24

Memory for Emotional Events

JONATHAN W. SCHOOLER & ERIC EICH

How, if at all, do emotions influence memory for personal events? This basic question has had a longstanding and contentious history, particularly with respect to recollections of events charged with negative emotion such as sadness, shock, or terror. Discussions of the impact of strong negative emotions on memory have typically been focused within one of three research domains: eyewitness memory, flashbulb memory, and memory for traumatic experiences. Though each of these literatures has developed its own set of paradigms and idiosyncratic discussions, all three converge in their central focus on two controversial issues: (1) whether emotion enhances or diminishes the strength of memory for an event, and (2) whether special mechanisms are required to account for the effects of emotion on memory.

While both of these issues have invited strong and often sharply divided opinions in all three domains, recent analyses have become increasingly intricate. Claims regarding the effects of emotion on the strength of memory have evolved from relatively simple characterizations to more complex assessments of the distinct factors that mediate the impact of emotion. Discussions of the role of special memory mechanisms have also become more involved, shifting gradually from polarized debates to a growing appreciation of the manner in which emotion and memory interact.

Eyewitness Memory

This progression of views is well illustrated by changes in discussions of the impact of emotion on eyewitness memory. Based on the venerable Yerkes-Dodson curve, which characterizes decrements in performance on many tasks following very low or very high degrees of arousal, it was originally assumed that the strong emotion evoked by witnessing a violent act would impair memory performance (Deffenbacher, 1983). Consistent with this assumption, Clifford and Scott (1978) found that subjects who viewed a videotape depicting a violent event (a physical assault) were less accurate in answering memory items on a subsequent questionnaire than were subjects who viewed a nonviolent event (a verbal exchange between a bystander and a policeman). Relatedly, Loftus and Burns (1982) reported that exposure to a videotape that included a violent incident (a murder) impaired memory for previously seen details. Small wonder, then, that 70% of the eyewitness-memory experts surveyed by Kassin, Ellsworth, and Smith (1989) endorsed the statement that "very high

levels of stress impair the accuracy of eyewitness testimony."

Accuracy of Eyewitness Memory for Emotional Events

Though the impact of negative emotion on eyewitness memory initially seemed straightforward, the picture became more complicated with the identification of a variety of mediating factors. One essential factor, foreshadowed by Easterbrook (1959), concerns memory for central in contrast to peripheral details of the to-be-remembered or target event. Easterbrook proposed that arousal may narrow the focus of attention, leading to improved memory for central details of the target event but impaired memory for peripheral details. Evidence from several sources supports this proposition (e.g., Christianson, 1992a; Heuer & Reisberg, 1990), and the idea of attention narrowing has been invoked to account for the phenomenon of weapon focus, whereby memory is impaired in the presence of a gun or knife (Loftus, Loftus, & Messo, 1987).

Retention interval has also been shown to be a potentially important mediating factor in determining the effect of emotion on eyewitness memory. It has long been known that when retention is tested immediately, high arousal at encoding impairs paired-associates learning, but that at longer retention intervals, arousal leads to superior memory performance (Kleinsmith & Kaplan, 1963, 1964). Though this same pattern has been seen in several studies involving eyewitness memory (e.g., Christianson, 1984; Burke, Heurer, & Reisberg, 1992, experiment 2), it has not been observed in others (Burke et al., 1992, experiment 1; Christianson & Loftus, 1987). Still, a recent meta-analysis (Park, 1995) suggests that the interaction of retention interval and memory for emotionally charged eyewitness events is a bona fide effect. Thus, retention interval further adds to the increasing complexity of the conditions under which emotion helps or hinders eyewitness memory.

Mechanisms of Eyewitness Memory for Emotional Events

Does eyewitness memory for emotional events draw on mechanisms that are qualitatively different from those involved in remembering nonemotional experiences? Among researchers in the area, few questions have stirred more dissent or propagated more polarized answers. On the one hand, Yuille and Cutshall (1986) investigated witnesses' memory for an actual robbery and murder and observed generally accurate recall with relatively little decline over time. Given the disparity between these results and those revealed by laboratory studies involving staged crimes, Yuille and Cutshall contended that extreme emotional events experienced in real life lead to "qualitatively different memories than innocuous laboratory events" (p. 178). Christianson, Goodman, and Loftus (1992), on the other hand, maintained that differences between lab-related and real-life emotional events may be more apparent than real (also see Christianson, 1992b).

Recent research by Cahill and his colleagues has suggested a more nuanced conclusion concerning the existence of special memory mechanisms associated with eyewitnessed emotional events. In one study (Cahill, Prins, Weber, & McGaugh, 1994), subjects were injected with either propranolol (a beta-adrenergic blocker) or a placebo before they viewed an emotionally arousing or neutral short story. Strikingly, propranolol attenuated participants' recognition advantage for the emotional elements while having no effect on their memory for the nonemotional elements (the emotional story contained both arousing and neutral parts). These findings suggest that the normal memory advantage for the central details of emotional scenes is a result of the unique involvement of adrenergic hormones, which were blocked for participants receiving propranolol.

