Article The Construction of Subjective Experience: Memory Attributions

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A central question now being asked about consciousness was also considered at the turn of the century: Is consciousness a passive spectator to behavior, or is consciousness instrumental in the adaption of an organism to its environment (e.g. Dewey 1963)? Along with many others (e.g. Helmholtz 1968; Marcel 1983b; Mandler and Nakamura 1987), we treat conscious experiences as constructions based on inferences (Jacoby, Kelley and Dywan 1989).

By a constructivist view, it is important to specify the cues that serve as the basis for particular classes of subjective experience. In this paper, we consider the bases for the subjective experience of remembering. Our analysis is similar to Brunswik's 1956 ecological approach to perception. By his model of perception, perceptual experiences such as depth and size constancy derive from inferences based on cues in the environment. In our analysis of memory, the experience of remembering also derives from inferences, but the cues that are the basis for those inferences are aspects of one's own thoughts and behavior, such as the ease with which ideas come to mind. We will illustrate the importance of inference in the subjective experience of remembering by showing errors of inference. One type of error produces unconscious influences of memory, effects of prior experience that are not accompanied by the subjective experience of remembering. We also show that illusions of memory can be produced, and we discuss the importance of those illusions for uncovering the bases for the subjective experience of remembering.

In a constructivist view, conscious experience follows changes in performance rather than directs performance. In a sense, the constructivist view treats consciousness as a spectator, although not a strictly passive one that 'copies' objective reality. Rather than being identical to earlier unconscious processing, consciousness depends upon an active interpretation of that processing (Marcel 1983b). Furthermore, in everyday life, people often make conscious awareness a prerequisite for intentional actions. In a second major section of this paper, we consider intention with reference to both conscious and unconscious influences of the past. We argue that conscious intentions do sometimes direct behavior and describe an experimental method that we have found useful for separating conscious from unconscious effects.

Unconscious Influences of the Past

People commonly use the term 'memory' to refer to conscious remembering. I remember what I had for breakfast this morning, where I was on January 15 this year, and what the weather was like the day I graduated from college. However, the past can also affect us unconsciously. For example, amnesics often cannot remember events, but nonetheless their behavior reveals the influence of past experience (Warrington and Weiskrantz 1974; Cohen and Squire 1980; Young and de Haan this volume). A classic anecdote illustrates this phenomenon. The French neurologist Claparede 1951 hid a pin in his hand and then shook hands with a woman amnesic patient. The next day, he extended his hand in greeting, but she refused to shake hands with him. When pressed for an explanation, she clearly could not remember having shaken hands with him the day before, although she finally justified her behavior by saying 'Sometimes pins are hidden in people's hands'. Her behavior indirectly revealed memory for the prior incident, but in the absence of conscious recollection.

Such a dissociation between conscious remembering and unconscious effects of the past can also occur in people with normally functioning memories. For example, reading a list of words increases the likelihood that people can later read them when those words are flashed very briefly on a computer screen. Interestingly, successful identification of the briefly presented words can be independent of the ability to recognize them as words studied on the list (Jacoby and Dallas 1981). In this example, the recognition test is a direct test of memory (Richardson-Klavehn and Bjork 1988; Johnson and Hasher 1987) because the instructions refer to a target event in the personal history of the subject (earlier reading of a list of words). In contrast, the perceptual identification task is an indirect test of memory because the instructions refer only to the task at hand and do not refer the subject back to a particular prior event, even though performance on the task is affected by the prior experience. A variety of tasks indirectly reveal memory by enhanced performance due to past experience: perception of briefly presented words or visually degraded pictures (Jacoby and Dallas 1981; Jacoby and Brooks 1984), completion of word fragments (Tulving, Schacter and Stark 1982) or word stems (Graf, Mandler and Haden 1982), solution of problems (Jacoby and Kelley 1987), and speeded reading of text (Kolers 1976).

Early studies of direct versus indirect memory tests yielded exciting findings. Organic amnesics are typically more impaired on direct tests of memory than on indirect tests. Indeed, in some cases, amnesics perform as well as normal subjects on indirect memory tests. In people with normally functioning memories, performance on direct tests of memory often is stochastically independent of performance on indirect tests of memory (Tulving et al 1982; Jacoby and Witherspoon 1982). For example, the probability of completing a fragment or identifying a briefly presented item is no higher for items that have been recognized than for unrecognized items (Jacoby and Witherspoon, 1982; Tulving et al 1982). A number of experimental variables differentially affect performance on direct as compared to indirect memory tests. For example, studying items by meaningfully elaborating upon them versus simply reading them substantially improves memory performance as measured by recall or recognition, but seems not to affect performance on indirect tests such as fragment completion or the ability to identify briefly presented words.

