19 Memory Attributions

Larry L. Jacoby
McMaster University

Colleen M. Kelley
Williams College

Jane Dywan
McMaster University

What word comes to mind as a completion for the following fragment: L—ST? A social psychologist with a Freudian bent might treat the fragment as a projective test, revealing enduring dispositions, particularly if the completion fits with Freudian concerns as in the case of LUST. A perception psychologist may focus on the constraints provided by the particular letters given, or the frequency of the completion word, as Broadbent (Broadbent & Broadbent, 1975) has done. A memory theorist may see the fragment as an indirect memory test and assume that the completion word was recently encountered, even if the circumstances of that encounter are not remembered. In this case, a completion such as LIST might be readily attributed to recent discussions of memory experiments. The attribution of a completion to the effects of memory, perception, or personality is probably sometimes justified. We suggest that not only do psychologists attribute observed effects to a source, but experimental subjects in an experiment do the same thing. A subject's claim that he or she remembers is an attribution of a response to a particular cause; that is, to the past. The subject differs from the experimenter, however, in that the subject has access to fewer control conditions than does the experimenter. Consequently, the subject's attributions will more often be in error. The particular word completion might be primarily due to the influence of memory but may be misattributed to some other source. We focus on misattributions of memory later. First, we argue for the necessity of an attributional analysis of remembering, and then provide a general framework for that approach.

We write this chapter to honor Endel Tulving for his contribution to our understanding of human memory. Tulving has a great talent for picking an important issue, and then taking a controversial position on it. In doing so, he focuses the attention of the field on a topic that might otherwise have been neglected. We emulate that style by making claims that are likely to be controversial. We also hope to honor Endel by our focus on an issue that he has found important.

Recently, Tulving has emphasized the importance of the subjective experience of remembering (e.g., Tulving, 1983). Differences in subjective experience may be the quality that most clearly differentiates amnesics from people with normally functioning memories. As noted in many of the chapters in this volume, amnesics often show evidence of memory in their objective performance of a task although they deny having the subjective experience of remembering. Tulving accounts for this dissociation by proposing that remembering relies on an episodic memory system that is separate from the memory system that produces effects of prior experience on performance. The separate memory systems are assumed to differ in terms of representations. Episodic memory preserves the details of a particular event, whereas other memory systems preserve more general information. In contrast, we argue that the subjective experience of remembering is not a direct manifestation of a particular kind of representation. Using a memory representation is neither necessary nor sufficient for the subjective experience of remembering. Rather, we claim that subjective experience involves an attribution or unconscious inference that is as much a function of the present as a record of the past.

The Need for An Attributional Analysis of Remembering

People often use memory of a prior experience to help accomplish a present task without consciously remembering the prior experience. We (Jacoby & Kelley, 1987) have thought about the separability of the use of memory and conscious recollection in terms of Polanyi's (1958) distinction between using a tool versus inspecting it as an object. When using a hammer to pound in a nail, we attend to the nail; the hammer is treated as a tool. In contrast, we can attend to the hammer as a thing in itself, and focus on its weight and appearance. In both cases, the hammer is the same object, but we treat it differently. Similarly, memory is a tool when we solve problems, write papers, perceive and comprehend events, and so on. When memory is a tool, the focus of attention is not on the memory as such but on the present task. However, the same memory can be the object of attention, and it will then be experienced consciously. When memory is an object, the focus of attention is on the past.

However, an analysis in terms of retrieval processes or focus of attention is incomplete. What is missing from such an analysis is the subjective experience

of remembering, and it is subjective experience that is the hallmark of remembering. Many others (e.g., James, 1892; Lockhart, 1984; Titchener, 1928; Tulving, 1983) have noted that remembering is more than reviving a copy of an original event. The subjective experience of remembering also involves a feeling of familiarity or "pastness," a reference of the present to the past. Without such a feeling of familiarity, we do not claim to *remember*, as such. To illustrate, suppose you were confronted with incontestable evidence that you said or did something. Even so, you could comfortably insist that you did not remember making the statement or committing the act. Although the objective record must be accepted, it does not substitute for the subjective experience of remembering. Whereas researchers have concentrated on the objective validity of memory claims, it is the subjective experience of remembering that seems most fundamental to the rememberer. In this chapter, our focus is on the subjective experience of remembering, its basis, and its antecedents.

The subjective experience of remembering is a compelling and distinctive feeling of familiarity. It may cause people to believe that they are using a different "faculty" when they are remembering than when they are perceiving, imagining, thinking, or solving problems. The feeling of familiarity is experienced as an unlearned primitive quality of the memory system in operation. A logical possibility is that the feeling of familiarity totally reflects properties of the memory trace so that having and using a memory trace is necessary and sufficient to produce a subjective experience of remembering. If so, the subjective experience of remembering would be closely tied to representation. An inability to experience remembering would be readily understood as the absence of a corresponding representation. For example, an amnesic incapable of experiencing remembering may lack the ability to represent particular aspects of episodes, such as time and place.

However, the tie between representation and subjective experience is actually a loose one. Amnesics who do not experience remembering nonetheless have memory representations that they can use to interpret homophones (Jacoby & Witherspoon, 1982), complete word stems (Warrington & Weiskrantz, 1974), or answer questions (Schacter, Harbluk, & McLachlan, 1984). A contrasting case is the experience of remembering without a corresponding memory representation, that is, confabulation. Amnesics are sometimes convinced of the validity of their answers to questions about the past even when they are wrong (Mercer, Wapner, Gardner, & Benson, 1977). Bowers and Hilgard (1986) provided further examples to show that the subjective experience of remembering can be uncoupled from the presence or absence of a memory representation that corresponds to it for normal people as well as for amnesics.

The lack of correspondence between subjective experience and a veridical memory representation can be dramatic as in cryptomnesia or unconscious plagiarism (Reed, 1974). A famous case of cryptomnesia involved Helen Keller (Bowers & Hilgard, 1986). When she was 11 years old, she wrote a short story

that was published. Readers found the story to be very similar in theme and even wording to a story published earlier by another writer. She denied copying the story and had no memory of having "heard" it before writing her story. However, a family friend remembered telling it to her via sign language 3 years earlier. Helen apparently used the memory for the story as a tool in her own writing, without consciously remembering it. That is, it came to mind without an accompanying feeling of familiarity. Mark Twain came to her defense by claiming that most of literature is plagiarized, unintentionally and otherwise. Much the same can be said for science.

Disputes about what actually happened are common. Sutton (1984) described the conflicting memories of two physicists who won the Nobel Prize in 1957 for their discovery that the radioactive decay of many atomic nuclei is not completely symmetric with respect to space and time. Their accounts of the events leading up to their discovery are also not symmetric. Chen Ning Yang's account of their work in his *Collected Papers* so distressed his partner Tsung Dao Lee that he felt compelled to produce his own account of the events in question. The accounts differ in points such as who said what in a crucial meeting in a restaurant in New York, whether Yang and Lee both met with Einstein in his office, or only Yang, and whether Enrico Fermi influenced their thinking or did not. Apparently, both Lee and Yang have reconstructed plausible accounts of their collaboration and have invested these reconstructions with the status of remembering. Both experience a compelling feeling of remembering for the events they are reporting, although at least one of the two must be in error. Neisser (1982) pointed to similar examples in John Dean's memories reported during his testimony in the Watergate hearings, memories that Nixon's tapes later proved were false, although Dean's confidence led many to believe that his memory was excellent.

The feeling of familiarity is not to be found residing in a memory representation. Mismatches between subjective experience and memory representations imply that the subjective experience of remembering is an attribution or inference. We think of such inferences as unconscious, analogous to Helmholtz's notion of unconscious inferences in perception. Lockhart (1984) also argued that remembering is an inference about the past, and cited William James as an ally in reaching this conclusion. If familiarity is an inference, the absence of familiarity in amnesia is not necessarily due to the absence of a memory representation. Although representations obviously play a role in remembering, the presence of a memory representation is neither a necessary nor a sufficient condition for the subjective experience of remembering. To understand remembering, it is necessary to view the feeling of familiarity as the result of an inference or an attribution, and attempt to gain some understanding of the bases for making that particular attribution.

