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# A Social Cognitive Neuroscience Approach to Emotion and Memory

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In the movie *Blade Runner*, a woman named Rachel discovers that what she has always believed to be her most poignant childhood recollections are not her memories at all. Rachel learns that she is an artificially created, genetically engineered entity known as a *replicant.* She is physically indistinguishable from ordinary humans, and her psychological identity is based on memories taken from the life of her creator's niece. But if the personal past revealed in her recollections is imaginary, then who is Rachel? How can she think about herself in the present or plan for the future unless there is a past self to serve as a point of departure?

As one of us put it recently, "Memory's usefulness does not lie in its ability to replay the details of our lives with total accuracy, but in its power to recreate and sustain the important emotional experiences of our lives" (Schacter, 1996a). For Rachel, memories of childhood were certainly not accurate in the conventional sense, but they did provide her with an essential backdrop against which her present experiences could be evaluated. This backdrop is as essential for us as it is for replicants because memories, be they real or artificial, are an essential means of grounding our emotional lives; indeed, the behavior and reactions of replicants without a personal history was childlike and unpredictable, and they experienced life not as a coherent flow of comprehensible experience, but as a series of unexpected actions, consequences, and potential threats. This fictional example serves to illustrate that recreating emotional experiences is an essential

means of making sense of who we were in the past, who we are now, and who we might become in the future (Ross & Conway, 1986).

In this chapter, we examine how emotion influences memory by exploring the functional role that the appraisal and encoding of emotional experiences, and subsequent recall of them, plays in everyday life. Rachel's story illustrates the importance of recalling emotional events for defining the self. But certainty of self is only one functional end that memory of the emotional past makes possible. Recalling significant events serves current goals and can aid in the regulation of moods, can motivate current actions, and can be used to predict the consequences of future ones.

Traditional approaches to the question of how emotion influences memory have framed the issue in absolute terms, asking whether emotion makes memory better or worse, whether emotional memories are indelible, whether pleasant or unpleasant experiences are recalled more readily, or whether emotion promotes memory for central or peripheral detail (e.g., Bradley, 1994; Christianson, 1992; Conway, 1997; Matlin & Stang, 1978). From our perspective, the answer to each of these questions would include an important qualifier: it depends (see also Ochsner & Schacter, in press). We include this qualification because, as we will argue, the exact manner in which emotion influences memory cannot be specified without reference to how, in a specific situation, memory of one's emotional reactions serves a specific goal.

In this context, emotion is viewed as a process that identifies significant persons, objects, or events (e.g., Frijda, 1986; Lazarus, 1991) and readies appropriate responses to them. Emotions are therefore constructions based on current, contextually bound evaluations of personal significance and are not enduring properties of stimuli; the bully I fear today I might embrace tomorrow if I discover that he is a blood relative. Remembering an emotional experience is also a constructive process, but one that involves appraisal with respect to past events rather than current ones, and is similarly shaped by the significance of a given memory to one's current goals and desires. To say that emotional appraisal or that remembering is constructive is not to say that the construction process is always conscious or deliberative; in fact, as we argue below, in both cases construction first involves the operation of quick and automatic processes, with more deliberative processes coming into play only if need be. Therefore, to understand the relationship between emotion and memory, we need to understand two kinds of constructive processes and their interaction: (*1*) how we determine what is emotionally significant; (*2*) how we encode, store, and retrieve information; and (*3*) how the former guides the latter. Encoding and retrieval of explicit memory for specific emotional, and primarily nontraumatic, life episodes are the focus of this chapter (for an excellent review of the effects of moods on cognition and judgment, see Bower & Forgas, 1999; for a review of the research and theory

concerning memory for especially traumatic events, see Conway, 1997; for a review of emotion and implicit memory, see Tobias, Kihlstrom & Schacter, 1992).

## APPROACH AND ORGANIZATION

The goal-oriented approach to understanding emotion and memory that we elaborate here draws on and integrates data from social cognition and cognitive neuroscience; we call it the *social cognitive neuroscience approach.* This approach is distinct from traditional cognitive neuroscience in that it attempts not just to elucidate abstract information processing mechanisms and their neural substrates (Ochsner & Kosslyn, 1999) but also aims to understand how these mechanisms function in the context of current goals and motivations. Cognitive psychology and neuroscience have impressively demonstrated that memory is an active process that involves interpretation and construction at all stages (e.g., Schacter, Norman, & Koutstaal, 1998); social psychology has shown that the memory distortions or biases produced by the constructive process are motivated and may be systematically guided by self-relevant goals (e.g., Ross, 1989; Ross & Conway, 1986; Singer & Salovey, 1996). In this chapter, we consider how data from social cognition and cognitive neuroscience together can provide a more complete account of how emotion determines the directions and paths that the construction process takes than could either approach taken alone.

This chapter is divided into three main sections. In the first, we discuss how appraisal of the emotional significance of information directs attention during encoding; in the second, we consider how the encoded information may be modified by subsequent rehearsal and consolidation; and in the third, we outline the ways in which goals and emotional cues in the retrieval environment help guide the construction of memories for these experiences.

## EMOTION GUIDES ENCODING

Attention to incoming information enhances subsequent recollection of it (e.g., Craik et al., 1996), and attention is drawn to the information appraised as most significant to one's self in the context of current goals (Lazarus, 1991). These goals can be simple and global, such as the general goal to avoid physical or emotional harm, or they can be more specific, such as the desire to attain a particular promotion, make a good impression, or calm a frustrated friend. Appraising the significance of stimuli to one's self in the context of such current goals can evoke different emotions depending on the persons and objects involved and on which goals and needs are currently most important (Frijda, 1986;

Lazarus, 1991). Each emotion thus results from appraisals of different kinds of self-relevance: At turns, we might be sad if we think about the possible irrevocable loss of a loved one from illness, angry if we attribute responsibility for this outcome to a doctor's failure to give proper care, or hopeful if we feel that the medical care might result in a cure (Lazarus, 1991).

Although theorists differ in their specifications of which emotions result from which types of appraisal, most theories specify that appraisal involves the operation of fast, automatic, and mainly nonconscious processes, as well as conscious and more deliberate ones (Frijda, 1986; Lazarus, 1991; Ohman, Flykt, & Lundqvist, 1999; Zajonc, 1998). The fast and automatic processes seem adapted to making a quick bottom-up evaluation of a stimulus in terms of its valence, indicating that it is good or bad, to be approached or avoided. The slower and more deliberate processes involve memory retrieval and reasoning to counteract, augment, or reshape the more diffuse bottom-up signals. Both steps in the appraisal process can influence what is encoded and later remembered, and we consider the contributions of each in turn.

