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15

Incidental versus Intentional Retrieval: Remembering and Awareness as Separate Issues

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The definition of "amnesia" as "a loss of memory" is misleading in its simplicity. Everyone is subject to memory loss to some extent. Normal memory performance is inconsistent across tasks (e.g., Underwood, Boruch, & Malmi, 1978) and occasions of testing (e.g., Battig, 1979). Thus, memory performance typically lacks the monolithic quality that is implied by the definition of amnesia. Very little attention has been given to the potential significance of variability in memory performance across occasions of testing. However, researchers have focused on the independence of performance on different types of memory tests. According to several reports (e.g., Corkin, 1968; Milner, Corkin, & Teuber, 1968), amnesics preserve a nearly normal ability to employ memory for recent events to aid their interpretation of an ambiguous event (e.g., identification of a fragmented version of a previously presented picture) or as a source of savings revealed in their objective performance (improvement from practice of a pursuit-rotor task). These effects occur, although amnesics deny any sense of subjective familiarity when asked about the experience that gave rise to the effect on performance. That is, effects of recent prior experience on performance can be independent of memory, as assessed by standard tests of recognition memory or recall. This phenomenon has far-reaching implications for the understanding of memory in normals and amnesics. Many of the data described in this chapter were gained from normal subjects rather than amnesics. Using data gained from normals to help our understanding of amnesia seems justified, since many effects found with amnesics, including effects of prior experience in the absence of recognition memory, can also be found with normals.

Some sort of simplifying scheme is obviously needed to help make sense of the various results that are obtained in investigations of memory. One popular scheme has been to distinguish among "encoding" (putting things into memory), "storage" (maintenance in memory), and "retrieval" (recovery of information from memory), and then to specify the locus of deficits in terms of these three stages. It has been debated whether amnesia results from a deficit in encoding (e.g., Cermak, 1979) or a deficit in retrieval (e.g., Warrington & Weiskrantz, 1973). Further, it has been postulated that some amnesics suffer from an abnormally fast rate of forgetting, due to a deficit in storage (Huppert & Piercy, 1979; Squire, 1982). The independence of performance on some tests of memory has been explained by postulating separate memory stores or qualitative differences in memory. The

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memory that is preserved by amnesics and expressed in performance is attributed to memory for procedures (Cohen & Squire, 1980) or semantic memory (Kinsbourne & Wood, 1975), while the amnesic's poor performance on tests of recognition memory or recall is attributed to a loss of declarative memory (Cohen & Squire, 1980) or episodic memory (Kinsbourne & Wood, 1975).

In contrast to the scheme outlined above, I prefer to emphasize similarities in processing that cut across the memory stores and stages that others have postulated. Similarities in processing are potentially ignored by attempts to specify a deficit in memory as being limited to encoding, storage, or retrieval. In fact, forms of processing that are important for encoding may be equally important for retrieval, making it more fruitful to focus on deficits in processing in general rather than to consider encoding and retrieval problems separately. Thus, this chapter attempts to interpret the memory performance of normals and amnesics within a common processing framework. Both storage and retrieval are seen as sometimes requiring more active elaborative processing than amnesics will spontaneously carry out. The preserved memory in amnesia is treated as being due to effects on retrieval that can be explained in the same way as are effects of incidental versus intentional learning. Finally, effects of prior experience on objective performance and on awareness of remembering are treated as being separable. Rather than being viewed as inherent characteristics of memory, awareness of remembering or feelings of subjective familiarity are seen as relying on the application of a heuristic and as resulting from an attribution process.

Encoding, Storage, and Retrieval

It has been claimed that Korsakoff patients' amnesia results from encoding deficits; namely, in contrast to normals, amnesics reveal less flexibility in their processing of material, and less elaborative processing or processing of meaning (e.g., Cermak, 1979). Further, it has been suggested that it may be possible to repair the patients' memory performance by controlling encoding processes through the use of incidental-learning procedures. Experiments designed along these lines have shown that, as is true for normals, employing incidental-learning tasks that require Korsakoff patients to process the meaning of the material to be remembered, rather than more superficial characteristics, does enhance memory performance. Disappointingly, the control of processing through incidental-learning procedures does not substantially reduce the memory disadvantage of amnesics as compared to normals (Baddeley, 1982; Cermak & Reale, 1978).