Finally, performance on direct tests typically requires that people consciously reinstate a past episode, whereas facilitation on indirect tests of memory is not necessarily accompanied by conscious awareness of the past. This difference in subjective experience may ultimately be the most important. Past research on human memory neglected the subjective experience of remembering in favor of objective performance. Conscious remembering was considered irrelevant phenomenology, an epiphenomenon that accompanied correct recall or recognition. Ironically, it was the *absence* of the subjective experience of remembering on indirect tests that illuminated its importance for memory theories. Without the subjective experience of remembering we would be as amnesics: uncertain about the basis for our actions and unaware of how the past has influenced our current experiences. It is important to understand what gives rise to the subjective experience of remembering.

Most researchers in memory agree that direct versus indirect tests differentially reveal two forms or aspects of memory. These two types of memory have been variously termed memory with awareness versus memory without awareness (Jacoby 1984), conscious versus unconscious memory (Jacoby and Kelley 1987; Mandler and Nakamura 1987; Mandler 1989), and explicit versus implicit memory (Schacter 1987). In this paper, to stress the importance of subjective experience, we will use the terms 'conscious' and 'unconscious'.

What could produce the differences between conscious and unconscious memory? One approach assumes the differences reflect separate memory systems with separate neuroanatomical substrates (e.g. Tulving 1983; Cohen and Squire 1980): One system supports conscious recollection, whereas the other system supports unconscious influences of the past. One system is capable of representing aspects of experience such as contextual and temporal information which later give rise to the experience of remembering, whereas the other is not. By this account, the subjective experience of remembering totally reflects properties of the memory trace, so that having and using a memory trace is necessary and sufficient to produce remembering. An inability to experience remembering would be due to the absence of a corresponding representation. For example, an amnesic incapable of remembering may lack the ability to represent particular aspects of episodes, such as time and place.

However, the mapping between representation and subjective experience is far from perfect. Even when memory functioning is normal, people can use memory representations without experiencing remembering, e.g. performance on indirect tasks reveal unconscious effects of prior events. Furthermore, the memory representations involved in unconscious effects of the past are not abstract and stripped of contextual details, but often contain very specific contextual information, such as visual versus auditory modality of presentation (Kelley, Jacoby and Hollingshead 1989). The contrasting case of 'remembering' without using a memory representation also occurs. Following certain neurological disorders and head injuries, patients confabulate fantastic events that never occurred (Baddeley and Wilson 1986; Stuss and Benson 1986). Confabulation also occurs in people with normal memory, as we shall discuss later. 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.

What, then, leads people to experience their thoughts as remembering, rather than imagining, perceiving, or thinking? We argue that the feeling of remembering is based on an inference or attribution (see also Johnson 1988). People interpet particular aspects of their ongoing experience as either reflecting past experience or as due to current conditions. An attribution to the past gives rise to the subjective experience of remembering, which may be correct (veridical remembering) or incorrect (confabulation or memory illusions); conversely, an incorrect attribution of effects of the past to current conditions can alter subjective experience of the present.

Bases for the Subjective Experience of Remembering

We start by noting that past experience influences present performance on a variety of tasks. In learning theory, those influences are termed transfer effects. Many indirect tests of memory (fragment completion, identification briefly presented of items, reading speed and comprehension) can be viewed as cases of positive transfer, in that past experience allows the task to be performed more efficiently or fluently. 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 their performance on current tasks as a sign that they are using the past, much as they may learn to interpret environmental cues to produce perceptual experiences such as depth perception and size constancy (Brunswik 1956).