### Automatic Capture of Attention by Emotion

If benefits the rabbit to be able to identify the hungry fox as quickly as possible. Indeed, the more quickly an organism can determine if an event or object should be approached or avoided, the more likely that organism is to survive (Davidson, 1992). Evolutionary survival pressures have served us well: There is good evidence that merely looking at a stimulus leads to evaluation of it, and once a stimulus is identified as emotionally self-relevant, it may be difficult to ignore (Ohman et al., 1999).

Studies of the *automatic evaluation effect* indicate that bottom-up perception of a stimulus may reflexively activate information in memory about its affective properties, thereby providing the first source of information about how to respond to it (Bargh et al., 1992). In these studies, subjects judge the valence of a target word that has been preceded by a prime word of similar or different valence. Speeding or facilitation of this judgment for prime-target pairs that have similar valence appears to occur automatically and has been found across a variety of conditions that vary awareness of the prime-target relation (e.g., Bargh et al., 1992; Fazio, Sambonmatsu, Powell, & Kardes, 1986).

Emotional information also attracts and holds attention, as revealed by studies employing the emotional *Stroop* paradigm. In the standard Stroop task, subjects must attend to the color of a word and ignore its identity; the task is difficult because the relatively automatic process of reading the word interferes with the relatively controlled process of naming its color. In the emotional Stroop paradigm, it takes longer to name the color of emotional stimuli than it takes to name the color of neutral stimuli, and this difference is taken to reflect a per-

ceptual bias favoring the automatic encoding of affective information (for review, see Williams, Mathews, & MacLeod, 1996). In a prototypical experiment, Pratto and John (1991) found that normal subjects took longer to name the colors of positive and negative words than it took them to name the colors of neutral words, suggesting that attention was indeed captured by the emotional significance of these stimuli. What is positive or negative may differ from person to person, however, depending on their current goals and concerns. Consistent with this suggestion, Riemann and McNally (1995) found interference effects only for emotionally valenced words that were relevant to topics of current concern to their subjects (as assessed by pre-experimental questionnaires). Importantly, emotion-specific interference effects may disappear when clinical symptoms go into remission (Matthews et al., 1995), suggesting that it is the emotional salience of words specific to the presence of the disorder—not just greater experience with these words—that underlies the interference effects.

The ability of emotional, and especially threatening, information to attract and hold attention may help explain why people tend to recall best information that is most relevant to extracting the affective significance of a stimulus (often referred to as *central details*), causing memory for other kinds of information (often referred to as *peripheral details*) to suffer. Thus, for example, Loftus and Burns (1982) found that subjects who watched a videotape of a staged bank robbery in which the escaping robbers shot a small boy in the face had impaired memory for the events immediately preceding the attack compared with subjects who viewed a tape in which the robbers simply ran past the boy. This phenomenon is sometimes referred to as "weapon focus" in which witnesses to an actual or simulated crime tend to recall information about the weapons at the expense of other details about the setting and (Loftus, Loftus, & Messo, 1987).

It is possible that information central to appraising a stimulus is remembered more accurately simply because subjects look at it longer. A series of studies by Christianson et al. (1991) suggest, however, that improved memory for emotional information can occur even when the amount of viewing time for emotional and neutral information is equated. In studies with either tachistoscopic presentations or records of eye movements and fixation duration to equate looking time across emotional and neutral slides, memory was consistently more accurate for information central to the content of a set of emotional images. It seems that more information per unit time can be extracted about central, emotional details, and heightened attention to these details may be the mechanism that facilitates this process.

### Guidance of Deliberative, Elaborative Encoding by Emotion

In some situations, the quick and automatic classification of a stimulus as good or bad may be all that is needed to guide our behavior in the most appropriate

way. But in many instances, we need more information about the events we are reacting to, including why they have happened. For example, suppose you are bumped roughly while waiting in line at the supermarket. Your quick appraisal might be negative, perhaps initiating a rush of anger, but it would be smart to check this reaction if you realize that the bump was accidental, was not a threat, and was not intended to cause harm. Drawing inferences about the nature of our feelings in light of additional inferences about the causes of the events that elicited them, including the intentions and motivations of others, enables us to have greater complexity of emotional experience and expression (Lazarus, 1991; Stein, Wade, & Liwag, 1997).

Although there is debate about exactly which parts of the appraisal process (or which kinds of appraisals) are conscious and controlled as opposed to nonconscious and automatic, it seems clear that making inferences about causality and intentionality relies on the look-up of information in memory (Lazarus, 1991; Zajonc, 1998). Depending on the emotion elicited, different emotion-specific scripts or schemas will be accessed, each of which specifies what kinds of information are important to identify and evaluate (Lazarus, 1991). This knowledge then can be used effortfully to guide attention to the emotionally relevant internal (e.g., feelings, goals, and plans) and external (e.g., goal-relevant actors and events) stimuli specific to a given situation (Lazarus, 1991; Stein, Wade, & Liwag, 1997). In contrast to early accounts of emotion, which suggested that arousal results in a global disruption of attentional control (Easterbrook, 1959), this approach suggests that emotion directs attention in a specific way: Schema-relevant information will be noted and remembered well, whereas schema-irrelevant information will not be noted and will be remembered poorly (Levine & Burgess, 1997; Stein, Wade, & Liwag, 1997).

For most emotional schemas or scripts, the actions of others are more relevant than their appearance. Thus, people recall actions more often than the appearance of perpetrators of real (Yuille & Cutshall, 1986) or simulated (Clifford & Scott, 1978) attacks and recall themes better than perceptual detail in films depicting either a bank robbery or a boy being hit by a car (Christianson & Loftus, 1987). Studies that have compared memory for central and peripheral details generally have found increased memory for central, thematic, and appraisal-relevant information, including weapons (Burke, Heuer, & Reisberg, 1992; Loftus et al., 1987). It is possible that "weapon focus" may result in part from an effortful direction of attention.

Although schemas may help guide attention to important information, they may also limit our ability to draw accurate inferences about the causes of others' behavior. One way this can happen is when schema-guided encoding leads us to fill in missing or unattended information as an emotional event unfolds. Thus, we may recall feelings, motivations, and reactions that were inferred and not stated explicitly (Heuer & Reisberg, 1990). The need to fill in information

could be made greater if we attempt to divide our limited attentional resources between internal sensations and external actors and events. This may explain why Wahler and Afton (1980) found that highly stressed mothers who were having problems with their children tended to describe their children's behaviors in general, dispositional terms (e.g., malicious or naughty) and did not recall situational antecedents of the behaviors in question.