If we identify the *feeling* of familiarity as similar to an emotion, we could then apply an attributional analysis similar to that used to understand other emotions

(e.g., Schachter & Singer, 1962). Although there has been recent interest in memory for emotional events and the effects of emotions on memory (e.g., Bower, 1981), the feeling of familiarity has not been generally regarded as itself being a type of affective experience. In this chapter, we illustrate the attributional analysis of emotional experience in normal subjects and apply a similar analysis to the feeling of familiarity.

According to Schachter (e.g., Schachter & Singer, 1962), an emotional state is the result of the interaction between nonspecific physiological arousal and a cognition about the arousing situation. Physiological arousal determines the intensity of an emotion, but not the particular emotion. Cognition about the cause of the arousal determines the particular emotion, if any, that is experienced. The cognitive processes involved are assumed to occur very rapidly and to be unavailable to conscious introspection.

To reveal the contribution of cognition to the experience of emotions, experimental situations are arranged such that emotional experience is actually a *misattribution* of arousal. Schachter and Singer (1962) injected subjects with adrenalin in conditions that could be interpreted as either frustrating or pleasurable. Subjects experienced the adrenalin-induced arousal as either anger or happiness, depending on the contextual cues. Those particular results have been criticized (see Reisenzein, 1983), but when subjects are aroused by exercising and then enter an emotional situation, they also experience intensified emotions (Zillmann, 1978), in line with an attributional theory of emotion.

For us, the important point taken from Schachter's theory of emotion is that some nonspecific experience is attributed to a particular cause, and so experienced as a particular emotion. In an attributional analysis of the feeling of familiarity, the ease with which an idea comes to mind or the relative fluency of accomplishing a task might serve a role similar to physiological arousal in Schachter's analysis of emotions. Titchener (1928) may have had such fluency in mind when he stated: "If we take . . . the pattern of consciousness in recollection, we find what may be figuratively described as a reconstruction along the line of least resistance" (p. 414). Similarly, Baddeley (1982a) suggested that the ease with which ideas "pop into mind" can be taken as evidence that one is remembering. We (e.g., Jacoby & Dallas, 1981) have suggested that perceptual fluency can serve as a basis for the feeling of familiarity in recognition memory decisions. Items that were read during study were perceptually identified more readily at the time of test than were "new" items, and this difference in identification may underlie the feeling of familiarity. The claim is in accord with subjects' reports that the old items seem to "jump out" on a test of recognition memory.

As in Schachter's account of emotion, an inference regarding the cause of fluency is important for the experience of remembering. The question "Do you remember?" directs us to attribute to the past those ideas that come to mind readily, and so experience remembering. However, if remembering is an attribu-

tion, it should be possible to produce misattributions by arranging it so that something other than the past is the most salient cause of an idea coming to mind. For example, when we are writing, old ideas that come to mind may not be attributed to the past, but may instead be experienced as new ideas and perhaps as particularly good ones because of the authority with which they present themselves. The result would be the use of memory as a tool without the subjective experience of remembering—unintentional plagiarism. In later sections we provide evidence of misattributions of this sort as well as showing that the subjective experience of remembering can be produced without a corresponding veridical memory representation. First, however, we provide a general framework for our treatment of memory as an attribution. By doing so, we mean to emphasize the points that we think are most important.

Toward a General Framework for Remembering as Attribution

Remembering is an Attribution of Effects on Performance to the Past

In other investigations of familiarity and memory, familiarity has had the role of explanatory construct and has not itself been analyzed (c.f., Atkinson & Juola, 1974; Mandler, 1980). In contrast, we propose that the feeling of familiarity is not a given for theories of memory. Familiarity cannot be considered a necessary outcome of using a memory representation, nor is using a representation sufficient to produce the feeling of familiarity. Instead, we propose that there are processes that give rise to the subjective experience of remembering, and we outline our speculations about those processes.

We begin our speculation about the underpinnings of that subjective experience by looking to the larger class of effects of past performance. In the tradition of learning theory, we know that past experience on a task influences present performance from research across innumerable tasks, a variety of species, and the whole range of development. There is an old term in learning theories for such effects of the past on present performance—transfer effects. Positive transfer refers to cases in which past experience enhances present performance, allowing the present task to be performed more quickly, efficiently, fluently, or with greater accuracy. The past can also have a detrimental effect on present performance, and those effects are termed negative transfer.

We think differences in performance of the sort produced by transfer could serve as the basis for the subjective experience of remembering. People might learn to interpret variations in the fluency of their performance on current tasks as a sign that they are using the past. If transfer effects are quite specific rather than general, then those effects would be diagnostic of specific past experiences. Such specificity of transfer effects would make them both suitable and likely as an underpinning for the subjective experience of remembering. The subjective ex-

perience of remembering would depend on detecting very specific transfer effects, and learning to attribute them to the past. We should actually use the term "transfer-like effects", because people would really be learning to detect changes in performance of the sort that *could* be due to past experience. Such effects, whether really due to transfer from past experience or to some other factor such as general difficulty of a task, carry no guaranteed mark of their origin.

Recent work in memory development suggests that early experiences do show transfer effects of extreme specificity. Rovee-Collier (in press) tested infants' memory by conditioning them to kick in the presence of a particular crib mobile. (The kicking makes the mobile spin, which appears to be really rewarding for a 6-month-old). Rovee-Collier and her colleagues assessed the infants' memory for this experience by returning up to 2 weeks later, attaching the mobile to the crib, and observing their subjects' rate of kicking. Her subjects showed much better memory than was previously credited to infants. Most interesting to us is the extraordinary specificity of their "memories." Changing even small features of the mobile wiped out transfer of the kicking response to the new mobile. Effectively, the infants were behaving as if they recognized the old mobile and could discriminate it from very similar foils. Although we can't tell whether or not the infants in Rovee-Collier's studies experienced remembering, they exhibited a specificity of transfer that is diagnostic of past events, and so could serve as the basis for the experience of remembering. The acquisition of remembering would depend on learning to interpret these transfer effects as remembering. Changes in one's own performance would be cues that one has experienced something similar before.

Our analysis is similar to Brunswik's (1956) ecological approach to perception. By his lens model of perception, people search for cues in the environment that could serve as a basis for inferences. These inferences produce perceptual experiences, such as depth perception and size constancy. In contrast, in our analysis of remembering, the cues that signal prior experiences are more likely to be internal aspects of one's performance, such as fluency, rather than cues in the environment.

Correctly attributing transfer effects in one's own performance to their source in the past places one in the role of intuitive scientist (Kelley, 1973). It may be useful to first consider whether the task of correctly attributing transfer effects can be done by *any* scientist. That is, are cues in performance sufficiently diagnostic of the past? Imagine that you are an experimenter trying to assess whether a subject has ever learned to read French, but are not allowed to ask directly. You could easily give the subject some sentences in French to read and use his or her performance as an indicator of past experience. Next, you might try to assess whether he or she has read a particular sentence before. You could give the subject a number of sentences of equal difficulty and test whether any sentence is read more fluently than the other. Relative fluency would be the basis

for inferences of particular past experiences. We think subjects as well as experimenters can use relative fluency to infer particular past experiences. However, subjects don't have access to the same control conditions that an experimenter can arrange. The subject observing his or her own performance on a set of sentences cannot differentiate between fluent performance on a particular sentence that is due to the past and fluency due to the relative difficulty of that sentence. As we will see, such limitations on the subject's inferences regarding the cause of fluency can lead to memory illusions that are analogous to perceptual illusions.