Additional findings suggest a special role of the amygdala in facilitating emotional memory in the eyewitness paradigm. For example, Cahill, Babinksy, Markowitsch, and McGaugh, (1995) found no enhanced memory for emotional relative to nonemotional slides for a patient with bilateral degeneration of the amygdala complex. Furthermore, using a PET imaging procedure, Cahill et al. (1996) found that the degree of activation in the amygdala during the witnessing of emotional film clips predicted recall performance two weeks later ($r = .92$). In contrast, no reliable relation was found between amygdala activation during encoding and subsequent recall for neutral film clips.

The results of Cahill and colleagues suggest that there may be some important truths to both the claims that emotional memories in-

olve special processes, and that laboratory-based memories are not qualitatively different from more emotional real-world ones. The unique role of adrenergic hormones and the amygdala in the processing of memories with emotional content implies the involvement of brain processes that may not be associated with nonemotional memories (see Markowitsch, chapter 38 in this volume, for detailed discussion of the neural systems subserving memory and emotion). When considered together with the behavioral results, reviewed earlier, indicating that (1) central details of emotional memories are remembered better than peripheral details, and (2) the time course of consolidation of emotional memories may be different, these findings suggest that emotional eyewitness memories may indeed have somewhat different properties from nonemotional memories. At the same time, however, the success of Cahill and his associates in documenting the unique role of emotion in eyewitness memories in the lab suggests that memorial processes observed in the lab may not be qualitatively different from those induced in more extreme emotional situations. More generally, this analysis suggests that the question of whether or not special mechanisms exist for emotional memories may itself be an overly simplified question, as how one frames the question determines how it answered. If the question simply asks whether emotional memories draw on special processes, then the answer appears to be yes. If, however, the question challenges the pertinence of standard memory mechanisms and laboratory procedures to understanding emotional memories, then the answer seems to be no.

Rather then asking whether emotion elicits entirely unique memory processes, the more appropriate question that arises from a consideration of the eyewitness memory literature is, how and under what conditions do special emotion-related processes (such as attentional narrowing and increased amygdala activity) *interact* with standard memory encoding, consolidation, and retrieval functions? As will be seen, a similar resolution of the special-mechanism question seems appropriate for the comparable controversies associated with flashbulb memories and memory for trauma.

Flashbulb Memories

Another important area in which discussions of the peculiar properties of emotional events have taken place has been within the context of flashbulb memories—a term coined by Brown and Kulik (1977) in their analysis of vivid memories for salient news stories, such as the assassination of President John F. Kennedy. Brown and Kulik offered two theses in their characterization of flashbulb memories: specifically, that such memories (1) are uncommonly accurate, and (2) involve unique memory processes. As the following sections will show, both of these claims have been the subjects of much controversy.

Accuracy of Flashbulb Memories

Brown and Kulik's evidence for the accuracy of flashbulb memories was rather modest. Perhaps their most compelling finding was the simple fact that almost all of their participants reported remarkably detailed recollections of their circumstances at the time of learning of Kennedy's assassination. One limitation of Brown and Kulik's evidence, however, was that they did not verify whether individuals' vivid recollections were accurate. To address this issue, a variety of subsequent studies have employed longitudinal paradigms in order to assess the consistency of flashbulb memories over time. Of course, measures of consistency do not ensure accuracy, as it is possible that individuals could be consistently inaccurate. Nevertheless, consistency is a necessary if not sufficient component of accuracy—that is, if someone is inconsistent, then at least one of his or her versions must be inaccurate. Thus, since it is generally not possible to definitively ascertain an individual's personal circumstances surrounding the learning of a major news event, consistency is often treated as a useful proxy for memory accuracy.

As an example, Pillemer (1984) tested subjects twice for their ability to recall where they were, what they were doing, and who they were with when they first learned about the attempted assassination of President Ronald Reagan. On average, about 82% of the details recollected 1 month after the assassination attempt were recalled again 7 months later—a finding that Pillemer viewed as evidence for the impressive accuracy of flashbulb memories.

However, using a similar longitudinal design, other researchers examined memory for the *Challenger* space-shuttle explosion but concluded that such memories were not especially accurate. For instance, McCloskey, Wi-

ble, and Cohen (1988) found that only 61% of the recollections were entirely consistent across two tests given 1 week and 9 months after the disaster, with 6% being more specific, 19% more general, and 8% inconsistent. Neisser and Harsch (1992) found even larger changes in recollections, with 25% of participants providing outright inconsistencies between the reports they provided 1 day after the shuttle exploded and 32–34 months later.

The above longitudinal analyses clearly illustrate that recollections of important news stories are not necessarily maintained in an immutable form. However, assessing whether there is any merit to the claim that flashbulb memories are especially accurate is problematic because it is not clear to what such memories should be compared. For example, McCloskey et al.'s findings that only 8% of participants had outright inconsistencies in their recollections could just as well be taken as evidence for the general accuracy of such recollections. A separate, but equally serious, problem is whether these events were sufficiently emotional to engender especially accurate memories in the first place. Indeed, several researchers (e.g., Bohannon, 1988; Pillemer, 1984) found reliable correlations between individuals' reported emotional response at the time of the original experience and their memory consistency across testings, suggesting that when experiences are sufficiently emotional, uniquely accurate flashbulb memories may be observed.