Dispositional attributions following from schema-driven emotional appraisals also can have negative consequences for one's perception of self and recall of personal experiences. A vivid example is found in people who have suffered from depression or who have attempted suicide. Depressed persons tend to evaluate events in terms of their relevance to an abstract negative self-concept, thereby encoding their personal experiences in an overly general way. As suggested by Williams and Dritschel (1988), these individuals may focus internally, appraising the significance of an event in ways that confirm a global, stable, and negative disposition (e.g., "I have always been a failure") and fail to adequately consider the situational antecedents and aspects of their experiences. By turning otherwise neutral happenings into events diagnostic of their negative self-view, they can later retrieve only very general, and mostly negative, accounts of their lives (Williams, 1996). Repetition of this cycle may be an important contributor to the etiology and perpetuation of depression (Nolen-Hoeksema, 1991).

A tendency to selectively elaborate emotional information relevant to a disposition or self-concept may also explain why most people who usually have very positive self-views (Taylor, 1989) tend to recall (Denny & Hunt, 1992) or recognize (Mogg, Mathews, & Weinman, 1987) positive words more accurately than negative or neutral ones after having been asked to judge their self-relevance during encoding (for a meta-analysis, see Matt, Vasquez, & Campbell, 1992). Similarly, depressed people tend to recall or recognize depression-relevant words more often than other word types (e.g., Watkins et al., 1992). An interesting exception to this self-referential rule is exhibited by patients with generalized anxiety disorder, who tend to recall anxiety-relevant words either no more often than, or even less frequently than, other word types (see Mineka & Nugent, 1995). In contrast to depressed and normal people, who readily encode information that confirms their pre-existing self-views, it seems that anxious individuals try to avoid elaboration of self-threatening information (Mineka & Nugent, 1995).

## Special Neural Mechanisms for Encoding Emotion

Data from neuropsychology, neuroimaging, and animal learning studies provide converging support for the idea that separate processes are responsible for the automatic and deliberative encoding of affective information and suggest further that each may depend on discrete, but interacting, neural systems (see Ochsner

& Felman-Barrett, in press, for complete discussion; see also Reiman, Lane, Ahern, Schwartz & Davidson, 1996). Support for the existence of a separate processing pathway for the quick affective evaluation of objects and events comes primarily from studies of conditioned emotional responses and functional neuroimaging studies of responses to emotional stimuli. In extensive research with rats, LeDoux and colleagues have shown that learning to associate a light or a tone with the fearful anticipation of a shock requires only a direct and fast connection between a sensory organ and the amygdala, and the connection can completely bypass a longer route that sensory percepts take through the neocortex (see LeDoux, 1995). Research measuring classic conditioning of galvanic skin responses in humans has also indicated that the amygdala is necessary for learning to associate aversive physical states with specific visual stimuli (LaBar, LeDoux, Spencer, & Phelps, 1995).

In humans, functional neuroimaging studies and studies of patients with brain damage have shown the amygdala to be linked to the encoding of emotional information. For example, amygdala lesions will disrupt recognition of the emotions conveyed through facial expression, especially fear (e.g., Adolphs et al., 1994; Calder et al., 1996; for review of lesion studies, see Borod, 1992), and fear but not happy faces activate the amygdala, even when presented subliminally (Whalen et al., 1998). Similarly, amygdala activity measured during presentation of an emotional story has been found to be highly correlated with greater subsequent recall of the emotional elements of the story (Cahill et al., 1996), whereas patients with degenerative decay of the amygdala show impairments in their memory of these elements (Cahill et al., 1995). The selective importance of the amygdala for encoding emotional memories also has been demonstrated by studies of amnesic patients with an intact amygdala. Such patients can acquire affective preferences for music (Johnson, Kim, & Risse, 1985), can develop valenced attitudes toward people based on their experience with them (Johnson, Kim, & Risse, 1985), and can acquire conditional fear responses (Bechara et al., 1995) even though they cannot consciously remember their experiences with these various sorts of stimuli. Release of the neurotransmitter norepinephrine within the amygdala appears to be the mechanism by which the amygdala "stamps" in emotional memories, as shown by the memory-impairing effects of drugs that block norepinephrine in animals and humans alike (Cahill et al., 1994; McGaugh & Cahill, 1997). LeDoux (1995) has suggested that a neural "significance code" is quickly computed and stored by the amygdala and may provide a template for further, more complex stimulus evaluation.

The system responsible for this more complex and deliberative control of affective appraisals seems to involve aspects of the frontal lobe (Damasio, 1994; Stuss, Eskes, & Foster, 1994). The ability to generate top-down plans, revise or inhibit habitual responses, and monitor the task relevance of information is impaired by lesions of the lateral and dorsal prefrontal cortices (Shimamura, 1995;

Stuss, Eskes, & Foster, 1994). Furthermore, functional neuroimaging studies show that frontal cortices are activated during effortful, attention-demanding, perceptual or memory tasks that require strategic uses of attention and transformation of information in working memory (Schacter et al., 1996a; Tulving et al., 1994; for review of frontal contributions to memory and imagery, see Ochsner & Kosslyn, 1999). Interestingly, increased activation of the left inferior prefrontal lobe is associated with amount, or depth, of elaborative semantic processing during encoding (Tulving et al., 1994), and this area is hypofunctional in individuals with depression (Davidson, 1992; Drevets & Raichle, 1995). This hypofunctionality could play a role in the over-general encoding of experience exhibited by depressed people (Williams, Mathews, & MacLeod, 1986).

In contrast, the ventral medial frontal (VMF) and orbital frontal (OF) cortices have unique and strong reciprocal connections with the amygdala and are important for evaluating the affective, personal significance of choices and using that information to guide reasoning and action (Damasio, 1994). VMF and OF lesions may produce deficits in motivation, can result in poor control of affective impulses, and have been shown to eliminate the anticipatory, "anxious" autonomic response that precedes personally important decisions, thereby rendering patients unable to use their feelings to guide actions (Bechara et al., 1996; Damasio, 1994; Damasio, Tranel, & Damasio, 1990). The mechanism by which the ventral and medial frontal areas influence the amygdala may involve inhibition of the stimulus–visceral response associations that the amygdala codes. In both animals and humans, lesions to these areas may impair inhibition of conditioned responses that are no longer appropriate and limit the recoding of stimulus significance when it has changed (LeDoux, 1995; Rolls, 1995). Furthermore, using functional magnetic resonance imaging, Davidson and colleagues (Davidson, personal communication) have recently shown that an area of the left medial frontal lobe may tonically inhibit activity in the amygdala and that dysfunction of this connection may be a marker for depression. There have been few studies in humans that have examined VMF and OF contributions to memory for emotional information.