Transfer effects can occur at any level of activity—reading a word more fluently, solving a problem more easily, or even generating a train of ideas more readily. Although most of our experiments have measured perceptual fluency (Johnston, Dark, & Jacoby, 1985; Kelley, Jacoby, & Hollingshead, 1988), the notion of fluency as the basis for an attribution of familiarity is not restricted to the perceptual level of analysis. The familiarity of arguments, ideas, and other meaningful activities can also stem from an attribution of fluency. The most common reason for accepting an idea as a memory when we are trying to recall is the authority with which the idea presents itself. If an idea immediately comes to mind in response to a query, it is likely to be accepted as the answer. However, if fluency of an idea coming to mind is not sufficiently diagnostic of the past for remembering, people can engage in additional activities and assess the fluency of their processing on these new levels of analysis. For example, consider trying to answer a question such as "Did you eat dinner at La Casa a few weeks ago?". An image of sitting at a table in a restaurant might readily come to mind, but that image may not be sufficient to specify a particular visit to the restaurant. You then might elaborate on that train of thought until your elaborations narrowly specify an event. An additional detail might come to mind, such as "oh yes, we were discussing the election results" that would allow you to infer that you were truly "remembering" a specific event from several weeks ago. However, we take this experience of remembering as an attribution. An image is fluently generated, and that image includes specific details that are diagnostic of a particular prior experience. The transfer is assumed to occur between the actual event several weeks before and later fluent imagining of the event. But even the fluent generation of details can be open to error, as in the case of confabulation and errors of reconstruction. We discuss confabulation and manipulations that make people more likely to accept incorrect details that come to mind as memories in a later section on illusions of memory.

If transfer effects such as fluency are relatively specific to details of previous occurrence rather than widely generalizable, then its attribution to a source is typically correct. It is this specificity of fluency that makes it a useful heuristic for remembering. Part of the development of remembering may be learning to set ourselves cognitive tasks during retrieval that will be likely to show transfer from past experiences and rule out competing sources as explanations of our perfor-

mance. Of course, we also have to engage in processing at the time of events that will lead to specific transfer effects later. Here, Tulving's emphasis on encoding specificity and distinctive processing also are important for determining transfer effects in an attributional analysis of remembering.

Although transfer can be correctly attributed to the past to produce remembering, other factors can also influence performance in ways that are indistinguishable from the effects of prior events, as illustrated by our example of completing the fragment L—ST. A particular idea may come to mind because the task is so tightly constrained that no other response is possible. Even very specific details that come to mind while attempting to remember an event do not guarantee that one is "really remembering." The details can represent the easy exercise of imagination, rather than transfer from past experience of an event. Errors of the opposite sort can also occur. Fluency that actually is a transfer effect of past experience can be misattributed to other sources, as in the case of cryptomnesia. The subjects' misattribution of fluency probably depends on their goal in a particular situation, as when they are solving a problem or writing a paper rather than remembering.

Attributions are Influenced by Goals and Contexts. The major factor directing the attribution process is the goal set by subjects. If their goal is remembering, subjects will correctly attribute fluency to the past. If their goal is judging temporal duration, the difficulty of a problem, or the flow of a paper, fluency resulting from the past is likely to be misattributed to goal-relevant aspects of the situation. The goals may be quite explicit, or implicitly derived from the context in which fluency occurs. Of course, the subject's goal does not totally determine the course of attributions. People do sometimes spontaneously remember even when they are directed toward another task.

The importance of the goal in the experience of remembering is also relevant to the notion of remembering as an affective response. Goal-directed action is an important cause of emotions. For example, obtaining a goal creates happiness and satisfaction, whereas being blocked from a goal can produce anger or frustration. Similarly, familiarity and other affective aspects of remembering may increase when one's goal is remembering.

Our discussion of goals is relevant to descriptions of amnesia accompanied by frontal lobe damage, a deficit in the ability to form and pursue goals (Stuss & Benson, 1986). A goal directs processing and influences the attribution of effects on performance to a particular source. Remembering can be seen as setting successively more exacting goals designed to limit irrelevant sources of effects on performance and so allow more accurate attribution of familiarity. A failure to elaborate on the cues provided at the time of test restricts the opportunity for transfer to be experienced on various levels—conceptual as well as perceptual or motor. An inability to form and pursue the goal of remembering limits the opportunity for the subjective experience of remembering.

Implications for Dissociation of Remembering and Transfer Effects on Performance. How does our analysis of remembering as an attribution relate to various dissociations of transfer effects in performance and recognition? By other accounts, dissociations between remembering and transfer reflect the operation of different memory systems (e.g., Cermak, 1984; Cohen & Squire, 1980; Tulving, 1985). In contrast, we argue that "pastness" cannot be found in a memory trace but, rather, reflects an attribution of transfer in performance. Dissociation occurs when recognition is based on a different level of analysis than is the measure of transfer. For example, a dissociation will be seen if the experimenter measures transfer on the level of perceptual identification but the subject uses ease of generating context as a basis for recognition. However, if the experimenter measures transfer on the same level of analysis that the subject employs as a basis for remembering (e.g., perceptual identification and recognition based on perceptual fluency), dependence between transfer and remembering will be observed.

Our view emphasizes dependence between transfer and remembering, rather than emphasizing the dissociation of the two. By a memory-systems view, dissociations are important as evidence of separate memory systems. By our view, dissociations are easily obtained, but dependence can be even more revealing. The trick is the match between the transfer that is measured by the experimenter and the transfer used by the subject as a basis for an attribution of remembering. Dependence can reveal the cues and processes that underlie the subjective experience of remembering.

People Act on the Basis of Their Subjective Experience of Remembering. Most investigations of memory focus on the objective accuracy of performance. Such a focus may run contrary to the subjective experience of an individual. To illustrate, consider a behaviorist's objective definition of aggression as one person, perhaps a child, hitting another. The definition may be very unsatisfactory to the child. Upon being reprimanded for fighting, children often rightfully object that they were only playing. An act must be interpreted in a larger context rather than in isolation. Similarly, the subjective experience of remembering involves the interpretation of an act in the context of ongoing activity.

Why should we be concerned with subjective experience rather than being content to talk about objective memory performance? The subjective experience of remembering gives one the impetus to act. This important role for remembering is particularly striking when it is absent, as in the case of amnesics. Although amnesics can be encouraged to guess about the past, and often do so correctly, they are unwilling to trust that information enough to act on it. In the absence of remembering, we can misattribute the effects of memory used as a tool to other causes and so unwittingly change our interpretation of the present. We illustrate such misattributions in the next section of the chapter. The contrasting case of confabulation also points to the importance of the subjective experience of re-

membering. An illusion of memory can be as compelling a basis for action as a "real memory", but may have disastrous consequences. We review illusions of memory in the final section of the chapter.

REPRESENTATION WITHOUT REMEMBERING: MEMORY MISATTRIBUTIONS

One effect of the past is increased fluency of perception and thinking. Words read once are more easily re-read later; an idea considered once comes to mind more readily later. The fluency of perceptual and conceptual operations can be correctly attributed to the past and experienced as remembering. However, the effects of the past are often difficult to distinguish from other determinants of subjective experience.

The effects of the past can be misattributed to physical characteristics of the present. The possibility of misattributions of this sort arose in investigations of the effects of prior presentation of a word on the fluency of later visual perceptual identification (Jacoby & Dallas, 1981). Several subjects in those studies reported that some words stayed on the screen longer, and so were easier to report. The words thought to have been presented for a longer duration were words that had been read in an earlier phase in the experiment. Witherspoon and Allan (1985) actually varied the duration of presentations and required subjects to judge duration. Words that had been presented previously were judged as staying on the screen longer than new words. That is, the effects of prior experience were misattributed to a present difference in temporal duration. Similar misattributions occurred in an experiment in which subjects listened to sentences presented against a noisy background (Jacoby, Allan, Collins & Larwill, 1988). Their task was to judge the loudness of the background noise and it was found that they judged it less loud when the foreground sentences were old rather than new. The prior experience of hearing the sentences increased the fluency with which they were perceived and comprehended at test. The easy perception of the old sentences was misattributed to a lower background noise level.