Incidental-learning procedures may still leave remaining differences in encoding between normals and amnesics. Normals may do more creative or elaborative processing when answering a question; this additional processing is not strictly required by the task, but may serve to enhance memory performance. Differences in encoding processes of this sort are difficult to detect when easy questions requiring a "yes" or "no" answer are employed in the incidental-learning phase of an experiment. Patients might be as likely as normals to answer the questions correctly, but might still engage in less undetected processing than normals do. The use of more complex questions and additional measures such as reaction times might be useful for detecting existing differences. One could then further equate encoding processes, thereby potentially reducing differences in memory performance between Korsakoff patients and normals.

The ineffectiveness of incidental-learning procedures as a therapeutic device seems more likely to stem from differences in retrieval than from undetected differences in encoding processes. Central to the rationale underlying the use of incidental-learning procedures is the claim that Korsakoff patients are less likely to engage in elaborative processing on their own initiative than are normals, so they must be forced to do so. If patients are unlikely to engage in elaborative processing during encoding, there seems to be no reason to think that they would do so at the time of retrieval. In line with the encoding-specificity hypothesis (e.g., Tulving & Thompson, 1973), gaining maximal benefits from elaborative processing during encoding may require that subjects engage in the same form of processing at the time of test. A failure to engage heavily in elaborative retrieval processing on their own initiative would explain why Korsakoff patients still show a memory deficit even when incidental-learning procedures are employed to increase their elaborative processing during encoding. Just as incidental-learning procedures have been used to manipulate encoding processes, it may be possible to devise "incidental-testing" procedures to control retrieval processes, and thereby to eliminate the difference in memory performance between Korsakoff patients and normals. Following incidental learning, the memory disadvantage of Korsakoff patients may be removed if memory is tested by comparing the effects of the prior training on the objective performance of some subsequent task. In this vein, there have been many reports of nearly "normal" memory revealed by Korsakoff patients on incidental tests (as opposed to standard recall and recognition-memory tests) of this form (e.g., Cohen & Squire, 1980).

Effects on rate of forgetting also may be due to processes similar to those involved in encoding and retrieval. Differences in rate of forgetting have been used to postulate two types of amnesia, with only one of the two types suffering from a deficit in storage. Diencephalic amnesia, of which the Korsakoff syndrome is an example, is characterized by a normal rate of forgetting, whereas bitemporal amnesia (of which the case of the famous patient H. M. is an example) is said to reveal a deficit in storage, being characterized by rapid forgetting (Squire, 1982). To compare forgetting rates, additional exposures of material to be remembered have typically been used to equate the memory performance of amnesics with that of their controls on an initial test (equating degree of learning). The difficulty is that equal performance on an initial test does not imply that the different groups achieved that performance by the same means. Qualitative differences in encoding and retrieval processing may be responsible for the apparent differential rate of forgetting. The finding of fast forgetting is very important for specifying different types of amnesia, regardless of whether fast forgetting is due to qualitative or quantitative differences in memory. What is being advocated here is comparing performance across a variety of retention tests to reveal any qualitative differences in encoding and retrieval processes. It would be particularly interesting to compare the forgetting rate of diencephalic amnesics and bitemporal amnesics, using tests that rely on memory for prior experience being revealed as a source of savings, or other such incidental tests of retrieval.

Preserved Memory in Amnesia

By definition, amnesics are impaired in their ability to reflect on memory for prior episodes or to recognize items as being familiar. However, according to several reports, amnesics preserve a nearly normal ability to employ memory gained from recent experience to

facilitate their objective task performance. The most common examples of preserved learning and memory lie in the domain of perceptual-motor skills (Squire, 1982).

