activities apparently can be performed outside awareness. Linguistic contents can be rendered subconscious, and percepts and memories can be subconscious even though the person's linguistic abilities remain intact. Nor, within the realm of declarative knowledge, is the subconscious simply the repository, if that is the word, for unattended perceptual inputs, weak memory traces, and the products of early, simple, and automatic cognitive operations.

Neodissociation theory links a diverse set of real-world and laboratory phenomena under a descriptive rubric and challenges cognitive science to account for them. It comes as no surprise that attention can be divided, though that fact in itself poses problems for conventional models of information processing that are predicated on the existence of limited-capacity channels and discrete storage structures. But if attention can be divided, with one stream of complex, deliberate cognitive activity proceeding outside awareness, this seems to cause some problems for the way we usually think about things. The empirical basis for the theory is sometimes problematic, but as in the case of "subliminal perception" all that is needed is one solid finding to change the way we think about the mind. The purpose of the present essay is to argue that current models of the mind do contain the raw materials—in the form of representational and procedural principles—of a plausible account of dissociation. James may have overstated the importance of the discovery of subconscious mental processing. Psychological research has turned up other surprises since the turn of the century. But while these findings have been largely incorporated into emerging theoretical developments, the phenomena of dissociation have not. If we do not take these phenomena seriously, and consider their implications for our understanding of the cognitive system, our evolving model of the mind may be led seriously astray. This is reason enough to continue to pursue neodissociation theory, and the phenomena it tries to comprehend, and to incorporate it and its insights into larger theories in order to produce a comprehensive view of the mind in order and disorder.

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