In an effort to finesse these problems, Conway and his colleagues (1994; see also Conway, 1995) compared the recollections of two groups of subjects—citizens of the United Kingdom versus individuals who did not live in the United Kingdom (mostly, although not entirely, U.S. citizens)—concerning the resignation of British Prime Minister Margaret Thatcher. All participants were tested at both 2-week and 11-month retention intervals. Not surprisingly, the U.K. citizens were more emotional about the experience and perceived it as more important than their North American counterparts. Nevertheless, over 90% of subjects in both groups reported recollections of sufficient detail to be classified as flashbulb memories at the 2-week interval. However, whereas 86% of the U.K. citizens retained a flashbulb memory 11 months later, only 29% of the North American residents did likewise. Moreover, the former subjects showed markedly greater consistency in their recollections between the two testing intervals than did the latter. Thus, by providing an appropriate control group, Conway et al.'s findings suggest that the quality of recollection associated with a flashbulb-type news event is indeed more detailed and accurate than that associated with a less emotionally significant news event.

Mechanisms of Flashbulb Memory

In addition to disputes over their exceptional accuracy, a second central issue in the flashbulb-memory debate has been whether such memories involve special memory mechanisms. In their original proposal, Brown and Kulik (1977) suggested that flashbulb memories entail entirely distinct memory mechanisms. Drawing on Livingston (1967), they speculated that extremely significant life experiences cause the reticular formation to discharge a *now-print* order that produces a "permanent registration not only of the significant novelty, but of all recent brain events" (Brown & Kulik, 1977, p. 76).

Critics of this special flashbulb-memory mechanism have countered that there are a variety of standard memory mechanisms—such as distinctiveness, rehearsal, and personal relevance—that could, in principle, account for the impressive though imperfect accuracy of such memories. As McCloskey et al. (1988) observed: "To the extent that we accept that ordinary memory mechanism could support reasonably good memory for experiences of learning about shocking events . . . there is no need to postulate a special flashbulb memory mechanism" (p. 180).

As in the case of eyewitness memory research, more recent findings have suggested compromise views by which flashbulb memories can be seen as the product of standard memory mechanisms that have been supplemented by the singular influences of emotion. For example, Conway et al. (1994) found that events that either did or did not eventually develop the canonical properties of flashbulb memories had distinguishing elements or features; in particular, the primary differences between the two types of recollections were the contributions of affective intensity and perceived importance. Also, recent structural-modeling analyses (Finkenauer et al., 1998) have further highlighted the importance of emotional reaction in the formation of flashbulb-type memories.

Though emotion apparently contributes to the exquisitely detailed quality of flashbulb memories, it should also be emphasized that they still share great similarity with more standard memories. For example, Anderson and Conway (1993) found that most autobiographical memories have the canonical attributes of flashbulb memories but simply not to the same degree. Moreover, the mechansims by which emotion influences flashbulb memories remain to be determined. Although emotions may alter the manner in which such memories are initially encoded, it is also possible that emotion may primarily have its impact on post encoding factors. For example the emotional salience of an experience may influence the frequency with which it is subsequently rehearsed (Neisser et al., 1998). Alternatively, or in addition, emotion elicited at the time of recall may alter the manner in which memories are retrieved (cf. Schooler, Bediksen, & Ambadar, 1997). For example, if individuals experience marked emotion during recall, such emotional intensity could in principle be conflated with sensory vividness, creating the phenomenological experience of a uniquely detailed memory.

Once again, then, a reasonable conclusion regarding the special mechanism question is both "yes" and "no". Emotional processes do seem to give flashbulb memories some unique properties—strength, vividness, and detail, in particular. However, although the precise mechanisms by which emotion imbues flashbulb memories with these properties remains to be fully determined, it seems likely that emotion related processes work in concert with—rather than apart from—standard and often reconstructive memory mechanisms. Thus, they do not ensure that flashbulb memories will be entirely veridical.

Memory for Traumatic Events

Though debates about of the impact of emotion on eyewitness and flashbulb memories have at times been heated, neither domain has ignited anything like the firestorm that has engulfed discussion of memory for trauma (see Loftus & Ketcham, 1994; Ofshe & Watters, 1994; Schacter, 1996). Nevertheless, the same two key issues that arose before apply here as well—namely, (1) assessing the impact of trauma on the accuracy of memory, and (2) determining whether trauma elicits special memory mechanisms (see Bower & Sivers, 1998, for a thorough analysis of these and related issues).

Accuracy of Traumatic Memories

Victims of trauma often lament that their traumatic experiences are associated with painfully vivid recollections, and research bears out this claim (Koss, Tromp, & Tharan, 1995). Traumatic recollections are often quite accurate, though certainly not flawless, for a variety of experiences including kidnapping (Terr, 1988), sniper attack (Pynoos & Nader, 1989), concentration camp experiences (Wagenaar & Groenweg, 1990), and emergency room visits (Howe, Courage, & Peterson, 1994). Though there has been some dispute over exactly how accurate intact memories of trauma are likely to be (Goodman, Quas, Batterman-Fauce, Riddlesberger, & Kuhn, 1994), the bigger debate in this domain has been whether traumatic memories can be completely forgotten and then later accurately recovered. This question has proved to be a divisive issue of unprecedented proportion, whose resolution has been complicated by the ethical difficulties of experimentation, the investigative constraint of corroborating clandestine activities, and the intellectual challenge of deciphering evidence that may be colored by zealotry and dogma.

As a first step in unpacking this contentious issue, it is helpful to note that the question of whether it is possible to forget and then remember traumatic memories can be usefully broken down into two separate subquestions: (1) can traumatic memories be forgotten? and (2) can traumatic memories that have been characterized as "recovered" actually be authentic?