The examination of situations that reveal normal savings is important for specifying the aspects of memory that are spared by amnesia. If only perceptual-motor tasks revealed preserved learning and memory, it would seem reasonable to argue that the perceptual-motor system is separate from the rest of memory and is spared by amnesia. However, amnesics also reveal effects of recent prior experience in their performance of verbal tasks. We (Jacoby & Witherspoon, 1982) found that Korsakoff patients' interpretation of the meaning of a homophone (e.g., "read-reed") is influenced by memory for its recent prior presentation. Homophones were presented auditorily in the context of questions that biased interpretation toward the less frequent meaning of the homophone (e.g., "Name a musical instrument that employs a reed"). Subjects were later asked to spell several words; no mention was made that some of the words were homophones that had been presented in the earlier phase of the experiment. Surprisingly, Korsakoff patients showed a slightly greater tendency than did normals to spell homophones in line with the bias produced by the earlier questions (e.g., "reed"). This effect of memory on the interpretation of homophones appeared, although a later test revealed that Korsakoff patients were much less likely than normals to recognize the homophones as having been previously presented. Further analyses revealed that effects on spelling were independent of recognition memory for both normals and amnesics. Normals, like amnesics, show effects of prior experience on performance of perceptual tasks that are independent of recognition memory. For example, we (Jacoby & Dallas, 1981) reported that the prior presentation of a word enhances it subsequent tachistoscopic identification, and that this effect on perception is independent of recognition memory. Data such as those coming from the spelling experiment described above can be used as evidence that the separability of effects on objective performance and recognition memory is general, rather than being restricted to perceptual-motor tasks.

A difference in the sensitivity of the two types of memory tests could underlie the effects of prior experience on objective performance in the absence of recognition memory. In this vein, Meudell and Mayes (1981) argue that evidence of learning without recognition memory is not unique to amnesics, but, rather, is characteristic of weak memory in general. To support their argument, they show that the relationship between normals' ability to detect hidden objects in cartoons and their recognition memory for the cartoons after 17 months is similar to that of amnesics after a delay of 7 weeks. Similarly, Nelson (1978) employed normals and found that a savings measure of retention revealed evidence of memory even when subjects failed a test of recognition memory. Nelson interpreted these results as evidence that the two types of tests differ in their sensitivity. Recognition-memory tests were described as having a higher threshold than do savings measures of memory.

Unfortunately for this differential-sensitivity explanation, weak memory produced by a long delay between study and test is not required to find effects on perceptual tasks in the absence of recognition memory for normals. Savings in perceptual tasks are statistically independent of recognition memory, so that having passed the "high-threshold" test of recognition memory does not coincide with a larger effect of prior experience on "low-threshold" savings measures of retention (Jacoby & Witherspoon, 1982; Tulving, Schacter, & Stark, 1982). Further, some study manipulations have an opposite effect on recognition

memory and on performance of a subsequent perceptual task (Jacoby, 1983b). Results of this form are clearly incompatible with the claim that the types of tests differ only in their sensitivity to memory for recent prior experience.

Separate Memory Stores?

Given the independence of recognition memory and memory as revealed by savings, it is tempting to conclude that different memory systems underlie performance on the two types of tests. Common to several accounts is the postulation of two memory systems that differ in terms of the level of abstraction of information that they represent. For example, recognition memory may rely on "episodic" memory, a system that preserves information about individual events, while effects on savings measures of memory rely on "semantic" memory, a system that represents more general, abstract information (Kinsbourne & Wood, 1975). Effects on performance in the absence of recognition memory might be described as being due to the "activation" of an abstract semantic-memory representation that does not preserve information about particular episodes of the sort required to support recognition memory. Tulving *et al.* (1982) have suggested that episodic memory underlies recognition memory, while a rather poorly specified "perceptual" memory that is separate from both episodic and semantic memory is responsible for the independent effect of recent prior experience on their perceptual task (word-fragment completion). Cohen and Squire (1980) postulate two memory systems by distinguishing between "procedural" and "declarative" knowledge, a distinction that is apparently seen as being unrelated to the distinction between semantic and episodic memory. "Procedural" knowledge refers to knowledge for rules or procedures, while "declarative" knowledge refers to information that is based on specific items or data.