The "mere exposure effect" in studies of aesthetic preferences may also be a case of the misattribution of the effects of prior experience (Jacoby, 1984; Mandler, Nakamura, & Van Zandt, 1987; Seamon, Brody & Kauff, 1983). Subjects in those studies have shown a preference for stimuli such as random polygons or short melodies that occurred in an earlier phase of the experiment, relative to new stimuli (Kunst-Wilson & Zajonc, 1980; Moreland & Zajonc, 1977). Prior exposure presumably produces more fluent processing of the old items relative to the new items. Because subjects are asked "Which do you prefer?", they may misattribute the fluent processing of items to a characteristic of the items—that they have a good form or are particularly pleasing. Such a

misinterpretation of the effects of the past as a pleasing quality of the stimulus rather than as a feeling of familiarity points again to parallels between the feeling of familiarity and other affective experiences.

Prior experience may also influence subjective experience used as a basis for more cognitive judgments. To illustrate this possibility, consider the case of judging the quality of writing. We typically judge whether a paper is well-written by our subjective experience of the flow of the paper as we read it. However, that experience changes with re-reading. We become increasingly adept at anticipating examples and following previously difficult arguments. Unfortunately, we are unable to separate the contribution of prior readings to our current subjective experience of "good flow" from the contribution of the structure and style of the paper. The influence of the structure of the paper and our prior readings may be integrally combined determinants of subjective experience. In that sense, we may speak of subjective experience as a nonanalytic basis for judgment (see, for example, Jacoby & Brooks, 1984). The effects of the past are misattributed to the quality of writing.

Hindsight: Subjective versus Objective Bases for Judgments

The example of the influence of prior experience on judging the quality of writing is similar to a hindsight effect. Once given the outcome of an uncertain event, people find it nearly impossible to ignore that outcome and make predictions that are equivalent to those of the naive subject (e.g., Fischhoff, 1975). By our view, giving people the outcome of an uncertain event robs them of a fundamental basis for assessing uncertainty—their subjective experience of that uncertainty. People's experience and interpretation of later events is influenced even when they are told to disregard the earlier event.

Jane Collins, a graduate student at McMaster, recently obtained a hindsight effect in the paradigm requiring subjects to judge the loudness of background noise. In one condition, subjects made noise judgments and judged the background noise less loud when old versus new sentences were in the foreground. Subjects in the second condition were told about this effect and warned to try to avoid the effect on their noise judgments. However, these informed subjects produced exactly the same pattern of results as did uninformed subjects. They were unable to "ignore" the effects of prior presentation of sentences when making noise judgments.

Similarly, once informed about the answer to a problem, the problem often appears easy. If we judge the difficulty of problems by trying to solve them,but solving is made easier by being told the answer earlier, we may underestimate the difficulty of the problem for others. The only way to escape such a hindsight bias is to shift to an alternative basis for making judgments. We examined this

possibility in experiments aimed at a hindsight bias in judging the difficulty of anagrams for others (Jacoby & Kelley, 1987).

To illustrate the paradigm, judge how difficult it would be for most people to solve the anagram "fscar." If you are like most of our subjects, you use your own experience of solving the anagram as a basis for judging its difficulty for others. Suppose you had read the solution to the anagram, scarf, in a list of words in an earlier phase of the experiment. Reading the solution would make it easier to later solve the anagram. If you continued to use your own subjective experience as a basis for predicting for others, you would underestimate the difficulty of the anagram. The effect of prior experience would be misattributed to the difficulty of the anagram.

We asked subjects to rate the difficulty of anagrams for others. They did use their own subjective experience of solving an anagram to judge difficulty, as shown by the finding that speed of solving anagrams correlated highly with rated difficulty. Reading the solution words in the first phase of the experiment substantially reduced the time to solve the anagrams encountered in the next phase, and also resulted in those anagrams being rated as easier for others to solve relative to the ratings of subjects who had not previously read the anagram solution words. People apparently misattributed the effects of prior experience to the anagram's being easy.

Can people avoid a hindsight bias by using a more objective basis for judgments? To illustrate such an objective basis for judgments in the anagram experiment, we arranged a condition that forced subjects to give up subjective experience as a basis for judgments. In that condition, the solutions to anagrams were given immediately before each anagram, e.g., "scarf fscar." The influence of reading the solution was meant to be inescapable and to block the subjective experience of solving the anagram. We predicted that those subjects would rely on rules for judging the difficulty of anagrams, such as "common words are easier to solve."

Subjects shown the anagrams accompanied by solutions made their ratings more slowly than did the others, which is consonant with using rules rather than an immediate impression of difficulty. This use of a more objective basis for judgments did diminish the hindsight bias. Anagrams presented with their solution words were rated as being more similar in difficulty to new anagrams than were anagrams whose solution words had been presented earlier. To gain further evidence of a qualitative difference in the basis for judgments, we collapsed ratings across subjects, and compared the patterns of relative difficulty ratings for anagrams accompanied by solutions versus anagrams without solutions (c.f. Rubin, 1985). The relatively low correlation of difficulty ratings between those conditions (.30) is consistent with the claim of qualitatively different bases for judgment. The ratings in the two conditions in which subjects could actually try to solve the anagrams correlated .71.

Why did subjects who had earlier read the solution words not recognize that their subjective experience was flawed and, consequently, use a more analytic basis for judgments? First, the success of that strategy depends on the availability of a good theory of anagram difficulty. Perhaps, rightfully so, they had little faith in their theory. As a criterion measure of anagram difficulty, we used the average solution times for anagrams that were new. Ratings of the difficulty of anagrams that were old but rated alone correlated .79 with actual difficulty, but the correlation was only .31 when the solutions accompanied the anagrams. That is, the use of flawed subjective experience did produce better predictions than did the use of a theory. Second, judgments based on subjective experience present themselves with an immediacy that contrasts with slower, more analytic judgments. That immediacy may give judgments based on subjective experience a powerful veridical quality, regardless of their true validity.

The misattribution of prior experience to a difference in anagram difficulty is essentially a hindsight bias and could be seen as egocentrism of the sort found in some classic Piagetian demonstrations of children's predictions for others (c.f. Olson, 1986; Piaget & Inhelder, 1956). For example, children mistakenly rely on their own subjective experience when they predict what another person can see. We think such egocentric behavior is not a characteristic of a general developmental stage that is replaced by more sophisticated judgments later. As shown in the anagram experiment, even adults rely on subjective experience to make judgments for others, despite the invalidation of that subjective experience by the effects of the past. Instead of being stage-specific, egocentrism may be domain-specific (Dasen, 1977; Gelman, 1978; Piaget, 1972). We may escape egocentrism when we develop an alternative, more objective basis for judgment in a particular domain. However, in other domains, decisions based on subjective experience are decidedly more efficient and accurate than those based on theory.

Subjective experience is a nonanalytic basis for judgments (Jacoby, 1988; Jacoby & Brooks, 1984). Many factors jointly determine the experienced difficulty of a task or the readiness with which an idea comes to mind without the subject's awareness or understanding of the influence of the separate factors. Such nonanalytic judgments are global or comprehensive. They reflect the influence of factors that may be subtle and complex, and so not captured by more analytic judgments. However, nonanalytic judgments may be affected by irrelevant factors, as when each re-reading increases our sense that a paper flows well. In contrast, people have more control over the information that enters an analytic judgment. Particular factors can be given more or less weight or even be ignored when a theory is used. When people recognize the irrelevant influence of prior experience, they can shift to an alternative, more analytic basis for judgment, and so escape the influence of prior experience. This, of course, requires that one's theory is adequate to the task, and that one has the time and resources to use the theory.

Mistaking the Specific for the General: Discriminating Between Sources of Familiarity

General knowledge can be mistaken for memory of a specific event. Such errors have been interpreted as evidence that people use general schemas or scripts to reconstruct what must have happened on a particular occasion, and so mistake the general for the specific (e.g., Alba & Hasher, 1983). In contrast, experiments that we describe hereafter demonstrate that the confusion between general knowledge and memory for specific events is symmetrical. People are unable to discriminate between the "episodic" familiarity produced by presenting an item in the experimental setting and the "semantic" familiarity produced by general knowledge. Consequently, memory for the specific can be mistaken for the general as readily as the general can be mistaken for the specific. Such symmetrical errors would be difficult to accommodate in a schema model of memory. However, this symmetry is consistent with an attributional analysis of memory. Familiarity does not specify its source but, rather, is attributed to a particular source depending on the details of the experimental situation.