Can Traumatic Memories Be Forgotten?

Several sorts of investigations have addressed whether traumatic memories can be forgotten, including retrospective surveys of people reporting traumatic memories, retrospective case studies of single individuals, and prospective studies of subjects identified on the basis of their exposure to trauma.

Retrospective Survey Studies. A number of studies have used retrospective questionnaires to assess individuals' traumatic memories of sexual abuse (e.g., Briere & Conte, 1993; Gold,

Hughes, & Hohnecker, 1994; Loftus, Polonsky, & Fullilove, 1994) as well as more general types of trauma (e.g. Elliott & Briere, 1995). Though reported estimates of forgetting have varied markedly, all of these studies have found significant proportions of respondents reporting that there was a time that they did not remember their trauma. Such findings are consistent with the claim that it is possible to forget traumatic experiences; nevertheless, they must be viewed with caution on two accounts. First, in none of these studies was there independent corroboration of the trauma, and as will be discussed, there are serious reasons to be uncertain about the status of recovered memories in the absence of corroboration. Second, these studies depended on respondents' ability to recall their prior memory states, and as will also be discussed, there is evidence that individuals can unknowingly exaggerate their prior degree of forgetting.

Retrospective Case Studies. A second approach to investigating the forgetting of traumatic memories is to engage in detailed review and corroboration of the claims of individuals who reportedly forgot and subsequently remembered traumas. Though such cases are useful with regard to assessing whether claims of recovered memories can involve actual abuse (see following section), they are limited with regard to documenting actual forgetting because, as with retrospective survey studies, forgetting must be estimated retrospectively. Thus, individuals may exaggerate or distort their degree of forgetting; indeed, using a case study approach, Schooler and his associates (Schooler, in press; Schooler, Ambadar, & Bendiksen, 1997; Schooler, Bendiksen, & Ambadar, 1997) provided evidence for just such distortions. Specifically, in several cases, individuals were found to have known about their traumatic experiences (i.e., they talked about it with others) at a time at which they retrospectively thought they had forgotten about it. On the basis of such errors, Schooler proposed a variant of the *knew-it-all-along effect* hindsight bias (Fischhoff, 1982) termed the *forgot-it-all-along effect*, whereby individuals underestimate rather than overestimate their prior knowledge. Accordingly, individuals may reason that "if I am this upset and agitated about this experience, then I must have previously had no idea about it." Whereas, in fact, their agitation may stem not from discovering the memory itself, but rather from generating a new interpretation of the experience or accessing previously dormant emotions about it (see next section).

Prospective Studies. A more convincing demonstration of forgetting traumatic experiences comes from prospective studies that identify individuals on the basis of their known trauma histories (alleviating concerns of potential false memories) and that test their current recollections of abuse (alleviating concerns of retrospective assessment of forgetting). In several such studies (e.g., Widom & Morris, 1997; Williams, 1994), a substantial proportion of individuals who were known to have been abused reported no recollection of the recorded abuse incident. Though these studies provide the strongest evidence to date for the forgetting of specific incidents of trauma, they have limitations. For example, studies of this sort only address memory for individual instances of abuse and do not necessarily speak to the more general claim that individuals can forget repeated episodes of abuse. In addition, many of the individuals in these studies did not recall the particular incident of abuse for which they were treated, but nevertheless recalled other sexual assaults. Some of these individuals may have confused their recollections of abuse rather than have forgotten them completely. Despite these and other concerns (see Pope & Hudson, 1995), such studies suggest that individuals can forget single traumatic incidents. However, just because some traumatic memories can be forgotten does not mean that discovered memories of purportedly long-forgotten episodes of abuse are necessarily authentic, the issue that we turn tc next.

Can Traumatic Memories That Have Been Characterized as "Recovered" Actually Be Authentic?

At the core of many discussions of recovered traumatic memories is the question of whether individuals who report having discovered long-forgotten memories of trauma are in fact recalling real events. Though such memories are typically referred to as *recovered memories*, Schooler, Ambador et al. (1997) have ad-

vocated the term *discovered memories* because it maintains agnosticity regarding whether the memory was truly forgotten or, indeed, whether the discovered event even occurred. At the same time, however, it respects the integrity of the individual's experience of having made a profound discovery (see Schooler, in press; Schooler, Ambador et al., 1997).

In recent years, an alarming number of people have reported discovering long-forgotten memories of abuse, often in the context of intense psychotherapy. The allegations sometime lead to litigation, and typically to deep family rifts. Nevertheless, there are good reasons to believe that discovered memories can be the product of therapists' over-zealous search for an explanation of their clients' symptoms. It is beyond the scope of this chapter to survey the voluminous evidence for such concern, and the reader is directed to the lucid reviews by Lindsay and Read (1994), Loftus and Ketcham (1994), Pendergrast (1996), and Schacter (1996). Suffice it to say, it is now well established that:

1. Individuals can remember, sometimes in excruciating detail, memories of events that are extraordinarily unlikely to have occurred, including alien abductions and satanic rituals (see Loftus & Ketcham, 1994; Persinger, 1992).
2. Under certain experimental conditions, subjects can be induced to recall "memories" of disturbing events that never happened, such as being lost in a shopping mall (Loftus & Pickerel, 1995) or spilling punch on the bride's parents at a wedding (Hyman, 1995).
3. A variety of psychotherapeutic techniques such as visualization (Garry, Manning, Loftus, & Sherman, 1996), repeated retrieval attempts (Hyman & Pentland, 1996), dream interpretation (Mazzoni & Loftus, 1998), and hypnosis (Putnam, 1979) can contribute to the production of false memories. These techniques correspond, with disturbing closeness, to those used by a sizable minority of clinicians in their aggressive efforts to "recover" memories of abuse (Polusny & Follette, 1996).
4. Therapists who use such techniques are the most likely to induce discovered memories (Poole, Lindsay, Memon, & Bull, 1995), and are also the most likely to have patients who ultimately retract their recollections (Nelson & Simpson, 1994).