If savings in objective performance rely on a more abstract memory representation than does recognition memory, effects on savings should be less specific to the details of the prior presentation of an item than is recognition memory. That is, if the activation of an abstract representation underlies savings, details that are specific to a particular presentation of an item should not be preserved to influence the amount of observed savings. Although effects on perceptual identification can be independent of recognition memory, performance on both types of tests can apparently rely on memory for particular prior episodes. The effect of a prior presentation of a word on its subsequent perceptual identification is subject to the same encoding variables (Jacoby, 1983b) and retrieval variables (Jacoby, 1983a) that have been well documented in studies of recognition memory and recall for particular events. There is no evidence that savings in objective performance necessarily rely on a more abstract representation of prior experience than does recognition memory (Jacoby & Witherspoon, 1982).

The failure to find a difference in specificity of effects also weighs on the distinction between procedural and declarative knowledge employed by Cohen and Squire (1980). Cohen and Squire found that amnesics acquired the skill of reading inverted text as readily as did normals, but had poorer memory for the specific words that had been read. They concluded that procedural learning was unimpaired, although there was a deficit in declarative learning. Cohen and Squire apparently view the reading of inverted text as a general skill or procedure that is invariant across the particular texts to which it is

applied—a view that may be unjustified. Kolers and his colleagues (e.g., Kolers, 1979), in their investigations employing normals, have shown that the effects of training are specific to the particular orientation of the text, the words read, the type font, the order of approximation to English, and the spacing of letters. The skill of reading inverted text does not seem to be abstract in the sense of being divorced from the specific material that has been the object of prior practice. Rather than being general, procedures may be so specific to the items to which they are applied that procedural knowledge cannot be treated as being independent of declarative knowledge. Even if a distinction between procedural knowledge and declarative knowledge is justified, it may be more useful to focus on their interaction, rather than treating them as independent systems. Recent work on skill learning has been aimed at determining how declarative knowledge can be used to modify procedural knowledge (Hayes-Roth, Klahr, & Mostow, 1981; Neves & Anderson, 1981). For example, instructions can be seen as a form of declarative information that influences the development of a skill, procedural knowledge. By this view, a loss of the ability to remember declarative information would not invariably leave procedural knowledge unaffected. These considerations undermine the utility of the procedural–declarative knowledge distinction in explaining amnesics' memory performance.

Incidental versus Intentional Retrieval

Rather than postulating separate memory stores, I prefer to employ a distinction between "incidental" and "intentional" retrieval that parallels the distinction between "incidental" and "intentional" learning. Evidently, the only factor common to tasks revealing effects of prior experience that are independent of recognition memory is that in all cases the subject's memory is tested using procedures that do not require intentional retrieval (Baddeley, 1982; Jacoby, 1982). Rather than restriction to a particular type of task (e.g., perceptual–motor tasks), then, it is the incidental nature of retrieval that seems important for preserved learning and memory. Differences between incidental and intentional learning have been described in terms of differences in processing, and a similar approach seems appropriate for describing differences between incidental and intentional retrieval.

It has been suggested that intention is important for learning only to the extent that it is translated into processing or representational activities; incidental learning can be made identical to intentional learning by requiring the incidental learner to engage in the same activities as does the intentional learner (Postman, 1964). If incidental-learning procedures had been successful in removing the memory deficit of amnesics, the effect would have been described as due to a difference in processing rather than a difference in memory stores. That is, separate memory stores would not be identified with incidental and intentional learning. Similarly, the effectiveness of incidental retrieval is perhaps better attributed to an influence on processing, rather than being attributed to a separate memory system that is preserved in amnesia. The independence of incidental retrieval (e.g., effects on perceptual identification) and intentional retrieval (e.g., recognition memory) can also be understood in terms of differences in the type of information processed. Incidental-learning procedures can be devised to produce a parallel independence of effects. If subjects in one condition are required to deal with the meaning of a presented word while

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those in a second condition deal with its physical appearance, for example, some manipulations would have differential effects on performance in the two conditions. The result would be independence that comes from qualitative differences in encoding. Similarly, the independence of incidental and intentional retrieval can be attributed to qualitative differences in the types of information that are employed during retrieval.