To assess whether such an inferential or attributional basis for remembering is feasible, we need to ask whether effects of the past typically revealed by indirect tests (what we are calling transfer effects) could serve as a sufficiently diagnostic basis for the experience of remembering. Recent work in memory development suggests that early experiences show transfer effects of extreme specificity. Rovee-Collier 1989 tested infants' memory by conditioning them to kick in the presence of a particular crib mobile. She arranged it such that the infants' kicking made the mobile spin, an intriguing event 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 the infants' rates of kicking. The infants showed much better memory than anticipated. Most interesting to us is the extraordinary specificity of their memories. Changing even small features of the mobile eliminated transfer of the kicking response to the new mobile. Effectively, the infants behaved as though they recognized the old mobile and could discriminate it from very similar foils. Although no one knows whether the infants experienced this as remembering, the study reveals that effects of the past on behavior can be extremely diagnostic of a particular past experience. The development of remembering might involve increasing sophistication in interpreting one's own behavior and qualities of one's thoughts as reflecting past experiences (for a related argument, see Lockhart 1984).

Following Helmholtz's 1968 analysis of perception, and Baldwin's 1906 analysis of memory development, we expect that a variety of cues engender remembering. One common effect of past experience is more fluent perception and thinking. Words read once are more easily perceived later; an idea formulated once comes to mind more readily later. We take fluent processing to be a primary cue in the construction of remembering, and hypothesize that the feeling of familiarity in recognition is sometimes based on an inference about the ease or relative fluency of perceptual operations. We noted earlier that perceptual identification of briefly presented words is an indirect test of memory. Reading a word allows one to perceive it more readily later. Jacoby and Dallas 1981 proposed that this ease of perceptual processing could be experienced as familiarity. In support of this idea, Johnston, Dark, and Jacoby 1985 found a correlation between ease of perception (assessed by probability of identifying briefly presented items) and recognition memory judgments for pseudowords. Items that were readily perceptually identified were more likely to be judged as 'old'.

The feeling of remembering is enhanced when we can follow up one idea with supporting details (cf. Baddeley 1982). Each detail brought to mind increases our confidence that we are remembering rather than inventing. Nonetheless, even the feeling of 'really remembering' that one has when recalling details of an event involves an inference process, rather than being an intrinsic property of the memory representation. As such, the experience of remembering is open to error, as in the case of confabulation and errors of reconstruction.

As an example, Ross 1989 found that memories can reflect people's theories as much as their past experience. In one experiment, women remembered experiencing pre-menstrual syndrome when those symptoms were assessed retrospectively. However, daily records kept by the same women (who did not know that the study involved menstrual symptoms) revealed no such syndrome. Ross argues that people's autobiographical memory is partially constructed on the basis of their beliefs about the world. Widespread beliefs in PMS lead to widespread 'remembering' of pre-menstrual symptoms. People's theories of what must have happened lead them to fluently think of those outcomes when they attempt recall, and fluently generated thoughts may be misattributed to past experience.

Another guality of thoughts that may serve as a cue that we are using the past is the vividness of an image. Brewer 1988 studied undergraduates' memory for randomly sampled events in their lives. Students wore beepers set to signal them about once every 2 hours, at which time they were to record what they were doing and thinking. Their memories were tested up to 55 days later. The subjects were most confident that they were remembering when they had vivid visual imagery for the event, rated as 'complete re-experiencing of the particular visual experience' (Brewer 1988, p. 67). People learn to use the presence of vivid imagery in a thought as a cue that they are recalling, rather than imagining. People also use such cues in the reports of others to infer that they are really remembering. Schooler, Gerhard, and Loftus 1986 found that people use the amount of sensory detail in the memory reports of others to distinguish memory for actual events from memory for suggested events. Similarly, Johnson and her colleagues (Johnson, Foley, Suengas and Raye 1989; Johnson and Raye, 1981) have found that people use the amount of sensory detail in a memory to infer that they are remembering an event that they actually experienced, rather than one they simply imagined or dreamed about.

In summary, the conscious experience of remembering is not to be found in a memory trace. Rather, remembering is an inference based on internal and situational cues. A fundamental cue for such an inference is what we have termed fluency, the fluent perception of objects, the easy generation of ideas and details. In general, fluency is a reliable cue to the past, because past experience does facilitate present re-experience, and these transfer effects are remarkably specific. An attributional theory of remembering also predicts errors of attribution. We consider such evidence in the next section.

Misattributions and Memory

Much as perceptual psychologists have used perceptual illusions to investigate the information used to construct perceptual experiences, we have used memory illusions to investigate the information used to construct memorial experiences. We also study misattributions that lead to unconscious influences of the past.