Though the authenticity of discovered memories was originally treated as an either/or issue (e.g., Ofshe & Watters, 1994), recent discussion has become more balanced by promoting the view that while some discovered memories may be the product of therapists suggestions, others may correspond to actual incidents (see Lindsay & Briere, 1997; Schacter, 1996; Schooler, 1994). A number of cases, documented by the news media and in the courts, have provided compelling corroborative evidence of the alleged abuse. For example, Ross Cheit's discovery of a memory of being molested by a choir counselor was corroborated by the tape-recorded confession of his perpetrator (Horn, 1993), and Frank Fitzpatrick's discovered memory of being abused by a priest was supported by similar charges levied by many other alleged victims (Commonwealth of Massachusetts v. Porter, 1993). Nevertheless, and somewhat surprisingly given the importance of the issue, there have been relatively few attempts by researchers to systematically document and corroborate allegations of recovered memories. Moreover, most of the investigations of discovered memories that have considered corroboration have primarily relied on patients' claims (e.g. Andrews, 1997; Chu, J. A., Frey, L. M., Ganzel, B. L., Mathews, J. A., 1999; Feldman-Summers & Pope, 1994; Herman & Schatzow, 1987; van der Kolk & Fisler, 1995; Roe & Schwartz, 1996)—a questionable practice, given the patients' strong biases to present their discoveries as being authentic.

A few researchers have sought to find independent corroboration for the abuse associated with discovered memories (e.g., Dalenberg, 1996; Kluft, 1998; Duggal & Stroufe, 1998; Schooler, in press; Schooler et al., 1997a, 1997b; Williams, 1995). Several of these studies are somewhat difficult to interpret however, because they do not clearly differentiate the corroboration for discovered memories of additional episodes of abuse versus the fact that one was the victim of abuse. Although the recollection of an additional abuse episode is of interest, it is clearly qualitatively less remarkable than a memory discovery that leads one to the new found conclusion that he/she was the victim of sexual abuse. Importantly, however, corroborative evidence for the abuse

associated with such complete memory discovery experiences have been documented. For example, Schooler and colleagues (Schooler et al., 1997a, 1997b; Schooler, 2000) investigated a number of cases involving discovered memories of alleged abuse (ranging from inappropriate fondling to rape) of individuals who believed they had been previously unaware of their abuse status. Schooler et al. sought and found independent corroboration of the abuse by seeking other individuals who had knowledge of the abuse before the victims' discovery experience, or who had evidence of the abusive tendencies of the alleged perpetrator. In addition, these corroborated cases also provided some interesting clues concerning the nature of the discovery experience. For example, in each case, the discovery of the memory was purportedly associated with conditions that shared some significant correspondence to the original trauma (e.g., seeing a movie about abuse). In addition, individuals' accounts of their initial recollection of the abuse were characterized by great surprise and sudden marked emotion, further illustrating the aptness of referring to such experiences as memory "discoveries."

Mechanisms of Traumatic Memory

As in the domains of eyewitness and flashbulb memory, the existence of special mechanisms for traumatic memory has been a topic of marked controversy, with some authors passionately promoting special mechanisms and others arguing equally strongly against them. Perhaps the most frequently mentioned special trauma-memory mechanism is the notion of repression, whereby unconscious processes deliberately keep the traumatic recollection from entering awareness (see Brewin, 1997). Though the notion of a special repression mechanism has met with marked scientific skepticism (see Holmes, 1990; Loftus & Ketcham, 1994), many authors continue to believe that repression provides the best account of certain cases of forgetting (e.g., Erdelyi, 1990; Freyd, 1996; Ramachandran, 1995; Vaillant, 1994).

A second special mechanism, dating as far back as Pierre Janet (1889), relates to the idea that during the course a trauma, individuals detach or dissociate themselves from the ongoing experience—a process that could radically alter the way in which the experience is encoded and later retrieved (Spiegel & Cardena, 1991). Though individuals with extreme dissociative tendencies are known to manifest marked impairments of memory (Eich, 1995; Eich, Macaulay, Loewenstein, & Dihle, 1997), the contribution of dissociation to the specific case of forgetting and subsequent remembering of traumatic memories has yet to be established empirically (see Bower & Sivers, 1998).

A third special memory mechanism that also dates back to Janet is the suggestion that some traumatic memories are recollected in a purely sensory form "without any semantic representation . . . experienced primarily as fragments of the sensory component of the event" (van der Kolk & Fisler, 1995, p. 513). In addition to their fragmentary nature, sensory memories of trauma have been hypothesized to differ from more standard narrative memories in that they (1) are relatively invulnerable to change (van der Kolk & van der Hart, 1991), and (2) are not under conscious control, but instead are invoked automatically in response to certain environmental or experiential cues (see Brewin, 1989; Brewin, Dalgleish, & Joseph, 1996).