Others have identified types of tasks with independent memory systems. By concentrating on the type of information used by a task, in contrast, highly variable relations among tasks are predicted. Recognition memory can apparently rely either on memory for perceptual characteristics (familiarity) or on memory gained by processing meaning (e.g., see Jacoby & Dallas, 1981; Mandler, 1980). Recognition memory can be made to reflect prior conceptually driven processing (meaning), while effects on perceptual identification are made to reflect prior data-driven processing (memory for perceptual characteristics), so independence of performance on the two types of test can be produced (Jacoby, 1983b). However, the independence of recognition memory and effects on perceptual identification can be removed by altering procedures so as to insure that both types of test use memory gained from prior data-driven processing (Jacoby & Witherspoon, 1982). For normals, savings in performance of a perceptual task and recognition memory can be made dependent on or independent of each other by manipulating factors that influence the type of information that they employ. Consequently, it seems unwise to identify the tasks with independent memory systems.

Differences in processing along with the distinction between incidental and intentional retrieval are useful for interpreting the results of an experiment reported by Graf, Squire, and Mandler (1984). They presented amnesics and controls with a list of words for study in a first phase of an experiment. Words from the first phase were then intermixed with new words to be presented as word fragments, which were to be completed by subjects without instructions that some fragments had been derived from previously presented words. With the use of this incidental-retrieval procedure, amnesics and controls produced equal memory performance. By contrast, in a second experiment, amnesics and their controls were presented with word fragments that were to be used as explicit cues for retrieval of previously studied words (intentional retrieval). The use of intentional-retrieval procedures resulted in poorer memory performance for amnesics than for their controls. Comparisons across the experiments revealed that intentional retrieval produced higher performance than did incidental retrieval for control subjects, but produced the same level of performance as did incidental retrieval for amnesics. Graf *et al.* (1984) attribute this differential effectiveness of instructions to declarative memory's being intact in control subjects and impaired in amnesics.

As an alternative to their account, differences in processing can be emphasized. It is likely that normal subjects respond to instructions to remember by elaborating retrieval cues in terms of the prior study context. In this vein, Smith, Glenberg, and Bjork (1978) have reported that, for normals, the deleterious effects of a change in environmental context between study and test can be removed by instructing subjects at the time of testing to imagine that they are in the study context. As is true for encoding, it is unlikely that amnesics will engage in this elaborative retrieval processing of their own accord. Similarly, retrieval has been described as an active process that involves reconstruction through setting up plausible retrieval cues (e.g., Lindsay & Norman, 1972). To remember the name of one's third-grade teacher, for example, one begins by remembering where one lived in

the third grade, what the school looked like, and so on. Baddeley (1982) suggests that amnesics are less likely to actively generate their own cues for retrieval than are normals.

The account of preserved learning in amnesia in terms of processing differences between incidental and intentional retrieval ignores differences in awareness of remembering. It is striking that a patient can reveal normal memory for a prior experience in his or her objective performance while simultaneously denying any subjective familiarity for that prior experience. The problem of awareness might be treated as being sufficiently serious to justify postulating a separate memory store that is unique in that it allows awareness of remembering. However, a reasonable alternative is to treat subjective familiarity or awareness as arising from additional processing, rather than as an inherent characteristic of a particular memory system. As discussed in the next section, awareness of remembering may rely on the use of heuristics similar to those that have been described as being important in the attribution literature (e.g., Nisbett & Ross, 1980).