## Summary

The preceding analysis suggests that emotion is a product of the process by which we appraise the significance of stimuli and that the interaction of at least two types of appraisal processes can explain the results of many studies of memory for emotional events. Quick, automatic processes evaluate the valence of stimuli and maintain attention on them, while more deliberate, reflective processes modify, amplify, or inhibit this initial response, depending on how the significance of the given stimulus is appraised relative to current goals and needs. Each process may involve the action of distinct, but highly interactive neural systems:

The amygdala helps to evaluate stimulus significance quickly, and the prefrontal cortex can modify an initial appraisal and generate new ones if necessary.

## POSTEVENT ELABORATION AND CONSOLIDATION OF EMOTIONAL INFORMATION

### Role of Rehearsal

Every time we ask ourselves about the appearance of the attacker who stole our wallet, or wonder how our last court case ended in a disappointing loss, we are rehearsing and re-encoding our memories of those events. Emotional events by their very nature are significant and self-defining, with our major successes and failures denoting milestones in our personal development (Ross & Conway, 1986; Singer & Salovey, 1996). Except for very traumatic experiences (e.g., Christianson & Nilsson, 1984), in many cases our emotional memories are more often thought about and recounted to others than are their pallid, nonemotional cousins (Schacter, 1996b). Public events of personal emotional consequence, such as the assassination of President Kennedy or the explosion of the space shuttle Challenger, afford additional opportunities for recoding and rehearsal through further selective exposure to the event through media, friends, and relatives (Neisser & Harsch, 1992; Schacter, 1996b).

Negative events are especially likely to be rehearsed, as one repeatedly attempts to understand their significance and why they occurred (Skowronski & Carlston, 1989); as discussed earlier, if this process becomes habitual and self-critical, such reappraisals can fuel a ruminative cycle of negative-self evaluation that may foster depression (Nolen-Hoeksema, 1991). Unfortunately, however, it may be difficult to avoid rehearsal of negative events, even when one wants not to do so, because emotional memories may be difficult to ignore or suppress (Wentzlaff, 1993).

Not surprisingly, therefore, the amount of rehearsal an emotional event receives generally has been found to influence subsequent memory for it. Thomas and Diener (1990) asked subjects to record daily experiences in diaries and found that subjects had a tendency to rehearse and remember more negative than positive events. Interestingly, we might later overestimate the frequency with which we experienced negative events, perhaps mistaking frequency of rehearsal for frequency of occurrence (Singer & Salovey, 1996; Thomas & Diener, 1990). Broadly consistent results have been obtained by other researchers in studies showing a modestly positive relationship between affect, rehearsal, and memory in both old subjects (Cohen, Conway, & Maylor, 1994) and young subjects (Cohen, Conway, & Maylor, 1994; Conway & Bekerian, 1988; Rubin & Kozin, 1984; see, however, Christianson & Loftus, 1990; Pillemer, 1984). Repeatedly

thinking about an unpleasant experience may enhance memory for it by increasing the depth with which it is processed (Wagenaar, 1994).

### Reminiscence Effects

When tested immediately after encoding, memory for arousing stimuli may be worse than memory for neutral stimuli, although if memory is tested again hours or days later, recall of the emotional material may have a distinct advantage (for review, see Revelle & Loftus, 1992). This rebound in memory for emotional material as a function of retention interval is known as a *reminiscence effect*, and, although at first it appeared to be reliably demonstrable using both words (Kleinsmith & Kaplan, 1963) and pictures (Kaplan & Kaplan, 1969), some later failures to replicate under conditions that used slightly different stimuli and procedures cast doubt on the reliability of the phenomenon (e.g., Corteen, 1969). Christianson (1992) suggested that the effect is most reliable with paired associate learning and might reflect some idiosyncrasies particular to that paradigm.

More recent research has produced similarly conflicting results. On the positive side, Bradley and Baddeley (1990) found a reminiscence-like effect for associations generated to positive, negative, or neutral words after a 1 month delay, although this result may be more attributable to forgetting of neutral words than to enhanced memory for emotional ones. On the negative side, Burke, Heuer, and Reisberg (1992) found only a very small effect of retention interval in recall of both central and peripheral details of an emotional slide sequence. Despite these inconsistencies, however, a recent meta-analysis of many of the older studies concluded that the effect is reliable, if not especially large (Park & Banaji, 1996).

An initial account of the reminiscence effect postulated that arousal leads to temporary inhibition during memory consolidation (Walker & Tarte, 1963). Exactly why this should be the case was, however, never adequately specified. A more likely explanation has been suggested by Revelle and Loftus (1992). According to their "tick-rate" hypothesis, emotional arousal increases the rate at which information is encoded, and more information is encoded per unit time from an emotional than a neutral event (cf. Christianson et al., 1991). In the short term, it may be more difficult to find any one specific detail among the many that have been encoded. The increased rate of processing also promotes the rapid integration and assimilation of encoded details into pre-existing knowledge structures. In the long term, this means that emotional experiences will have undergone more consolidation per unit time than nonemotional experiences, resulting in relatively greater recall of them

A recent study by LaBar and Phelps (1998) has shown that the amydala is responsible for this consolidation effect. Patients with unilateral temporal lobectomies were aroused by emotional pictures, but failed to show an improvement in memory for them over time.

### Summary

The appraised emotional significance of objects, persons, or events influences how much attention is paid to them and how much one elaborates on their significance both when they were first encountered and subsequently as their significance is reappraised. Emotion thus influences the nature and distinctiveness of what is encoded and stored and therefore strongly determines what information is potentially available for subsequent recall. In the next section, we consider how emotion guides the retrieval of these memory traces.

## EMOTION INFLUENCES/GUIDES RETRIEVAL PROCESSES

Constructing a record of a past experience seems to involve at least two steps (for a more complete discussion, see Schacter, Norman, & Koutstaal, 1998). First, stored traces interact with retrieval cues either from the external environment or from those generated internally, and the product of this interaction provides the "raw material" for recollection (Norman & Schacter, 1996; Schacter, Norman, & Koutstaal, 1998; Tulving, 1983). Second, decision and reasoning processes operate on this raw material to help refine, reconsider, and supplement what has been "served up" in response to the initial retrieval query, and, if further information is required, the search can begin all over again by constructing new cues to retrieve additional specific past episodes (e.g., Schacter, Norman, & Koutstaal, 1998). Appraisal of one's current emotional state, the significance of cues in the current retrieval environment, and their relationship to goals and the self may strongly influence the operation of both of these processes.