Memory Illusions

If ease of perceptual processing is a cue that can serve as the basis for the experience of remembering, then experimental manipulations of perceptual processing should influence the subjective experience of remembering. That is, one should be able to create memory illusions by altering perceptual processing independently of past experience. Jacoby and Whitehouse 1989 manipulated the ease with which words on a recognition memory test were perceived in an attempt to create memory illusions. They briefly presented the same word (match) or a different word (mismatch) immediately prior to the recognition test item. These context words were flashed so briefly that subjects were unaware of their presentation. For both old and new words, a matching context word *increased* the probability of judging an item 'old'. The matching word facilitated perceptual processing of items and so increased subjects' feeling of familiarity.

Another condition in the Jacoby and Whitehouse 1989 experiment illustrates the importance of attributions in determining subjective experience. Subjects' interpretation of their fluent perception of recognition test words varied depending on whether or not they were aware of the briefly presented context word. When the context words were presented for a longer duration such that they were clearly seen, the results were opposite to those described above: People were actually less likely to call either an old or new recognition test word 'old' when the context word matched the test word than when no context word or a mismatch context word was presented. When they were unaware of the context word, people mistakenly attributed their enhanced processing of the test word to having read it on the study list, and so judged it old. In contrast, when aware of the context word, people attributed their enhanced processing of the test word to having just read it as a matching context word. Subjects in the Aware condition actually tended to over-correct for the effect of the matching word, and so were less likely to judge the test word old than if no context word had been presented.

Placing the effects of aware versus unaware processing in opposition is a key feature in the experiment described above. Conscious versus unconscious perception of the context word produced different attributions of the subsequent fluent processing of the test word. The opposition technique reveals unconscious perceptual processing that is not simply conscious processing that has gone undetected by the experimenter. We will discuss the importance of placing conscious and unconscious processes in opposition in a later section of the paper.

The notion that fluent processing is a cue that one is using the past is

not restricted to perceptual processing. The familiarity of arguments, ideas, and other commonplace activities can also stem from an inference regarding the ease with which we follow the argument or conjure up an image. When people are asked to recall, they tend to accept ideas that come readily to mind as remembered ideas. We predicted that the ease of producing an item during recall attempts would correlate with the likelihood of experiencing that item as remembered. Certainly such a correlation would not compel an attributional analysis of remembering. For example, remembering could be a phenomenological correlate of trace strength: items with strong traces would both be readily available and give rise to a strong feeling of remembering. However, the notion that the ease with which ideas come to mind is the basis for the feeling of remembering implies that we should be able to *manipulate* the ease with which ideas come to mind and so create illusions of remembering.

We had subjects study a long list of five letter words and then tested their ability to recall the words when given cues (Kelley, Lindsay, and Holland in preparation). The cues were fragments of the to-be-recalled words. Some of the fragments were easy to complete (1 letter missing, e.g. B_RCH), and others were relatively difficult to complete (2 letters missing, e.g. B_RC_). After generating an item, subjects described their subjective experience as 'Clear Memory', 'Feels Familiar', or 'No Memory'. Unbeknownst to subjects, a small proportion of cues on the cued recall test were fragments that could only be completed with new words, that is, words that were not on the study list. Of those new targets, half were cued with easy-to-generate fragments and half were cued with difficult-to-generate fragments. As predicted, the ease with which words came to mind in response to the fragment cues influenced the subjective experience of remembering. There were significantly more reports of 'Feels Familiar' and 'Clear Memory' for words produced given the easy cues than for words produced given the difficult cues. What is critically important in this study is that the effect of ease of generation occurred even for new items, those that had never been studied on the list. Thus ease of generating contributed to subjects' experience of remembering and produced illusions of remembering.

Effects of the Past on Subjective Experience of the Present

Others have suggested that the differences between conscious memory and unconscious memory result from separate memory systems. In contrast, we see conscious and unconscious memory as tightly linked. Both reflect changes in processing given past experience, in particular increases in the fluency of thinking and perception. On a direct memory test, the situation directs subjects to make a particular inference regarding fluent operations—that they are due to past experience. However, the same fluent operations may be misattributed to other factors and so change subjective experience of the present. To illustrate such misattributions, consider the case of the misattribution of ease of perceptual processing of words or sentences due to past reading. Witherspoon and Allan 1985 had subjects first read a list of words on a computer screen, and later judge the duration of presentation of words presented individually on the screen. Subjects judged the exposure duration as longer for old words (read on the list in the first phase) than new words, although the actual duration was identical. They misattributed their fluent perception of old words to a difference in duration.