Dosher (1984) demonstrated that people mistakenly "recognize" semantically related items on a test of episodic memory, and concluded that people are unable to discriminate between episodic and semantic familiarity. We have reached the same conclusion; subjects mistake memory of a particular episode for general knowledge on a test of famous names. Our experiments (Jacoby, Kelley, Brown & Jasechko, in press; Jacoby, Woloshyn, & Kelley, in press) show that the familiarity of a name produced by simply reading it in the experiment can be mistaken for the general familiarity that characterizes a famous name. Reading a name in the first phase of an experiment increased the probability that it would later be judged "famous."

This false fame is a misattribution similar to the hindsight effect. Familiarity is a nonanalytic basis for fame judgments that does not allow subjects to ignore the irrelevant effect of prior presentation of the name in the experiment. As in the anagram experiment, people could use an alternative, more analytic basis for judgments of fame. For example, they could call a name famous only if they could recall what the person did to become famous.

In our experiments, people did shift to a more analytic basis for judgments when faced with the possibility of confusion between sources of familiarity. In one experiment, subjects in a baseline condition made fame judgments without having previously read names in the experiment. Another group made fame judgments after having seen half of the names in a prior phase. Those subjects were told that the earlier presentation of the names was uninformative regarding actual fame because half of those names were famous and half were nonfamous.

The results from that experiment are presented in Table 19.1. By comparing the judgments of new famous and new nonfamous names, we see evidence of a

TABLE 19.1
Probability of Judging a Name Famous

	Type of Name			
	Famous		*Nonfamous*	
Test Condition	Old	New	Old	New
Condition 1 (Baseline)	—	.66	—	.39
Condition 2	.74	.63	.32	.23

qualitative shift in the basis for fame judgments produced by the possibility of confusion between sources of familiarity. The discrimination, d', between new famous and new nonfamous names was higher when old names were included in the test list (1.47) than it was in the baseline condition (1.11). The old nonfamous names reduced the validity of familiarity as a basis for fame judgments, so subjects shifted to more analytic judgments. However, they did not completely rely on the more analytic basis for judging fame. Old names were still more likely to be called "famous" (.53) than were new names (.43), and this was true regardless of whether the names were truly famous or nonfamous. The familiarity gained from prior presentation was still sometimes misattributed to fame.

If people had been asked to recognize names rather than judge their fame, they might have correctly attributed the familiarity of old names to its source in the experiment. That is, familiarity might serve as a basis for either fame or recognition memory judgments, depending on the question that is asked. Also, recognition may have a basis that is more analytic than is judging the familiarity of the name (e.g., Atkinson & Juola, 1974; Jacoby & Dallas, 1981; Mandler, 1980). For example, retrieval of study context could serve as an analytic basis for recognition memory judgments.

We (Jacoby & Kelley, 1987; Jacoby, Woloshyn & Kelley, in press) have argued that treating memory as an object for conscious recollection involves a different goal and a different focus of attention than does using memory as a tool to accomplish some present task. The notion is that conscious recollection requires an attention-demanding act that is separate from the unconscious influences of memory. Conscious recollection of the context and other particulars of the prior presentation of an item can serve as a more analytic basis for recognition memory decisions, but it requires more processing than that necessary to assess the familiarity of the item. It should be possible to limit attention so that a person could not use conscious recollection to recognize items, but prior presentation of a name would still increase familiarity as measured by the fame test.

To obtain this separation of conscious recollection and familiarity, recognition memory performance was placed in opposition to the increased familiarity of a name gained from its prior presentation. To do so, we presented only non-

TABLE 19.2
Probability of Judging a Name Famous

	Type of Name		
	Famous	*Nonfamous*	
Test Condition	New	New	Old
Full Attention	.54	.18	.13
Divided Attention	.49	.14	.28

famous names to be read in the first phase of the experiment and informed subjects that the names were not famous. Prior presentation is now relevant to the fame judgment—recognizing a name as coming from the first phase allows one to be certain that the name is nonfamous. The fame judgment test was given either under conditions of full or divided attention. In the divided-attention condition, subjects engaged in a listening task while simultaneously judging the fame of names presented visually. Dividing attention was expected to make it impossible to consciously recollect the names, but not to impair the experience of familiarity of old names. Consequently, in the divided-attention condition, old nonfamous names should seem familiar but not be recognized, making them *more* likely to be judged famous than new nonfamous names. In contrast, when full attention is given to the test, subjects should be able to use conscious recollection to recognize old nonfamous names, allowing them to be certain that those names are nonfamous. Thus, with full attention at test, old nonfamous names should be *less* likely to be called famous than new nonfamous names. The results of that experiment are shown in Table 19.2.

The results of this experiment are consistent with our claim that conscious recollection is an act that is separate from assessing the familiarity of a presented item. The higher probability of calling old as compared to new nonfamous names "famous" in the divided-attention condition suggests that reading a name increased its familiarity, without the name being recognized as previously read. In tests of recognition memory, subjects can use familiarity or the more analytic retrieval of context as a basis for recognition memory. The fame judgment task directs subjects to misattribute familiarity to fame, leaving only the analytic basis for recognition. Divided attention at test eliminates that basis for recognition memory, while leaving familiarity intact.

The procedure of placing conscious recollection in opposition to unconscious influences of memory is likely to be generally useful for separating different uses of memory. In many experiments, the conscious use of memory dictates the same response as an unconscious use of memory. For example, increased probability of completing a word fragment due to prior presentation of the word could result from either an unconscious influence of memory or from active retrieval of the prior presentation. This creates difficulties for interpretation, because uncon-

scious influences of memory could actually be due to conscious recollection (e.g., Richardson-Klavehn & Bjork, 1988). Placing conscious recognition in opposition to the unconscious use of memory eliminates this difficulty. For example, in our experiment, recognition of a name dictated a different response (calling the name "nonfamous") than did a gain in the familiarity of the name (calling the name "famous"). This allows us to be certain that the false fame effect as a measure of unconscious memory is not mediated by conscious recollection of the names from the prior presentation.

Divided attention at test prevents people from checking the bases for their first impressions, a form of monitoring. Even without divided attention, people differ widely in the degree to which they engage in such activity. The elderly may be particularly poor at monitoring. A common complaint about older people is that they tell the same story repeatedly. Perhaps this repetition of stories is similar to the phenomenon of old nonfamous names being called famous when attention is divided at the time of test. Having told a story may make the story more readily come to mind later in the presence of the same audience. The elderly may become repetitive in part because they fail to check why the story came to mind. In line with this possibility, we (Dywan & Jacoby, 1988) have found that the elderly are more susceptible to the false fame of old nonfamous names than are younger subjects. Consistent with claims made by Craik (Craik & Byrd, 1982), age produces effects that parallel those of dividing attention; in this case, producing confusion between sources of familiarity.

In summary, the effects of prior experience can be misattributed and so change the subjective experience of the physical stimulus, influence affective judgments, produce hindsight effects, and make nonfamous names seem famous. These effects on subjective experience are important, because we often act on our subjective experience. For example, if we experience a problem as easy to solve, we are likely to draw a very different conclusion about a person who fails to solve the problems than we would if we had experienced the problem as being difficult to solve.

Judgments of problem difficulty or fame were nonanalytic with respect to the factor of irrelevant prior experience. In both cases, subjects could use a more analytic basis for judgment that would allow them to escape the irrelevant effects of the past. Subjects in the fame study used a more analytic basis for judging fame when faced with confusion between sources of familiarity. Subjects in the anagram study did not change to theory-based judgments, perhaps because they were not sensitive to the effects of prior reading of solution words on later anagram difficulty, or perhaps because their theories were not particularly good predictors of anagram difficulty. An analytic basis for recognition memory requires extra attentional resources at retrieval to specify source. These studies point to two bases for recognition memory. Familiarity is a nonanalytic basis for recognition that we have tracked by measuring its misattribution to sources other than the past. A more analytic basis for recognition is conscious recollection, that

is, the generation of additional details of an event that more narrowly specifies its source in the past.