The Fluency Heuristic and Awareness of Remembering

Recognition memory seems to require awareness of remembering, although awareness is not required to show savings gained from prior experience in objective performance. Awareness has been treated as being an inherent characteristic of the episodic-memory system, the system responsible for recognition memory (e.g., Tulving *et al.*, 1982). However, that approach gives rise to a problem that is similar to a problem associated with the claim that depth perception is innate. If one decides that depth perception is innate, there is a tendency to think that depth perception is then understood and to forget that it is still necessary to specify the cues that are used to infer depth. Similarly, saying that awareness is an inherent characteristic of episodic memory does not specify the cues on which awareness is based. I prefer to treat awareness of remembering as being an attribution (cf. Nisbett & Ross, 1980), and to regard relative fluency as being one cue that is used for that attribution (Jacoby & Dallas, 1981).

Rather than being directly accessed as an attribute of memory, awareness of remembering may be viewed as involving an attribution process that is similar to the process involved in using the availability heuristic to estimate probabilities (Kahneman & Tversky, 1973). When using the availability heuristic, a person infers that a class of events is a probable one if an instance of that class is highly available (i.e., it can be readily brought to mind). In the awareness of remembering, fluency in performing a task, like availability, is a basis for application of a heuristic. Subjective familiarity or awareness of remembering a particular event resembles probability in being a dimension that is judged by application of a heuristic. Others have treated familiarity as primitive and as serving as a basis for recognition memory (e.g., Mandler, 1980). In contrast, I treat effects of prior experience on performance as primary, and view feelings of subjective familiarity as being due to performance effects' being attributed to prior study. The judgment of familiarity follows effects on performance and requires additional processing. Amnesics may fail to use judgments of relative fluency to monitor their performance. As a result, effects of prior experience on objective performance are not accompanied by feelings of subjective familiarity. The amnesic, then, is seen as being less likely to actively generate plausible retrieval

cues at the time of testing, and as also being less likely to monitor his or her own performance to make the attribution of subjective familiarity.

Earlier discussions have centered on judgments of relative perceptual fluency as a heuristic for recognition memory (Jacoby & Dallas, 1981). However, use of the fluency heuristic need not be restricted to judgments of perceptual fluency. One could as well judge fluency of semantic processing as a heuristic for deciding whether or not an item had been encountered during study. In this regard, retrieval of study context has been said to provide an alternative to judging relative perceptual fluency as a basis for recognition memory (Jacoby & Dallas, 1981). For retrieval of study context, however, a subject still has the problem of deciding whether he or she has actually retrieved the study context or has only invented it. The fluency of constructing study context is likely to provide a basis for making the decision. Although there are other cues that one can use to aid in the judgment of whether or not he or she is remembering (e.g., Baddeley, 1982), the fluency heuristic seems to be useful over a wide range of situations.

Several advantages can be gained by treating familiarity as an attribution rather than as an inherent characteristic of memory. First, feelings of familiarity do not invariably arise when we encounter previously experienced people, events, or objects. We do not experience a feeling of familiarity when we encounter a colleague at work, but would experience such a feeling and would be aware of recognizing the colleague if we encountered him or her in an unexpected location. The feeling of familiarity seems to rely on a discrepancy reaction of some sort or on a direct question about recognition that calls for an attribution to be made. Indeed, it would be incredibly disruptive if a subjective feeling of familiarity intruded every time we encountered a previously experienced person, location, object, or event.

Treating familiarity as an attribution also has the advantage of allowing for variability in the relation between effects in performance and a subject's attributions. Effects on performance due to factors other than recent prior experience will sometimes give rise to feelings of subjective familiarity. The higher probability of a false recognition of a high-frequency than a low-frequency word can be seen as due to subjects' mistakenly attributing the performance effects of frequency in the language to prior study. An effect of recent prior experience on performance also will not always be attributed to the correct source. In a study of duration judgments, subjects incorrectly attributed their superior perceptual identification of old words to those words' being presented for a longer duration than were new words (Jacoby & Witherspoon, 1982). As a similar but more commonplace example, when beginning to learn a foreign language, one has the impression that the language is being spoken at an incredibly rapid rate by native speakers and that this rate interferes with comprehension. As a function of experience, the rate at which the language is spoken seems to slow. In this example, effects of prior experience on fluency of comprehension are incorrectly attributed to a difference in speaking rate. In general, effects of prior experience on performance are probably often incorrectly attributed to physical characteristics of the stimuli, rather than their giving rise to feelings of subjective familiarity.