Similar effects of the past on perception were found by Jacoby, Allan, Collins, and Larwill 1988. Subjects listened to old and new sentences against a background of white noise and judged the noise level. They estimated the background noise as less loud when old sentences were presented in the foreground than when new sentences were presented. Subjects apparently misattributed their enhanced perception and comprehension of old sentences to lower levels of background noise.

In the above experiments, subjects were biased toward interpreting changes in ease of processing due to prior experience as changes in physical characteristics of the present. In other experiments, we found that problems were made easier when subjects read the answers in an earlier phase of the experiment (Jacoby and Kelley 1987). However, the subjects experienced their own facile solution of the problems as due to a characteristic of the problems-that they were easy. The experience of the problems as easy led subjects to systematically underestimate their difficulty for others. The experiment is analogous to a problem inherent in teaching: how do we judge the difficulty of material for our students? When teaching new material, we may successfully use our own subjective experience of difficulty to estimate what the students will find difficult. When teaching material that we have long-since mastered, our subjective experience is a poor basis for predicting students' difficulty: we may experience the material as simple and the students as dull-witted. In so doing, we are guilty of egocentrism of the sort exhibited by children (Piaget and Inhelder 1956).

Potentially, any effect of past experience on performance could be misattributed to factors other than the past. Thus, the past is a pervasive source of unconscious influence (Jacoby and Kelley 1987) that can change our interpretations of the perceptual world, our comprehension and evaluation of events, and our prediction of the future. If the current situation directs one toward the past, then it is likely that an idea that comes to mind readily will be attributed to past experience. However, if the situation directs one to another goal, such as solving a problem, then the effects of past experience may be misattributed to other factors such as the relative difficulty of the problem. The seemingly trivial difference between interpreting a change in behavior as reflecting past experience (and so remembering) or as reflecting current conditions can lead to substantially different experiences and have substantially different implications for later behavior.

The Role of Intention

We have described the difference between direct and indirect tests as primarily a difference in subjective experience. On direct tests, people attribute changes in their performance to the past and so experience remembering, whereas on indirect tests people attribute those effects of the past to contemporary factors. Although subjective experience is important, it clearly is not the whole story with regard to conscious versus unconscious memory. Amnesics do not simply fail to make particular inferences regarding effects of the past. They lack the ability to form an intention to remember and to engage in special activities that would allow them to carry out that intention (Baddeley 1982; Warrington and Weiskrantz 1982).

In this section, we begin by considering the relation between intentional control and memory. First, how does the intention to remember modulate memory performance? Second, how can other behaviors be controlled by memory? One role credited to consciousness in general is that of a higher-order executive function (Shallice 1972; Johnson-Laird 1986). We argue that behaviors can also be controlled by unconscious memory for similar episodes. However, one cannot distinguish between the two types of control by simply asking people why they did something, because intention itself is an attribution that can follow behavior as well as direct it.

Intention as Necessary for an Act

Intentional Control of Memory

People can exert conscious control over their memory performance in several ways. When remembering is unintentional, the retrieval cues are given by the current situation (including one's thoughts and feelings). Those cues lead to a particular idea popping to mind. People can, however, attempt to elaborate upon an idea in ways that increase the likelihood that particular ideas or images will come to mind. This strategic generation of cues in intentional recall is evident in Williams's 1976 study of people's attempts to recall the members of their high school class. People consciously attempted to reinstate various contexts, such as imagining a history class or a particular beach frequented by classmates, and then reported the names that came to mind after focusing on those cues.

In intentional remembering, conscious activities generate cues for retrieval. Such intentional control can be mimicked by structuring the retrieval environment for a person. Many neuropsychologists credit the frontal lobes with being the location of executive functions such as planning, restructuring, and monitoring (Stuss and Benson 1986). For some time, the importance of those executive functions was not appreciated because people with frontal lobe damage, including frontal lobotomy patients, could perform normally on memory and intelligence tests. Their loss of executive functioning was masked during those highly structured test situations because the psychological examiner effectively served as the patient's frontal lobes.

During retrieval, the intention to remember structures the retrieval environment and, thereby, guides processing. In indirect tests, the structure of the task guides processing (Jacoby 1984), and retrieval follows incidentally. Perhaps that is why the performance of many amnesics is so much better on indirect than direct tests (Moscovitch 1984). There is a similar distinction between incidental and intentional control at encoding, that is, at the time of entering a representation into memory. In intentional encoding, people deliberately memorize by actively engaging in activities that will produce good memory. But encoding can also be an incidental byproduct of a task. In some populations, including children (Flavell and Wellman 1977) and depressives (Hertel in press), encoding that is structured by the situation leads to far better memory than does encoding that is structured by the subject. Clearly, the control one has over memory depends upon knowing effective strategies and initiating those strategies, both at encoding and retrieval.