### Affective Retrieval Cues Can Bias Retrieval

The synergistic combination of cue and trace information has been called the *ecphoric* process (Schacter, 1982; Semon, 1909/1923; Tulving, 1983), and the output of the ecphoric interaction is substantially determined by the nature of the retrieval cue itself. An incomplete, poorly specified, or incorrectly specified cue may retrieve a memory that is related to, but not an exact match for, the episode that was desired (Schacter, Norman, & Koustaal, 1998). In the absence of criteria that clearly identify that such close matches are incorrect, these false memories may be experienced as accurate (e.g., Roediger & McDermott, 1995; Schacter, Israel, & Racine, 1999; Schacter et al., 1996b). This seamless blending of present and past experience may be a powerful route by which emotion can bias retrospection.

Sometimes the cues that bias the retrieval process are one's own current affective reactions. For example, Eich et al. (1985) found that individuals currently

experiencing high levels of headache pain tended to recall the pain they experienced in the past as having been more severe than it actually was. For these patients, present pain cues may have combined with traces of past painful experiences, thereby systematically shifting estimates of past pain to be more like the level of the pain currently being felt. Although other studies on memory for pain (e.g., Linton & Mellin, 1982) and memory for mood (Matt, Vasquez, & Campbell, 1992) are compatible with this view, the exact way in which ecphory may lead to a recall bias in these studies is difficult to assess. Painful experiences and diffuse moods may have many components, both positive and negative, and it is difficult to specify exactly which aspects will synergistically combine with exactly what stored information. Furthermore, recall could be influenced by current pain levels not because the ecphoric process has been biased but because current pain and affect primes memories for past experiences with similar levels of pain or affect, making them more easily accessible (Bower & Forgas, 1999; Salovey & Smith, 1997).

The power of ecphoric processes to bias recall of affective information was examined by Ochsner, Schacter, and Edwards (1997) using a procedure that escapes the above-noted problems of studying memory for pain and mood. Subjects studied photographs of faces while listening to a corresponding voice speaking in a happy and excited or angry and frustrated tone. When subjects later were presented with photos of the same people as cues in a recall test for tone of voice, they tended to recall the pictured person as having spoken in a tone of voice consistent with the affect conveyed by the retrieval cue in front of them: If the face had a slightly positive expression, they tended to recall that the person had spoken happily; if the face had a slightly negative expression, they recalled the person as having spoken angrily. This recall bias was quite robust, did not depend on overall level of recall accuracy, and was accompanied by high confidence that recall was correct. In these experiments, the ecphoric process seems to have been dominated by the affect present in the retrieval cue rather than the affect present in the memory trace, and this effect may be related to the dominance of visual over auditory cues in the perception of nonverbal affective information (Rosenthal et al., 1979). This method of controlling the exact nature and valence of cue and trace information may allow further examination of the specific ways in which ecphoric processes can bias memory for emotional experiences.

### Evaluations of and Judgments About Past Episodes Are Guided by Current Emotion

If the ecphoric process may occasionally produce information that is systematically biased by retrieval cues, the second step of the memory construction process may be subject to even greater influence by emotion. Current goals may set the occasion for remembering emotional experiences by guiding people to recall

episodes that enhance or preserve a self-concept or help regulate moods and may even help fill in memories for affective feelings that were not well encoded in the first place. Furthermore, the emotional nature of what is recalled may also influence judgments people make about various attributes of their memories.

### Retrieval as self-regulation

The constructive recall of affective events may at times be led by the desire to remember the emotional past in a way that helps create a particular view of the self in the present (Conway & Ross, 1984; Ross, 1989). For most people, this view is quite rosy, which suggests that, by and large, people are good at using recall of past experiences to bolster positive self-regard (Taylor, 1989). This does not mean that everyone will have a generalized bias to recall more positive than negative experiences (although this may be the case for happy people; see Seidlitz & Diener, 1993), but it does suggest that if it is costly or inconsistent with a current schematic self-view to recall a past mistake or negative experience, we may distort memory of it in the present. Indeed, examples of this phenomenon abound: Good students tend to recall poor grades as having been better than they were (Bahrick, Hall, & Berger, 1996), gamblers tend to recall unsuccessful wagers as exceptions rather than the rule (Gilovich, 1983), and married men whose emotions toward their wives sour over time may recall feeling less positive about early marital interactions than they initially reported (Holmberg & Holmes, 1994, cited by Levine, 1997).

How we remember positive and negative events will be determined by differences in the individual nature of the self-concept that we are chronically trying to regulate. Thus, Higgins and Tykocinski (1992) found that individuals who are motivated by the attainment of positive experiences will better recall information related to the presence or absence of positive outcomes (e.g., finding a $20 bill or going to see an eagerly anticipated film that turns out to no longer be playing), whereas individuals motivated to avoid negative experience will better recall information related to the presence or absence of negative outcomes (e.g., being stuck in the subway or getting a break from a hectic work schedule). An important aspect of these data is that recall was driven by the focus of the subjects on positive or negative outcomes as defined relative to their enduring self-goals—and not by the absolute valence of the events. Thus an individual motivated toward achieving positive experiences might remember more about the failure to achieve a good grade on a test than she will remember about the fact that her parents did not scold her afterwards, even though the former experience was aversive and the latter unexpectedly positive (cf. Singer, 1990).

The ability to re-evaluate past experience as congruent with one's self concept may have important implications for mental health. Indeed, the tendency to give even stressful life events a positive spin may lead to happiness (Seidlitz & Diener, 1993), whereas a bias to initially interpret situations as confirmations of a

negative self-concept may lead to depression (Nolen-Hoeksema, 1991). The gradual accumulation of positive life experiences, guided by self-enhancing interpretation of events, may be one of the most significant contributors to a stable sense of subjective well-being (Seidlitz & Diener, 1993; Taylor, 1989).