Research with animal models has provided evidence that is broadly consistent with the existence of fragmentary sensory memories for traumatic experiences. A potentially central role of the amygdala in traumatic memories is suggested by LeDoux (1992, 1995), who has demonstrated that the amygdala is critically involved in the learning of fear responses. Moreover, LeDoux has identified two pathways from the thalamus to the amygdala: one via the cortex and the other circumventing the cortex. In principle, the latter route could "generate emotional responses and memories on the basis of features and fragments rather than full-blown perceptions of objects and events" (LeDoux, 1992, p. 277). Nadel and Jacobs (1998) review additional animal studies indicating that stress may disrupt the memory consolidation functions of the hippocampus. From such evidence, the authors posit that "when stress is high enough to impair the function of the hippocampus, resulting memories will be different than those formed under more ordinary circumstances. These empirical data suggest that memories of trauma may be available as isolated fragments rather than as coherently bound episodes" (Nadel & Jacobs, 1998, p. 156). Together, these lines of research suggest that traumatic events may simultaneously foster the amygdala-based formation of highly affective sensory representations, and hinder hippocampal binding and integration

processes (for similar suggestions see Bower & Sivers, 1998; Krystal, Southwick, & Charney, 1995; Metcalfe & Jacobs, 1998; van der Kolk, 1994).

Further evidence for the sensory qualities of traumatic memories comes from recent research on posttraumatic stress disorder (see Brewin et al., 1996; Krystal et al., 1995). One study purported to compare the phenomenological quality of traumatic and nontraumatic memories (van der Kolk & Fisler, 1995). During an interview, trauma victims (who had been recruited through newspaper ads) reported that they initially remembered the traumatic event in the form of somatosensory or emotional flashback experiences, and a narrative memory began to emerge only later. In contrast, nontraumatic events were recalled as narratives without sensory components. Though consistent with the sensory account of traumatic memories, this study lacked adequate matching (e.g., age, salience, etc.) between the traumatic and nontraumatic experiences (Shobe & Kihlstrom, 1997).

Moreover, other studies comparing traumatic and nontraumatic events have produced results that seem to be at odds with the idea that the former have an especially sensory quality. For example, Tromp, Koss, Figueredo, and Tharan (1995) compared memories of a traumatic rape with pleasant and other unpleasant memories. In contrast to the predictions of the sensory hypothesis, memory of the rape was less clear, less vivid, and less detailed than were the other types of memory.

Based on the inconsistencies and unpersuasiveness of the evidence for unique traumatic-memory mechanisms, some researchers have suggested that recollections of traumatic events rely on precisely the same processes that underlie more ordinary memories. For example, noting the lack of evidence for special mechanisms and the clear applicability of standard mechanisms (e.g., lack of rehearsal) that could account for purported characteristics of traumatic recollections, Shobe and Kihlstrom (1997) concluded "nothing about the clinical evidence suggests that traumatic memories are special" (p. 74).

In their analysis of case studies of discovered memories, Schooler, Ambador et al. (1997) also noted a number of standard memory mechanisms—such as directed forgetting, encoding specificity, hypermnesia, and, as alluded to above, lack of rehearsal—that could lead to the discovery of seemingly forgotten recollections of abuse. In addition, Schooler et al. identified several other mechanisms that could create the illusion that a memory had previously been completely forgotten. For example, individuals may confuse the reinterpretation of an experience (e.g., realizing that a particular action constituted sexual abuse) with the discovery of the memory itself. Alternatively, if the memory had previously been deliberately suppressed, then individuals could misconstrue the emotional rebound that can result from thought suppression (Wegner & Gold, 1995) as having resulted from the discovery of an entirely forgotten memory of abuse.

Though many of the corroborated claims regarding traumatic memories can be accounted for on the basis of standard memory mechanisms, it seems likely that traumatic memory, like eyewitness and flashbulb memory, will be found to involve processes that are extended in particular ways owing to the unique and emotional nature of the experience. For example, in accounting for several—albeit uncorroborated—claims that memories of sexual abuse were precipitously forgotten the morning after they had occurred, Schooler (in press) speculated about the possible involvement of the forgetting processes that are unique to nocturnal experiences (e.g., those associated with the forgetting of dreams and brief awakenings). If such processes do in fact contribute to the (alleged) rapid forgetting of nocturnal abuse, they would in a sense be "special" in that they would presumably be limited to specific types of nocturnal experiences. Nevertheless, they would also be quite "ordinary" in that may be drawing on processes that occur every night (see Bonnet, 1983).

In a similar vein, even the idea that changes in the activation of normal neural systems (especially the amygdala or hippocampus) may contribute to impaired recollections of trauma can be viewed as extensions of, rather than alternatives to, standard memory processes. For example, Cahill et al.'s (1996) observation of amygdala involvement in the encoding and retrieval of emotional but less than traumatic events demonstrates that while the amygdala may be especially involved in the recollection of trauma, severe trauma is not a prerequisite for amygdala involvement.