Memory in the Control of Behavior

From the perspective of the actor, the most salient form of control over one's behavior appears to be consciously held intentions. However, behavior can appear organized and goal-directed even when not under conscious control. As suggested by James 1890, habit replaces intention and the conscious control of behavior. Extended practice results in one responding 'automatically' without conscious intervention. Even amnesics are capable of improving with practice on a task, although they are unable to consciously recollect the particular experiences that gave rise to learning (Warrington and Weiskrantz 1974).

According to a recent theory of automaticity, automatic responses may actually be unconsciously mediated by memory for specific prior episodes. Logan 1988 presents evidence that automaticity comes about when people change over from computing responses algorithmically to relying on memory for a past response. As in our earlier discussion of indirect memory tests, memory for a prior experience can influence later performance even in the absence of conscious recollection of that earlier experience. The correct response on the current task simply pops to mind. Automaticity thus reflects the use of memory for particular prior experiences rather than the use of an abstract habit that accumulates across many experiences.

A crucial question regarding intentions is the level at which behavior is controlled. When control is conscious, it is in a sense extrinsic, imposed upon the situation and the responses one would automatically make. When control resides in unconscious memory for prior episodes, it is intrinsic to the situation. Details of the current situation serve as cues for the retrieval of memory for similar experiences, and those experiences then unconsciously guide performance. Behavior that appears orderly and goaldirected can emerge from unconscious influences of memory for prior episodes.

Intention and the Attribution Process

Intentions are conscious experiences and so are themselves also subject to inference and attribution. An observer often cannot tell whether behavior is intentionally and consciously controlled or unintentionally guided by unconscious influences of prior experiences. But an actor's report that a particular action was consciously intended is not a reliable guide, because that intention could be an attribution that followed the behavior rather than caused it. In addition, intentions can enter into the construction of conscious experience by serving as a context for attributions. We will first give an example of intention as a *context* for attributions, and then discuss intention as a *product* of attributions.

Consider the role of the intention to remember in the construction of the conscious experience of remembering. When people are asked to remember, they are biased to interpret evidence such as fluent perception as reflecting the past. If people are asked to estimate duration, they will be biased to interpret fluent perception as reflecting characteristics of the stimulus (Witherspoon and Allan 1985). Thus, the goal held by subjects influences their interpretation of the same evidence.

In addition to biasing one towards attributing thoughts to the past, the intention to remember may also enter in as a component of the subjective experience of remembering. Talland 1968 interviewed an amnesic man about his family, including details about the forthcoming wedding of the amnesic's 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 performance. The man replied, 'I didn't tell you about the wedding, you told me'. Talland speculated that this misattribution was caused by the highly structured nature of the interview that 'programmed the patient's responses step by step' (p. 154). To experience remembering, ideas that come to mind must be attributed to one's own efforts, rather than to the situation. The intention to remember can be part of the experience of remembering.

Are intentions themselves subject to attribution and inference? We do not always plan and then act. We often act and then concoct an explanation. Munsterberg's motor theory of consciousness held that conscious intentions are actually a post hoc interpretation of the behaviors they are assumed to produce. Leahey 1987 provides a vivid example: Thus, I might announce that I'm going to stand up from my chair, not because I've reached a decision to stand but because the motor processes for standing have just begun and have entered consciousness. I feel my will to be effective because generally the incipient tendencies to act are followed by real action, and the former trigger memories of the latter (p. 269).

By the motor theory of consciousness, the actual causes of the behavior are not incorporated into one's conscious construction of the experience.

Similarly, a recent body of research reveals that people are often unable to specify the factors that are important for controlling their behavior (e.g. Bowers 1984; Nisbett and Wilson 1977; Wason and Evans 1974). When asked to explain their behavior, people report *a priori* cultural theories or hypotheses that may bear little relation to the variables that psychologists know to be controlling the behavior (Nisbett and Wilson 1977). One part of cultural theory for Westerners is that behavior is ordered by intentions and plans. When people reflect on their behavior and describe it in terms of their intentions at the time, the intentions may actually exist only retrospectively. That is, an intention may be an attribution about a behavior, rather than a cause of the behavior.