Divided attention at test produced difficulty in specifying the source of familiarity. Memory for source or context may be particularly poor in the elderly and in some forms of amnesia (Hirst, 1982; Schacter, Harbluk & McLachlan, 1984; Winocur & Kinsbourne, 1978). One interpretation of poor memory for source is that it reflects a generally weakened or degraded memory trace (e.g., Mayes & Meudell, 1981). However, the difficulties in specifying source when attention is divided at test cannot be accounted for by a degraded memory trace, because, of course, the trace would be equivalent to that of unimpaired subjects in the full attention condition. Instead, divided attention at test may prohibit subjects from elaborating on the test cue, thus limiting opportunity for transfer from study to test.

REMEMBERING WITH AND WITHOUT MEMORY REPRESENTATIONS: BASES FOR THE SUBJECTIVE EXPERIENCE OF REMEMBERING

In the previous sections, we considered the use of memory without the corresponding experience of remembering. Using memory as a tool without awareness that one is doing so can result in misattribution similar to the cryptomnesia or unintentional plagiarism illustrated earlier in the case of Helen Keller. However, the use of memory for a prior event is often accompanied by the subjective experience of remembering. By our emphasis on misattributions, we run the risk of underestimating the validity of memory claims. The fluency that was misattributed to fame or to the difficulty of problems could as easily be correctly attributed to the past, and be quite diagnostic of the past. Also, people can use a more analytic strategy for remembering, such as attempting to generate details of the original experience. We first present evidence to show that fluency can be used as a valid basis for memory claims. Next, we return to a discussion of memory errors by considering confabulation—the subjective experience of remembering without a corresponding veridical representation. We argue that the more analytic basis for remembering nonetheless rests on subjective experience and is also open to deception and misattribution.

Perceptual Fluency as a Basis for Remembering

An important factor that guides the direction of the attribution is the goal that is set for the subject. When asked about the past, effects of the past on fluency are likely to be correctly attributed to their source. Such correct attributions are likely because effects on fluency are relatively specific to reinstating details of the prior occurrence, rather than being widely generalizable. To illustrate the

specificity, consider the task of judging whether one previously read or heard a word. If some words are originally read and others are originally heard, the read words have a larger advantage in later visual identification (Jacoby & Dallas, 1981; Morton, 1979). Thus, relative differences in perceptual fluency could serve as one basis for remembering modality of presentation. An item that is read very easily at the time of test is likely one that was read during study. If subjects base their judgment of whether an item was read or heard on relative perceptual fluency, we should see a positive correlation between ability to perceptually identify an item and the probability of judging it "read."

To check this possibility, we (Kelley, Jacoby, & Hollingshead, 1988) presented a set of words to subjects in the first phase of an experiment. Half of the words were read by the subject and half were heard. In the second phase, the old words and a set of new words were presented briefly on the screen of a CRT and followed by a pattern mask. Subjects attempted to identify each word as it was presented. Immediately after they attempted to identify a word, it appeared in full view with the question "OLD OR NEW?". Next, subjects judged whether they had read or heard the item.

We expected that subjects would often use perceptual fluency as a basis for remembering modality. Therefore, we predicted dependence between perceptual identification and modality judgments. Of course, subjects could rely on other bases for remembering modality. Within our attributional analysis of remembering, subjects could assess transfer in their performance on other levels of analysis, perhaps conceptual rather than perceptual. However, because subjects were not instructed to study the modality of presentation, we anticipated that perceptual fluency would be the primary basis for judging modality.

Dependence between perceptual identification and modality judgments might simply reflect variations in trace strength or item differences (e.g., Watkins & Gibson, 1988). To guard against such interpretations, we attempted to change the size of the correlation by reducing subjects' reliance on perceptual fluency as a basis for remembering modality. Whereas subjects in the first condition only read or listened to a word, subjects in a second condition were given a mnemonic for remembering modality that was to be used during study. The mnemonic would provide an alternative basis for remembering modality and so reduce the size of the correlation between perceptual identification and modality judgments. Subjects were told to think of negative aspects of words they read and positive aspects of words they heard. So, for example, if the word "rugby" were read, they might think of rugby as a bruising, painful sport, but if the word "rugby" were heard, they might think of rugby as an exciting and fun sport. The mnemonic was reversed for half of the subjects.

Table 19.3 shows the probabilities of calling a word "read" conditionalized on perceptual identification performance for each of the two conditions. Those probabilities were computed using modality judgments only for those items that were called "old." As illustrated by the conditional probabilities, the mnemonic

TABLE 19.3
Probability of Calling a Word "Read" Conditionalized on Perceptual Identification (For Items Called "Old")

	Study Conditions	
	Incidental	*Mnemonic*
P("Read") | PI)	.59	.48
P("Read") | $\overline{PI}$)	.36	.39
Difference	.23	.09

condition led to a substantially lower correlation between perceptual identification and modality judgment on the later recognition test than did the incidental condition that simply read or heard words in the first phase of the experiment. This conclusion is supported by a comparison of gammas in the two conditions, a measure of the relationship between perceptual identification and modality judgments. The gamma in the incidental condition (.46) was considerably higher than that in the mnemonic condition (.23).

Perceptual fluency is one of several bases for remembering modality. The mnemonic reduced subjects' reliance on perceptual fluency by allowing them to use the strategy of regenerating other details at test regarding modality of presentation. When reading words at test, a negative or positive aspect of each word presumably came to mind that served as the basis for remembering modality. Such a basis for remembering is more analytic than perceptual fluency, but it nonetheless requires that subjects attribute those aspects coming to mind to a particular source. It is not a perfectly reliable indicator of past experience, as it could also be susceptible to influences other than the specific episode.

This study clearly illustrates the variable relationship between effects on perception and memory judgments. The degree of dependence between the two was a function of the basis used for an attribution of modality. Similarly, the variable relationship between effects in perception and recognition memory performance reflects the basis used for recognition decisions (e.g., Johnston, Dark & Jacoby, 1985).

Memory Illusions

We *know* we are remembering when we can follow up one idea with supporting details (c.f., Baddeley, 1982b). Each detail increases our confidence that we are remembering rather than inventing, particularly if the details are idiosyncratic and there is no other plausible source for those ideas coming to mind. In addition to generating supporting details as a basis for remembering, Marcia Johnson and her colleagues (e.g., Johnson & Raye, 1981) have discussed other bases for the

experience of remembering. Memory representations of perceived events include more spatial and temporal information and greater sensory detail than do memory representations of imagined events. The ability to generate such details might also be evidence that one is remembering, rather than imagining, at test. In line with this possibility, Schooler, Gerhard, and Loftus (1986) found that people use the amount of sensory detail in a memory report to distinguish memory for actual events from memory for suggested events. Particularly vivid imagery may also indicate that one is remembering, rather than imagining (Johnson, Raye, Wang, & Taylor, 1979). Memory images may be more vivid than those that are invented at the time of test. However, it is interesting to note that Titchener (1928) made precisely the opposite claim. He argued that memory images are less vivid and more uncertain than are invented ones.