By the same token, the suggestion that trauma may reduce the ability of the hippocampus to consolidate the components of emotional memories into a single, coherent narrative does not require the *addition* of any

special memory processes. To the contrary, it actually suggests the attenuation of standard memory processes—for example, the involvement of the hippocampus in the integration or binding of diverse perceptual experiences into discrete episodes or events (McClelland, McNaughton, & O'Reilly, 1995). In the absence of such integration, traumatic memories would presumably be degraded and—contrary to claims of the unique veridicality of sensory trauma memories—especially prone to distortion and misattribution (McClelland, 1995). At the same time, lacking cohesion and integration with associated memory representations, such memories could be especially difficult to retrieve deliberately, leaving them at the mercy of situational retrieval cues (Krystal et al., 1995; van der Kolk, 1994). Such a state of affairs could resolve one of the common paradoxes of characterizations of traumatic memories—why they are sometimes retrieved excessively and other times not recalled at all. If traumatic recollections are primarily evoked by external or internal cues, then when such cues are present, recollections of trauma may be inescapable; however, when the appropriate cues are absent, so too may be the recollections.

Summary

Though researchers have, in the past, attempted to describe the impact of emotion on memory in straightforward (albeit often contradictory) ways, current findings suggest that this relation involves complex interactions among multiple variables that can lead to markedly different outcomes. Eyewitness memory for emotional events can be more or less accurate than that of nonemotional events, depending in part on both the centrality of the events' details and the amount of time that has passed since their encoding. Analogously, flashbulb memories for salient news events can be accurate or inaccurate, depending on their significance, the emotion they elicit, and ultimately to what they are being compared. And even traumatic memories can be remembered with excessive vividness or not recalled at all, depending (perhaps) on both the pattern of cognitive/neural activity at the time of encoding and the nature of the environmental and experiential cues that are encountered later.

With regard to the question of special mechanisms, although discussions have also often tended toward categorical yet contradictory positions, recent evidence suggests a more nuanced conclusion. On the one hand, emotion seems to have rather specific effects on brain activity, memory performance, and subjective experience. On the other hand, these processes are orchestrated with, and in many cases critically depend on, nonemotional processes.

Ultimately, the question of whether special memory mechanisms exist for emotional events may itself be a red herring, as its alternative presupposes a single set of neurocognitive processes that apply to all recollections. However, recent research implies that memory involves a remarkable amalgamation of distinct processes that are differentially elicited as a function of the specific circumstances surrounding event encoding, consolidation, and retrieval. Since emotional memories invoke particular subsets of these processes, they may be thought of as "special"—but perhaps no more so than the equally distinct subsets that are apt to be associated with other types of memories.

Acknowledgment Preparation of this chapter was aided by the cogent comments and advice offered by Sherry Slatten, Katie Shobe, and Tonya Schooler, and by a grant (R01-MH59636) to the second author from the National Institute of Mental Health.

References

Anderson, S. J., & Conway, M. A. (1993). Investigating the structure of autobiographical memories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*, 1178–1196.

Andrews, B. (1997). Forms of memory recovery among adults in therapy. In J. D. Read & D. S. Lindsay (Eds.), *Recollections of trauma: Scientific research and clinical practice* (pp. 455–467). New York: Plenum.

Bohannon, J. N. (1988). Flashbulb memories of the Space Shuttle disaster: A tale of two theories. *Cognition, 29*, 179–196.

Bonnet, M. H. (1983). Memory for events occurring during arousal from sleep. *Psychophysiology, 20*, 81–87.

Bower, G. H., & Sivers, H. (1998). Cognitive impact of traumatic events. *Development and Psychopathology, 10*, 625–653.

Brewin, C. R. (1989). Cognitive change processes in psychotherapy. *Psychological Review, 96*, 379–394.

Brewin, C. R. (1997). Clinical and experimental approaches to understanding repression. In J. D. Read & D. S. Lindsay (Eds.), *Recollections of trauma: Scientific research and clinical practice* (pp. 145–163). New York: Plenum.

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review, 103*, 670–686.

Briere, J., & Conte, J. (1993). Self-reported amnesia for abuse in adults molested as children. *Journal of Traumatic Stress, 6*, 21–31.

Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition, 5*, 73–99.

Burke, A., Heuer, F., & Reisberg, D. (1992). Remembering emotional events. *Memory & Cognition, 20*, 277–290.

Cahill, L., Babinsky, R., Markowitsch, H., & McGaugh, J. L. (1995). The amygdala and emotional memory. *Nature, 377*, 295–296.

Cahill, L., Haier, R., Fallon, J., Alkire, M., Tang, C., Keator, D., Wu, J., & McGaugh, J. L. (1996). Amygdala activity at encoding correlated with long-term, free recall of emotional information. *Proceedings of the National Academy of Sciences, 93*, 8016–8021.

Cahill, L., Prins, B., Weber, M., & McGaugh, J. L. (1994). Beta-adrenergic activation and memory for emotional events. *Nature, 371*, 702–704.

Christianson, S.-A. (1984). The relationship between induced emotional arousal and amnesia. *Scandinavian Journal of Psychology, 25*, 147–160.

Christianson, S.-A. (1992a). Remembering emotional events: Potential mechanisms. In S.-A. Christianson (Ed.), *The handbook of emotion and memory: Research and theory* (pp. 307–340). Hillsdale, NJ: Erlbaum.

Christianson, S.-A. (1992b). Emotional stress and eyewitness memory: A critical review. *Psychological Bulletin, 112*, 284–309.