We acknowledge that conscious intentions may at times be necessary for action and other times be simply a post hoc interpretation of behavior. The important issue then becomes separating the two. As Nisbett and Wilson 1977 point out, people's post hoc theories about the causes of behavior may be correct, not because they have conscious access to those causes but because the two happen to coincide. When a conscious intention would cause the same behavior that would be produced unconsciously, it is impossible to know which is controlling behavior. In the next section we will describe a method that we have found useful for separating conscious and unconscious influences of memory.

The Advantages of Opposition

The indistinguishability of conscious and unconscious processes that are in the same direction has led to a history of research marked by supposed demonstrations of unconscious influences followed by further research to uncover methodological flaws in those supposed demonstrations. Experimental demonstrations of unconscious perception (e.g. Marcel 1983a) have been criticized on the grounds that the experimenter has mistakenly measured conscious rather than unconscious performance (see Reingold and Merikle this volume). Holender 1986 argues that there is so far no convincing evidence for unconscious perception. Similarly, in studies of memory, performance commonly ascribed to unconscious forms of memory may be contaminated by conscious recollection (Richardson-Klavehn and Bjork 1988). For example, the enhanced completion of word fragments for old words relative to new may be accomplished by intentional conscious retrieval of studied words.

We have avoided relying on differences in threshold or sensitivity of tests as a way of separating conscious from unconscious influences. Instead, we have adopted the strategy of placing conscious and unconscious processing in opposition. In several studies (Jacoby and Whitehouse 1989; Jacoby, Woloshyn and Kelley 1989), we arranged it such that subjects made opposite responses depending on whether they were aware or unaware of a prior event. For example, in the Jacoby and Whitehouse 1989 study described earlier, when subjects were unaware of the matching context word that preceded a recognition test item, they were more likely to judge that item 'old', whereas if they were aware of the context word, they were less likely to judge the item 'old'. This rules out the possibility that unconscious effects are simply conscious effects that the experimenter is unable to detect, and allows a clear separation of the two.

The strategy of looking for opposite effects is a variant of the strategy of searching for qualitative differences in performance produced by conscious versus unconscious perception or memory (e.g. Dixon 1981; Marcel 1983a; Cheesman and Merikle 1986; Jacoby and Dallas 1981; Tulving *et al* 1982). The opposition strategy is also a variant of methods that pit an unintended process against one's conscious intentions, as in the Stroop test (see Reingold and Merikle this volume). Holender 1986 dismissed evidence of qualitative differences are primarily revealed by an interaction of the conscious versus unconscious measure with some other variable. As Holender points out, interactions do not necessarily reveal separate processes, but can be interpreted by a variety of single process theories. What Holender neglects to point out is that interactions are important when they derive from a coherent theory.

The opposition of conscious and unconscious influences is more than a methodological tool: an important function of consciousness is to oppose unconscious influences. A commonplace example of such a function is the problem of avoiding repeating oneself. One effect of telling a story is to make that story come more readily to mind later (and, perversely, to do so most often with the same audience). Conscious recollection can be used to oppose this effect of the past. Similarly, conscious awareness can oppose the effects of unconscious perception. The fear of subliminal messages seems to be based on the notion that people cannot resist influences of which they are unaware. A subliminal message to 'Drink Coke' could be mistakenly taken as one's own desire for a drink.

To set conscious and unconscious influences of memory in opposition, we have used a phenomenon that we call the 'false fame' effect. In the first phase of these experiments, people read a list of nonfamous names, such as 'Sebastian Weisdorf'. In a second phase, those old names were mixed with new famous and new nonfamous names in a test of fame judgments. The fame test served as an indirect memory test: names that were read earlier were more likely to be judged as famous than were new names, even if those names are actually nonfamous. We consider this an unconscious influence of prior reading of the names, because the names are often falsely experienced as famous, rather than remembered from the list (Jacoby *et al* 1989).

Subjects could avoid the false fame of recently encountered nonfamous names by directing their attention to the past. We correctly informed subjects that all of the names they had read in the first list were nonfamous, so if they recognized a name on the fame test as from the first list, they would know it is actually nonfamous. In this way, conscious memory for a name from the list would oppose the effect of unconscious memory on fame judgments.