Generating supporting details, particularly sensory and temporal details, provides a basis for greater certainty that we are remembering than does familiarity based on perceptual fluency. Such an analytic basis for memory judgments sharpens the relationship between memory representation and the subjective experience of remembering. It is an analytic basis for remembering in that gaining additional evidence reduces the contribution of irrelevant sources of transfer to current experience. However, we see the more analytic basis for remembering as nonetheless relying on an attribution to the past and as susceptible to misattributions. It is as reasonable to talk about the ease with which an idea comes to mind or the ease of making an argument and the corresponding familiarity of ideas and arguments as it is to talk about the fluency of perceptual processing and the familiarity of an item's appearance. Analytic and nonanalytic bases of remembering are relative terms. A process is analytic to the extent that it excludes irrelevant factors. For example, we described the analytic process of judging fame by generating an accomplishment for which someone became famous. That process excluded the irrelevant influence of reading the name earlier in the experiment. But ease of generating an accomplishment could also be affected by an earlier phase in the experiment. Imagine an experiment in which subjects read names paired with accomplishments such as "Sebastian Weisdorf—composer" before attempting to judge the fame of names. Fluency can occur on any level of analysis, and irrelevant sources of fluency may contaminate it as a basis for judgment. For supporting details to be accepted as remembered rather than invented they must be experienced as familiar. The ease with which those details come to mind is likely our basis for their being experienced as familiar, allowing even the analytic basis for remembering to be misled.

Source Confusions. Although the ability to produce elaborations can be used as a way of monitoring sources of familiarity, they can themselves form the basis of misattributions. One cause of memory illusions is people's own elaborations upon the past. In a study of hypermnesia for the recall of pictures (Dywan, 1984), subjects studied simple line drawings, including such items as a rabbit

and a bicycle. They tried to recall the items every day for a week using a forced recall paradigm (see for example, Erdelyi & Kleinbard, 1978). They also rated their confidence in their recall of each item on a scale from zero to four, with zero indicating that the item was simply a guess.

It soon became clear that one does not need 30 years, as in the case of the two physicists, for asymmetries to emerge between information as perceived and information as remembered. As the week progressed, hypermnesia, an increase in correct responses, was accompanied by a steady increase in the proportion of responses that were false positives or false negatives. That is, many correct items were given confidence ratings of zero, and many new items were reported to be memories with various levels of confidence. Even items correctly reported were not necessarily remembered with appropriate details. For example, when reviewing the slides at the end of the study, one young man accused the experimenter of changing the slide of the bicycle. He agreed that he had seen a bicycle during the initial stimulus presentation and had, in fact, reported "bicycle" on each recall trial but insisted that it had been a racing bike rather than the touring bike on the slide. In fact, he insisted that the original slide had been of a bike very much like his own which is how he remembered it so well!

We propose that the items generated repeatedly gained fluency—items were generated more easily on each trial and would eventually seem familiar irrespective of accuracy. To the extent that this occurs, each attempt to retrieve information should decrease the likelihood of it being accurately remembered. We explored the extent to which this was true by varying the number of interpolated recall trials that subjects undertook over the course of a week followed by a test of recognition memory (Dywan, Segalowitz, & Otis, in preparation). We found that recognition was best when subjects were never given the opportunity to recall the slides at all. Even one recall attempt lowered recognition accuracy by one third. Again, recalling that a bicycle had been seen, for example, made people less able to identify the particular bicycle that had been presented.

This propensity toward intrusions and source confusion seems to be a natural and inevitable result of cognitive operations. No attempt was made to influence what subjects would remember in the repeated recall studies. The leading question paradigm developed by Elizabeth Loftus and her colleagues takes advantage of this natural propensity and gives it a nudge (e.g., Loftus, 1981; Loftus, Miller & Burns, 1978; Loftus & Palmer, 1974). She found, moreover, that confidence for suggested memories can be as great as for memories based on actual perceptions (e.g., Cole & Loftus, 1979), and that subjects could provide detailed descriptions of these suggested memories. On one occasion, a nonexistent tape recorder was described as being "small, black, in a case, with no visible antenna" (Loftus, 1979, p. 62). Thus, the experience of "really remembering" as a function of the ability to generate related information is an attribution that can be influenced by irrelevant sources.

Laurence and Perry (1983) made very effective use of a leading question by

incorporating it into the hypnotic context—in effect, giving the propensity for incorporating intrusions a more powerful nudge. They instructed hypnotized subjects to relive the events of a night during the previous week. In the course of this recollection, subjects were asked whether they had been awakened by some loud noises and were allowed to elaborate on that suggestion. Upon awakening from hypnosis, many of the subjects stated that the suggested event had actually occurred. Even after they were told that the event had been suggested to them, many remained adamant that they had "heard" the noises and supported their assertion by referring to specific events that they believed had accompanied the noises.

Occasionally, subjects will try to impose a more objective criterion on their own experience of retrieval. Laurence and Perry (1983) reported that some of those who stated correctly that the noises had been suggested to them by the hypnotist reached this conclusion in a reasoned fashion. For example, one subject decided that the noises were suggested because they were more vivid than any noise he felt could occur in reality. When uncertain about the source of a "memory," the subject resorted to using an analytic, theory-based decision process. In this case, the theory helped.

A subject in the repeated recall paradigm tried to use a theory-based decision process with less success. When reviewing the slides at the end of the study, this subject was surprised when she saw that a rabbit had been one of the stimulus items. She explained that each time she attempted to recall the slides, the image of a rabbit had come to her. However, she never put "rabbit" down as a memory because her image was of a white furry rabbit on a green lawn and she knew that the slides had been black-and-white line drawings. Perhaps this subject had spontaneously elaborated on the concept she was trying to remember and, on the basis of that elaboration, rejected the persistent rabbit as a memory. She probably held an implicit theory that memory was made up of immutable representations and was unaware that one can elaborate on one's memories as well as on events that never, in fact, occurred.

Retrieval Experience. To confirm the notion that the experience of retrieval—familiarity—is not an intrinsic part of the memory representation but an attribution, the experience of retrieval must be modified without altering the content of the memory system. However, most experimental manipulations occur at the study or input phase. Leading questions raise plausible scenarios, suggestions are made about noises in the night, or repeated retrieval attempts leave a confusing residue of intrusion errors. All of these strategies modify the contents of memory to some extent, they produce source confusions but don't clearly separate the experience of remembering from that which is remembered.

However, it is possible to change the experience of remembering without modifying the contents of memory. One can manipulate the cues that subjects use to infer that they are remembering and in so doing create illusions of memo-

ry. Hypnosis allows us to do this because it provides an opportunity to observe the retrieval process under conditions in which some of Johnson's reality monitoring parameters (e.g., Johnson & Raye, 1981) are modified in predictable ways. We know, for example, that subjects report enhanced imagery during hypnosis (e.g., Crawford & Allen, 1983; Gur & Reyher, 1976; Rothmar, 1983). Hypnosis also induces a sense of effortless experiencing (Bowers, 1978). Thus, hypnosis ought to change the quality of items generated during retrieval making them more like remembered events—vivid, detailed, and effortlessly generated.

Using the repeated recall paradigm described earlier, we found that hypnosis can operate during retrieval to create memory illusions even when no attempt is made to mislead subjects (Dywan & Bowers, 1983). Subjects initially saw pictures and attempted to recall the pictures once each day for a week to establish a baseline with respect to recall and errors. On the eighth day, half of the subjects were hypnotized and half were given motivating instructions for recall. Both conditions led subjects to believe that they should be able to recall more items, but the memory reports of the high hypnotizables in the hypnosis condition were clearly most affected. They thought that more of the items that they generated during recall trials were memories and reported higher levels of confidence in these items relative to their nonhypnotized counterparts. The false illusion of remembering was apparent, however, because most of these "new memories" were not from the original stimulus set. Even if memory performance was not objectively improved, the subjective experience of remembering was enhanced.

Hypnosis is a dramatic example of the attribution process at work, but we believe that the effects are simply an exaggeration of what occurs in normal cognitive experience. We believe that hypnotic effects are related to the manipulation of attention as are a number of the other effects we have reported in this chapter. We have demonstrated, for example, that one can alter the attributions that subjects will make about familiarity by directing their attention away from the retrieval aspects of the task, that is, towards background noise, the difficulty of anagrams, or the judgment of fame.

Although internal context plays an important part in the experience of retrieval, it is clear that environmental context can also be influential. A very important part of the environmental context is social. The choice of question influences what is recalled, and an interviewer's response can have subtle but powerful effects on subjective experience. Simply leaning forward when a person reports an event may communicate that the statement is significant. If your audience treats your story as a memory, you will be more likely to give it the status of a memory yourself.