### Retrieval as mood regulation

A powerful way to build and maintain a positive self-concept is to develop the ability to regulate one's current emotional state. Recall of past personal experiences often occurs in the service of this goal (Erber, 1996). Quite often, this goal manifests itself in the desire to transform negative feeling states into positive ones, as shown in 1994 by Josephson, Singer, and Salovey (cited by Singer & Salovey, 1996), who found that induction of a sad mood can lead to conscious attempts to boost mood through the recall of positive personal experiences (cf. McFarland & Buehler, 1997). Positive moods may not always be desirable, however, and Parrott and Sabini (1990) have suggested that people sometimes use memory to deflate positive moods in order to motivate themselves to work rather than play, maintain a realistic self-concept, or temper undue optimism. The ability to regulate mood using memory may be related to one's self-concept: When in a bad mood, individuals high in self-esteem are more likely than individuals low in self-esteem to recall positive memories and, in so doing, feel better (Smith & Petty, 1995).

Importantly, whether or not retrieval of a particular positive or negative memory has a mood-depressing or mood-elevating effect may depend in large part on the perspective one takes when evaluating its personal significance during recall. On the one hand, it is true that replaying an unpleasant experience in one's mind can depress mood and may prime retrieval of further negative memories (Bower & Forgas, 1999; Smith & Petty, 1995; Strack, Schwarz, & Gschneidinger, 1985). For example, recall of recent events can boost mood if the events were positive and depress mood if they were negative (Strack, Schwarz, & Gschneidinger, 1985), and this effect may be increased if one believes that the recalled events are indicative of one's current abilities to cope with stresses and seek out enjoyable experiences (Janoff-Bulman, 1992).

On the other hand, recall of a negative event can actually enhance mood if one's life can be judged as having improved subsequently (Strack, Schwarz, & Gschneidinger, 1985). This process can be seen particularly clearly in studies of recall of past painful or traumatic experiences. To feel that one has control over pain, especially if it is chronic and enduring, it may be important to believe that one's level of pain has changed over time (Salovey & Smith, 1997). Toward this end, we may recall past pain as having been more or less intense than it actually was, depending on which pain level is most adaptive and is most likely to foster a sense of well-being, control, and hope in the present. Thus, people with high but not low levels of dental anxiety will recall a trip to the dentist as having been

more painful than it actually was (Kent, 1985), and mothers tend to rate labor pain as having been less intense 2 weeks after birth than they did during delivery (Norvell, Gaston-Johansson, & Fridh, 1987). Importantly, current levels of pain may bias memory for past pain only if current pain influences one's emotional state (Eich, Rachman, & Lopatka, 1990). This suggests that, if current pain is not aversive enough to affect mood, it will not lead people to recall their past pain inaccurately.

Whether we view an important, self-defining event as a success or failure can determine whether it makes us happy or sad (Moffitt & Singer, 1994; Strack, Schwarz, & Gschneidinger, 1985). In general, reinterpretation of the past can promote coping and emotional change and may improve mood by allowing people to feel that they have learned, grown, and gained control over the factors that influence their happiness (Folkman & Lazarus, 1984; Janoff-Bulman, 1992). Our construals of the past are not, however, infinitely malleable: If an experience has positive or negative effects that are too far-reaching, it may serve as a weighty anchor that constrains the way we evaluate subsequent life events. In such situations, a sense of control may be hard to come by. For example, Brickman, Coates, and Janoff-Bulman (1978) found that lottery winners took less pleasure than controls in mundane everyday activities, presumably because the extremely positive experience of winning the lottery had changed the scale against which they measured the quality of their present experience. Accident victims who had been rendered paraplegic showed a similar effect, though not because they had actually experienced a greatly positive event in the past but because they idealized the past relative to their current state. Paraplegics thus took less pleasure than controls in daily activities, but did so because they were comparing the present to a past that was made more positive in retrospect than it actually was.

Nevertheless, with some limits, recall and causal thinking about even very traumatic experiences can benefit mental and physical health. Pennebaker and colleagues have shown that systematic writing or talking about traumatic personal experiences such as the death of a loved one, or instances of physical or sexual abuse, may boost immune system functioning, reduce anxiety, and improve grades and work performance (for a brief summary, see Pennebaker, 1997). Importantly, a significant predictor of these effects appears to be how often the narratives of traumatic episodes include reference to their causes and eliciting circumstances (Pennebaker, 1997).

These studies illustrate an important point about the way in which we recall emotional events: Our initial interpretation of a given event's emotional significance need not be the last one we ever have, and how we encoded it initially need not determine how we react to it at recall. Re-evaluation of the significance of an event in the context of one's current circumstances, with the goal of unearthing the factors that lead us to experience maladaptive emotions, can be a

powerful tool for building a happy life (Janoff-Bulman, 1992; Seidlitz & Diener, 1993).

### Current appraisals may bias the content of emotional memories

A particularly compelling illustration of the power of current appraisals to alter memory of past appraisals was recently reported by Levine (1997), who studied the attitudes of supporters of candidate Ross Perot during the 1992 presidential campaign. She first assessed their emotions of hope, anger, and sadness following from Perot's withdrawal from the race in mid-July. Perot re-entered the race in early October, and after the election in November, Levine again assessed current feelings about Perot's candidacy and asked the supporters to recall how they had initially felt about Perot's withdrawal a few months before. Although memory for these past feelings generally was fairly accurate, it was systematically biased to be consistent with current feelings about the desirability and implications of a Perot presidency. The key finding was that specific past emotions were recalled accurately or were overestimated when they were consistent with current appraisals, but were underestimated when they were inconsistent with them (cf. Conway & Ross, 1984).

Such systematic distortions in memory for emotions may also occur because people have theories about how memory for emotions or attitudes change over time (Ross, 1989). Depending on the emotion involved, these theories might dictate whether feelings increase, decrease, or stay the same across time. Although they may be transmitted through personal and cultural experience, we may be unaware that implicit theories are guiding the assumptions we make about the accuracy of our memories. For example, although research provides only equivocal support for an increase in anxiety and distress during menstruation, there is a widely held cultural belief that such distress is prevalent and powerful (McFarland, Ross, & DeCourville, 1989). McFarland, Ross, and DeCourville (1989) suggest that adherence to this belief may guide women to recall past menstrual cycles as having been more aversive than they actually were.

### Current appraisals can fill in missing information

In our efforts to remember the emotional past in a way that helps make adaptive sense in the present, current emotional concerns can sometimes find their way into memories of our past feelings simply because these past feelings were not well encoded in the first place. Consider, for example, Levine's study (1997) of Perot supporters. In that study, recall of past feelings could have been used by Perot supporters to justify their current beliefs, as when a "loyal" supporter who wanted Perot to win in November recalls that he was always hopeful that Perot would re-enter the campaign. It is also possible, however, that the supporters' initial emotional reactions were not well encoded and that current ap-

praisals helped to "fill in the gaps" in their spotty memories. Thus, when Perot withdrew, the feelings experienced by a loyal supporter may not have been strongly encoded, and thus their postelection feelings in November served as a template for fleshing out their incompletely stored feelings from the past.