The fact that the fame paradigm separates conscious remembering from unconscious influences of the past allowed us to look for principled differences between the two that followed from our conception of consciousness. Historically, the unconscious and the conscious were considered qualitatively different (e.g. Ellenberger 1970; Dixon 1971). Conscious processes were thought to be more active whereas unconscious influences were more likely to emerge when one was relaxed or inattentive. Our distinction between memory-as-tool versus memory-as-object partially captures these distinctions (Jacoby and Kelley 1987). Memory can be used unconsciously as a tool to perform a task without any analysis or activity beyond performing the task itself. In contrast, treating memory as an object of conscious reflection generally requires more active processing.

We predicted that conscious remembering of the names from the first phase in the fame paradigm would require a separate, attention-demanding act. Therefore, if subjects are required to divide their attention between the fame judgment test and another task (detecting sequences of digits presented auditorially), they should be less able to use conscious recognition to oppose the false fame than subjects who devote their full attention to fame judgments. That was indeed the case (Jacoby *et al* 1989). Subjects in a divided attention condition were particularly susceptible to the false fame effect—they were *more* likely to call old nonfamous names 'famous' than new nonfamous names, whereas the opposite was true for subjects in a full attention condition. Making the past an object of conscious reflection requires a different focus of attention than using the past as a tool.

Conclusions

In one sense, recent studies of the unconscious effects of the past add more fuel to Nisbett and Wilson's 1977 arguments that we tell far more than we know about our own behavior. Past experiences affect the perception and interpretation of later events even when a person does not or cannot consciously recollect the relevant experience. Those unconscious influences of the past undoubtedly exert pervasive influences on our behavior. However, we think that such a focus on unconscious influences neglects the equally pervasive effects our conscious constructions have on subsequent behavior.

Memory experiments, our own included, typically investigate the effects of events in a first phase on performance in a second phase. For example, reading a list of nonfamous names in Phase I leads subjects to judge those names as famous in Phase II (Jacoby et al 1989). We view this as an unconscious influence of the past because subjects are not comprehending that the increased familiarity of the names is due to their prior reading of them in Phase I. If we had asked subjects to explain why they thought a particular name was famous, they might say 'I think she's some sort of athlete' or 'I think he's an actor'. From Nisbett and Wilson's 1977 perspective, it would be another instance of consciousness not reflecting reality. However, in real life, there is a Phase III, as well as a Phase I and Phase II. While conscious awareness in Phase II does not always accurately reflect the influences of Phase I variables, conscious awareness itself has consequences for later behavior. The consciously constructed interpretation of one's experience is the basis for later intentional behavior. If I think a person on an airplane looks familiar because they are famous, I may behave quite differently toward them than if I think they look familiar because I saw them earlier on the airport shuttle bus.

Marcel 1988 makes a similar argument about the causal status of consciousness based on his observations of patients with blindsight. The subjective experience of these patients is that they are blind, yet they can accurately make some visual discriminations when forced to make choices. One might argue that this also is a case in which conscious experience does not accurately reflect the facts of perceptual processing. However, as Marcel points out, blindsight patients are loathe to base any intentional behavior on their visual processing. Marcel argues that there are two reasons for this. First, a conscious intention cannot be formed if a logically necessary part or that intention (e.g. its referent) is not conscious. So, a blindsight patient cannot form an intention to reach out and pick up a glass if they are not consciously aware of the glass. Second, when people are mindful of their behavior, they do not perform actions without reason. People may or may not be capable of deliberately responding in the absence of conscious referents, but in our culture, they do not. By Marcel's account, consciousness is causal, even if its causal role derives solely from a culturally held belief that consciousness is causal.

Similarly, the conscious experience of remembering is causal even though conscious remembering does not perfectly map onto past experience. People often do not remember past experiences that nonetheless affect them, and they can also 'remember' events that never happened. We give great weight to remembered experiences, even though those memories are often in error. Analogous to Marcel's blindsight patients, we are much more willing to base behavior on clearly remembered events than on vague feelings of familiarity. In the domain of eyewitness testimony, judges and jurors give memories an evidentiary status that exceeds their reliability (Loftus 1979). Bruner 1987 makes a similar point that 'in the end we become the autobiographical narratives by which we "tell about" our lives' (p. 15). Bruner is only partially correct; at any point, we are only aware of a part of who we are and what controls our behavior. However, our conscious construction of ourselves nonetheless influences who we may become.¹

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