Effects of prior experience on performance may also sometimes be incorrectly attributed to affective factors. Zajonc (1980) has found affective judgments to be influenced by previous presentations of items, although subjects were unable to recognize the items as having been previously presented. He concluded that there is an affective system

that is separate from the cognitive system, which is responsible for recognition memory. Zajonc's results can be reinterpreted as being due to effects of prior experience on relative perceptual fluency, which subjects attributed to differences in affect. Effects on perceptual identification, like judgments of affect, can be independent of recognition memory. For both types of measure, the independence of recognition memory may be better described in terms of differences in the information that is processed than in terms of separate memory systems. The stimuli employed by Zajonc were typically meaningless and originally affectively neutral, so subjects may have had no alternative to using judgments of relative perceptual fluency as a heuristic for making judgments about affect.

Concluding Comments

Accounts of amnesia have typically attempted to identify memory deficits as specific to encoding, storage, or retrieval. In actuality, the types of processing required for encoding seem to be very similar to those required for retrieval; elaborative processing is important for both retrieval and encoding. In line with the encoding-specificity principle (Tulving & Thompson, 1973) or memory for operations (Kolers, 1979), the effect of prior study is seen as being restricted by the similarity of encoding and retrieval processing. Effects on encoding and effects on retrieval cannot fruitfully be treated as being separate.

I have treated the distinction between incidental and intentional retrieval as similar to the distinction made earlier between incidental and intentional learning. According to this view, preserved learning and memory are not restricted to any particular set of tasks, such as perceptual–motor tasks, but rather are due to the use of incidental-retrieval procedures to structure the retrieval environment for the amnesic. As has earlier been argued for encoding (e.g., Cermak, 1979), the amnesic will not spontaneously engage in more active, elaborative retrieval processing. Revealing effects of prior study requires that processing at the time of retrieval be similar to that at encoding. Controlling encoding through incidental-learning procedures in combination with intentional-retrieval procedures does not insure this similarity in processing, so is an ineffective means of repairing memory performance.

The amnesic is seen as being incapable of structuring his or her own encoding or retrieval processing without the support that is provided by incidental-encoding and incidental-retrieval procedures. Recent work on metamemory has been aimed at determining how a learner develops the ability to structure his or her learning activities (e.g., Brown, 1975). Corresponding work aimed at retrieval is needed. If one wants to argue that there are separate memory systems, a prerequisite for specifying such systems is gaining control over encoding and retrieval processes to show that differences truly stem from separate memory systems. Incidental-encoding and incidental-retrieval procedures are likely to be useful in this regard.

Awareness of remembering and effects of prior experience on objective performance are separate issues. Rather than being an inherent characteristic of a particular memory system, awareness of remembering is seen as being an attribution that results from the application of a heuristic. By this view, effects of a particular prior experience on performance are not necessarily accompanied by awareness; awareness corresponds to attributing effects on performance to prior experience as a source of those effects. Attribu-

tions vary in their veridicality. Effects on performance that arise from prior experience will sometimes be incorrectly attributed to other sources even by normals.

Effects on performance in the absence of recognition memory probably result from the amnesic's not monitoring his or her own performance, as well as from a failure to engage in more active retrieval processing. This failure to monitor performance should be particularly important in the development of certain skills. Most experiments on amnesia have followed a short study period with a single test of memory, so that only a small cross-section of memory performance is observed. A promising direction for future research is to compare the development of various skills, searching for cumulative effects of patients' failure to engage in more active processing and their failure to monitor their own performance.

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