Researchers on pain and the affect associated with body states have also suggested that affective reactions may not be stored well in memory: When trying to recall them, we have no recourse other than to use our current feelings as a starting point and to use theories about how our feelings may have changed to revise our initial estimate accordingly (Ross & Buehler, 1993; Salovey & Smith, 1997).

Duration is another dimension of emotional experience that may be poorly encoded. Consequently, overall duration of an event may not influence our retrospective evaluations of the pleasantness of an experience. Frederickson and Kahneman (1993) found that retrospective liking judgments for films were determined entirely by their positive and negative content and not at all by how long they lasted. If duration is not well encoded, when asked to explicitly recall the duration of an emotional episode, we may use memory of its intensity as a guide. Loftus et al. (1987) found that, as the violent content of film clips increased, so did subjects' retrospective evaluations of their durations.

We may fail to encode the duration of emotional episodes in part because the peaks and valleys of pain and pleasure capture and hold our attention so that a given experience is encoded in terms of its most salient or most recent emotional aspect. Noting changes in the emotional qualities of a situation could have great survival value: Knowing when guilt slips into shame, frustration into anger, or sadness into depression can help us to predict and better understand our own and others' emotional reactions in the future. In keeping with this idea, Varey and Kahneman (1992) found that memory for extended emotional experiences was determined by the rise or fall of pleasant and unpleasant sensation and not by how long each kind of feeling lasted. In further research, they found that this bias may even lead people to prefer painful stimulation that lasts for a longer amount of time as long as it tapers off at the end. Kahneman et al. (1993) had subjects hold their hand in an unpleasant cold water bath for 60 seconds in one trial and in another had them hold their hand in the bath for 60 seconds plus an additional 30 seconds during which the water temperature slowly rose 1°C. Most of the subjects preferred to repeat the longer trial even though it produced a greater amount of total painful stimulation.

Finally, it is worth noting that poor memory for perceptual details that are peripheral and not relevant to extracting the central emotional theme of an evolving emotion episode (Frijda, 1986) may be due in part to reconstruction of these details during retrieval because they were not well encoded initially. Attention does tend to be inwardly directed during emotional experiences (Lazarus, 1991; Stein, Wade, & Liwag, 1997), and subjects may infer the nature of perceptual

details on the basis of stored knowledge of similar events or from cues in the environment.

### Emotion influences the subjective experience of remembering

As discussed earlier, emotion tends to shift one's focus inward, toward regulation and interpretation of one's internal state (Stein, Wade, & Liwag, 1997). Focusing inward on one's emotions may lead to recollection of memories from a first-person *field* perspective in which events unfold in one's field of view just as they did initially. In contrast, a more abstract focus during recall may lead one to recall an event from an *observer* perspective in which one watches himself or herself from a third-person point of view (Robinson & Swanson, 1993).

Which perspective we adopt during recall may importantly determine how we think about the causes of an event and consequently how we appraise the emotional significance of it in the future. Frank and Gilovich (1989) instructed subjects to recall past conversations from either a third-person, observer perspective or from a first-person, field perspective. When in the observer mode, subjects tended to make more dispositional attributions for their own and their conversation partner's actions. This suggests that a detached, emotionally flat focus during recall can foster interpretation of past behaviors in terms of stable dispositions, which could have important implications for individuals with depression. Flat affect during retrieval could lead depressed persons to recall events from an observer perspective, which may only foster their tendency to encode and think about past behaviors in terms of stable, dysfunctional dispositions (Nolen-Hoeksema, 1991).

Subjective ratings of the vividness of a memory may also be related to the emotion experienced during its encoding. When asked to recall significant (Conway & Bekerian, 1988), exceptionally clear (Rubin & Kozin, 1984), or consequential and traumatic (Christianson & Loftus, 1990) personal memories, the experiences recalled are typically rated as highly vivid and emotional. Only a single study has examined the relation between vividness and recall of both positive and negative personal experiences. Reisberg et al. (1988) asked subjects either to recall and rate memories from positive and negative event cues (e.g., "passing a major examination in school") or to provide narrative descriptions of such memories in an interview. In both cases, rated vividness of the memories was highly correlated with the intensity but not the valence of the emotions experienced.

Some problems arise, however, with the interpretation of these different studies of vividness in autobiographical memory. First, the instructions used to elicit memories or to guide ratings of vividness may sometimes have biased the results. For example, Rubin and Kozin (1984) told subjects to recall memories with a flashbulb-like vivid character (Brown & Kulik, 1977), which may have led them to rate any clear memory as being more vivid. Second, and more impor-

tantly, it is not clear what memory attributes drive ratings of vividness: Memories could have been rated as vivid because the subjects were confident in the memories, because the subjects felt they re-experienced the memories, or because the subjects thought the memories were intense. Whatever the reason for the relationship, the correlation between emotional intensity and vividness does not mean the former caused the latter.

A more reliable means for assessing the relationship between recollective experience and emotion involves what has come to be known as the remember/know procedure (Gardiner & Java, 1993; Tulving, 1985). In this procedure, when an item is recognized on a memory test, participants are asked to decide if they "remember" that item with attendant sensory, semantic, and/or emotional detail or if they just "know" that it was seen previously but cannot recollect anything specific about its prior occurrence. "Remember" responses are sensitive to factors influencing explicit memory, and, given that judged personal emotional significance and self-relevance may boost recall, we would expect that these factors would make one more likely to "remember" an event as well. Indeed, Conway and Dewhurst (1995) found that self-referential encoding selectively increases the prevalence of "remember" recollective experiences. Similarly, Ochsner (2000) found that highly negative and arousing photographs were more likely to be "remembered" than were neutral or positive photos (cf. Mogg et al., 1992). This finding is important because it runs counter to previous failures to find a difference in memory for positive and negative events (Bradley et al., 1992; Reisberg et al., 1988). The previous studies tested only recognition memory, a quantitative measure that may not be sensitive to the qualitative effects that emotion may have on memory.