Thinking of the subjective experience of remembering as an attribution is of more than academic interest when one moves into applied settings. It is alarming to think that invalid memory reports can be produced and adamantly defended when the arena is not a psychology lab but a court of law. A case in point is that of Michael Kempinski (People vs. Michael Kempinski, 1980). The only witness

to a murder reported that he had seen someone running away from the scene of the crime but that he did not see the person clearly. Videotapes of the questioning procedure are very revealing in that one can watch "memories" being created. The witness was hypnotized and told that everything he had seen was stored in his memory and that if he kept trying, the original events would return to him. As the witness began to produce some tentative details, the officer became noticeably more interested and encouraged him to keep going. The witness became more excited as new details "came to him," and he eventually recognized the assailant as being a student from the local high school. The vividness of imagined events combined with the validation by an authority figure led to the experience of remembering. The newly created "memory" led eventually to Kempinski's arrest and may have led to a conviction except that an ophthalmologist testified that it would have been impossible to make an identification beyond 25 feet in the prevailing light conditions. The witness who had supplied the description had been 250 feet away in conditions of semi-darkness.

From the perspective of signal detection theory, the influence of hypnosis on memory performance could be described as a beta effect (e.g., Klatzky & Erdelyi, 1985). Increases in correctly reported items are offset by corresponding increases in incorrectly reported items. However, our claim is not that hypnosis makes memory better, but, rather, that it makes memory *seem* better. Our emphasis is on the subjective experience of remembering. Defining memory as an objective recounting of the past, as has typically been done by memory theorists, is like defining a person's emotional state as an objective account of his or her present life situation. Depression, for example, can be experienced even when it is seemingly not justified by the objective circumstances of a person's life. We propose that the subjective experience of remembering, like sadness or joy, is a feeling that can exist somewhat independently of the objective reality.

CONCLUDING COMMENTS

Titchener (1928) noted the importance of studying the feeling of familiarity, or "memory consciousness." He remarked that the introduction of nonsense syllables to the study of memory was, in a way, unfortunate because the precision of results and potential for quantitative analysis forced the problem of understanding memory consciousness to the background. Concern with the subjective experience of remembering has only recently again been brought to the front (e.g., Jacoby, 1984; Klatzky, 1984; Lockhart, 1984; Tulving, 1983). Understanding subjective experience is important because we use it as a basis for action and decisions. This is most evident in the case of dense amnesics who retain the ability to express memory for a prior experience in their performance but lack the subjective experience of remembering. Nearly as disruptive is the unwarranted

subjective experience of remembering that accompanies confabulation. We rely on the subjective experience of remembering to maintain contact with our own past, to act in the present, and to plan for the future.

We have argued that awareness of the past is not to be found in a memory trace. Rather, the feeling of familiarity is best treated as being similar to other affective reactions in its reliance on an attribution process. When the situation directs subjects to a task other than remembering, fluency resulting from prior experience is misattributed to contemporary causes. We described experiments in which memory used as a tool lowered the subjective experience of background noise, lowered estimates of the difficulty of anagrams, and increased the fame of nonfamous names. In each case, subjects' judgments were based on their subjective experience, and that subjective experience was altered by the use of memory as a tool. In some domains, subjects attempted to avoid or limit the effects of prior experience on judgment by shifting to more analytic, theory-based judgments. This research illustrates misattributions of the effects of prior experience that are analogous to the case of unintentional plagiarism. Having—and even using—a memory representation of a prior event is not sufficient to insure the subjective experience of remembering.

Next, we considered the opposite case, in which subjects falsely attribute current experience to the past, and so "remember" without a memory representation. In remembering, even more analytic judgments rest on familiarity and are open to misattributions. Vividness and distinctiveness may be two qualities of thought that produce an inference of remembering, rather than imagining or guessing. If we effortlessly generate a complex image of a birthday party that includes the number of guests, the presents they brought, and the kind of icing on the cake, we are likely to experience that as a memory rather than as a confabulation. In this regard, hypnosis produces a sense of effortlessness when producing vivid and detailed imagery. Hypnosis may not increase the accuracy of recall, but can increase the likelihood that one will have the subjective experience of remembering.

We end this chapter on a speculative note regarding the goal of remembering in determining subjective experience. For the subjective experience of remembering, ideas that come to mind must be attributed to one's own efforts, rather than to the situation. Consider an analogous situation in learning how to play golf. A parent might try to correct a child's golf swing by telling him or her exactly where to put his or her feet for the best stance, adjusting the child's hands until he or she has the proper grip, and then standing behind the child and guiding his or her arms through the arc of a perfect swing. The child might be able to hit a beautiful shot with such assistance, but it is unlikely that he or she will feel the satisfaction of making the shot. Rather, the child will credit his or her performance to the parent. Similarly, we can structure a situation such that it is guaranteed to evoke evidence of a prior experience, but the "rememberer" is

unlikely to feel that he or she is remembering. In this regard, it is interesting to note that unaware uses of memory often occur when responses are heavily constrained by the task.

These concerns make amnesics seem well justified in their claims that they are not remembering even when they show effects of prior experience in their performance. Dissociations between effects in performance and remembering are often produced by tightly structuring the test. For example, detecting savings on a task depends on creating a close match between the training and test situations. The test so constrains responding that amnesics may very reasonably attribute their performance to the current test situation rather than to the past, and so not experience remembering. This point can be illustrated with an example provided by Talland (1968).

Talland asked a man who was amnesic some questions about his family, including details about the forthcoming wedding of a younger brother. In response to Talland's detailed questions, the amnesic was able to provide a full report of the wedding plans. Because the man was quite concerned about his memory disorder, Talland complimented him on his memory performance. However, the man would not accept the compliment because he was convinced that all the information he had given actually had been *told* to him by Talland. Talland termed this misattribution *probole*, which is the Greek equivalent for projection, but without a motivational component. He speculated that it was caused by the highly structured nature of the interview that "programmed the patient's responses step by step" (p. 154). Talland found this misattribution of one's own recall to the questioner to be a strikingly odd error. Perhaps not. The patient's experience of hearing about the details of his brother's wedding plans, rather than remembering them, may be analogous to the golfer who credits the situation rather than himself or herself for the good shot. Perhaps the patient's attribution is at least as defensible as Talland's.

How does all of this relate to Tulving's proposal of separate memory systems? Once again, Endel Tulving has helped to focus our attention on an issue that we agree is an important one: the basis for the subjective experience of remembering. However, to account for awareness of the past, we think the functions accorded an episodic memory system will have to be considerably broadened. The difference between aware and unaware uses of the past cannot be fully accounted for in terms of differences among underlying memory representations or the factors controlling their retrieval. Having—or even using—a memory representation of a particular prior experience is neither a necessary nor a sufficient condition for producing the subjective experience of remembering. Rather, subjective experience involves an attribution or unconscious inference that is as much a function of the present as it is a record of the past. It is doubtful that the processes that are responsible for the inferences underlying awareness are unique to the subjective experience of remembering. We have been struck by the similarities among the problems of explaining perceptual experience, awareness of

the past, the experience of affect, and the attribution of responsibility in social settings. To understand people's awareness of remembering, we need to address issues beyond the scope of traditional memory theories. The focus of Tulving and others on data from amnesics is informative for speculations about the basis for awareness of the past; however, we doubt that any single anatomical structure that is responsible for adding awareness of the past to other functions of memory will ever be found. Even if such a structure were found, its functions could not be understood in the absence of a satisfactory analysis of the processes that underlie the subjective experience of remembering.

ACKNOWLEDGMENTS

This research was supported by a National Science and Engineering Research Council Grant to Larry Jacoby, and a Medical Research Council Fellowship to Jane Dywan. The authors express appreciation to Ann Hollingshead for her assistance collecting and analyzing data, and to Fergus Craik, Eric Eich, and Michael Ross for their comments on an earlier version of this chapter.

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