### Neural Mechanisms Involved in Retrieval of Emotional Information

The neural structures involved in retrieving emotional memories include some that are generally involved in retrieving memories regardless of their emotional content, plus some of the same structures that are used to encode and evaluate the initial emotional significance of an experience. The former areas include the right prefrontal cortex and hippocampus. Both neuropsychological and functional neuroimaging studies of the recollection of episodic memories have shown that the right frontal lobe may play an important role in generating effortful retrieval strategies (e.g., Schacter et al., 1996a,b; Tulving et al., 1994), whereas the hippocampus may help locate stored memory traces and support recollective experience (Schacter et al., 1996a; for reviews, see Cabeza & Nyberg, 1997; Schacter & Wagner, 1999).

Unfortunately, information concerning neural structures that may be involved specifically in the retrieval of emotional memories is limited because only a very few studies have examined emotional memory in neuropsychological popula-

tions, and even fewer have studied emotional memory using functional neuroimaging. A few studies have shown that right-hemisphere but not left-hemisphere lesions selectively impair the expression of emotion (Borod et al., 1996), as well as decrease the specificity of events reported during autobiographical recall. This is consistent with evidence that the right hemisphere is preferentially involved in the perception and expression of emotional behavior more generally (Borod, 1992; Borod et al., 1996). Given the consistent finding of right frontal involvement in retrieval of episodic memories, these data suggest that there may be some linkage between the mechanisms that govern the retrieval of episodic memories and the mechanisms that imbue them with emotional flavor. It is interesting to speculate that one reason the right frontal lobe is specifically involved in episodic memory is because it may help to re-instantiate the emotional context present during encoding (Cimino, Verfaellie, Bowers, & Heilman, 1991).

A larger body of data come from animal and human studies that support involvement of the amygdala in the encoding of affectively significant information but demonstrate that the amygdala is necessary for the storage and retrieval of these associations as well. In studies of fear conditioning, for example, the amygdala appears to be the site where the critical stimulus–visceral response association is coded, so if the amygdala is lesioned after training, expression of conditioned fear is prevented (LeDoux, 1995). Studies of rats (Phillips & LeDoux, 1992), monkeys (Zola-Morgan et al., 1991), and human patients with amygdala or hippocampal lesions have suggested that, although it is the hippocampus and not the amygdala that is critical for storing the perceptual or conceptual aspects of an event, the coding of visceral reactions by the amygdala gives a boost to memory for emotional information (Bechara et al., 1995; Cahill et al., 1994, 1995; Hamann, Cahill, & Squire, 1997; Johnson, Kim, & Risse, 1985).

A handful of neuorimaging studies involving recall of emotional events have also revealed the activation of structures involved in the encoding and generation of one's initial emotional reactions to the recollected events. This may be due, at least in part, to the fact that these studies have been concerned primarily with identifying the neural structures that support the generation and experience of emotion and elicit emotion by asking subjects both to recall specific personal emotional episodes and to view emotionally evocative pictures. These studies have consistently revealed activation of medial prefrontal cortex and thalamus (George et al., 1995; Lane et al., 1997a,b), regardless of the kind of emotion being recalled. As discussed earlier, these areas are also involved in learning and modulating the expression of emotional responses (e.g., Damasio, 1994). Some areas of activation specific to the recall of individual emotions have been observed (e.g., the insula has been associated with sadness; Lane et al., 1997b), but, given the small number of studies conducted thus far, no consistent patterns have yet emerged.

Interestingly, although amygdala activation has been observed during perception of emotionally evocative stimuli (e.g., Reiman et al., 1997), greater amygdala activity has not been consistently observed when subjects also are asked to recall personal, emotional episodes. This could be because the emotion-related physiological responses that the amygdala coordinates occur only when an emotion is being experienced strongly, and subjects' recollections may not have been sufficiently vivid to elicit additional amygdala activity. Alternatively, current neuroimaging methodology may not be sensitive to small changes in amygdala activity that could be generated by recall as opposed to perception of emotional events (cf. Kosslyn & Ochsner, 1994).

### Summary

The preceding analysis suggests that retrieving a memory of an emotional experience can be biased in two ways. First, cues in the retrieval environment can combine with stored traces to produce a memory that is consciously experienced as accurate, even though its affective qualities may be more a product of current than past feelings. Second, effortful search for, and evaluation of, past emotional experiences may be shaped by current goals to justify, further, or explain current self-beliefs or to alter current moods. In some cases, because the emotions experienced during a given event were not well encoded, current feelings can serve to fill gaps in memory; the use of implicit theories of how emotions—and memory of them—change over time may guide this process. Retrieval of emotional memories may involve the same neural structures used to retrieve neutral ones, but there is as of yet little evidence to support this claim directly. It is clear, however, that retrieving past emotional experiences does require the action of the neural systems used to encode and store specifically affective information.

## CONCLUSION

This chapter has drawn from research in both social psychology and cognitive neuroscience to inform an account of the relationship between emotion and memory that converges on three important principles: (*1*) Encoding of emotional experiences is guided by both automatic and deliberative appraisal processes that capture and guide attention to, and promote elaboration of, information that is judged to be most personally significant in the context of current goals and desires. (*2*) Retrieval of past emotional experiences is often biased such that memories of them make sense when evaluated from the perspective of one's current goals and feelings about them. (*3*) Separate but interacting neural systems are involved in the quick and automatic, or more effortful and reflective, encoding and retrieval of these memories.

Hamlet said, "nothing is either good nor bad, but thinking makes it so," and this review has outlined some ways that people make use of this ability to reinterpret their past in order to serve current and future-looking goals. In doing so, we have not offered specific directives about exactly which types of details, emotions, or events will be remembered most accurately. Instead, we have attempted to highlight the individualized nature of emotional processes and the importance of understanding the reasons why an emotional event is recalled in order to understand the content of subjective reports about the past. As noted at the outset, this emphasis reflects our contention that research on emotion and memory should move beyond questions such as whether emotional memories are indelible or highly fallible or which kinds of emotion make memory better or worse (e.g., see Bradley, 1994; Christianson, 1992; Conway, 1997; Matlin & Stang, 1978). These questions often are ill-posed, seek absolute answers that cannot be obtained (Tulving, 1985), and overlook the constructive, goal-driven nature of emotional encoding and recollection (Ochsner & Schacter, in press).

In closing, it is important to note that the work reviewed in this chapter was weighted most heavily toward the social and cognitive end of the social–cognitive–neuroscience spectrum. This bias stems from the fact that researchers only now are beginning to explore the neural bases of emotion and memory, and as future work maps the structures involved in motivated remembering of emotional experiences, the scales should balance out. Our thinking suggests that this balancing act will be most successful if researchers remember that remembering begins with a goal in mind and that feelings follow after.

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