Christianson, S.-A., Goodman, J., & Loftus, E. F. (1992). Eyewitness memory for stressful events: Methodological quandaries and ethical dilemmas. In S.-A. Christianson (Ed.), *The handbook of emotion and memory: Research and theory* (pp. 217–241). Hillsdale, NJ: Erlbaum.

Christianson, S.-A., & Loftus, E. F. (1987). Memory for traumatic events. *Applied Cognitive Psychology, 1*, 225–239.

Chu, J. A., Frey, L. M., Ganzel, B. L., & Matthews, J. A. (1999). Memories of Childhood Abuse; Dissociation, amnesia, and corroboration. *American Journal of Psychiatry, 156*, 749–755.

Clifford, B. R., & Scott, J. (1978). Individual and situational factors in eyewitness testimony. *Journal of Applied Psychology, 63*, 352–359.

Commonwealth of Massachusetts v. Porter. Taunton Superior Court. (1993).

Conway, M. A. (1995). *Flashbulb memories.* Hillsdale, NJ: Erlbaum.

Conway, M. A., Anderson, S. J., Larsen, S. F., Donnelly, C. M., McDaniel, M. A., McClelland, A. G. R., Rawles, R. E., & Logie, R. H. (1994). The formation of flashbulb memories. *Memory & Cognition, 22*, 326–343.

Dalenberg, C. J. (1996). Accuracy, timing and circumstances of disclosure in therapy of recovered and continuous memories of abuse. *Journal of Psychiatry and Law, 24*(2), 229–275.

Deffenbacher, K. A. (1983). The influence of arousal on reliability of testimony. In S. M. A. Lloyd-Bostock & B. R. Clifford (Eds.), *Evaluating witness evidence* (pp. 235–251). Chichester: John Wiley.

Duggal, S., & Sroufe, A. L. (1998). Recovered memory of childhood sexual trauma: A documented case from a longitudinal study. *Journal of Traumatic Stress, 2*, 301–320.

Easterbrook, J. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review, 66*, 183–201.

Eich, E. (1995). Searching for mood dependent memory. *Psychological Science, 6*, 67–75.

Eich, E., Macaulay, D., Loewenstein, R. J., & Dihle, P. H. (1997). Memory, amnesia, and dissociative identity disorder. *Psychological Science, 8*, 417–422.

Elliott, D. M., & Briere, J. (1995). Posttraumatic stress associated with delayed recall of sexual abuse: A general population study. *Journal of Traumatic Stress, 8*, 629–647.

Erdelyi, M. H. (1990). Repression, reconstruction, and defense: History and integration of the psychoanalytic and experimental frameworks. In J. L. Singer (Ed.), *Repression and dissociation: Implications for personality theory, psychotherapy, and health* (pp. 1–31). Chicago: University of Chicago Press.

Feldman-Summers, S., & Pope, K. S. (1994). The experience of 'forgetting' childhood abuse: A national survey of psychologists. *Journal of Consulting and Clinical Psychology, 62*, 636–639.

Finkenauer, C., Luminet, O., Gisle, L., El-Ahmadi, A., Van der Linden, M., & Philippot, P. (1998). Flashbulb memories and the underlying mechanisms of their formation: Toward an emotional-integrative model. *Memory & Cognition, 26*, 516–531.

Fischhoff, B. (1982). For those condemned to study the past: Heuristics and biases in hindsight. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 335–351). New York: Cambridge University Press.

Freyd, J. (1996). *Betrayal trauma: The logic of forgetting childhood abuse.* Cambridge: Harvard University Press.

Garry, M., Manning, C., Loftus, E. F., & Sherman, S. J. (1996). Imagination inflation: Imagining a childhood event inflates confidence that it occurred. *Psychonomic Bulletin and Review, 3*, 208–214.

Gold, S. N., Hughes, D., & Hohnecker, L. (1994). Degrees of repression of sexual abuse memories. *American Psychologist, 49*, 441–442.

Goodman, G. S., Quas, J. A., Batterman-Faunce, J. M., Riddlesberger, M. M., & Kuhn, J. (1994). Predictors of accurate and inaccurate memories of traumatic events experienced in childhood. *Consciousness and Cognition, 3*, 269–294.

Herman, J. L., & Schatzow, E. (1987). Recovery and verification of memories of childhood sexual trauma. *Psychoanalytic Psychology, 4*, 1–14.

Heuer, F., & Reisberg, D. (1990). Vivid memories of emotional events: The accuracy of remembered minutiae. *Memory & Cognition, 18*, 496–506.

Holmes, D. (1990). The evidence for repression: An examination of sixty years of research. In J. Singer (Ed.), *Repression and dissociation: Implications for personality theory, psychotherapy, and health* (pp. 85–102). Chicago: University of Chicago Press.

Horn, M. (1993). Memories lost and found. *US News and World Report*, November 29, 1993, 52–63.

Howe, M. L., Courage, M. L., & Peterson, C. (1994). How can I remember when "I" wasn't there: Long-term retention of traumatic experiences and emergence of the cognitive self. *Consciousness and Cognition, 3*, 327–355.

Hyman, I. E. (1995). False memories of childhood experiences. *Applied Cognitive Psychology, 9*, 181–197.

Hyman, I. E., & Pentland, J. (1996). The role of mental imagery in the creation of false childhood memories. *Journal of Memory and Language, 35*, 101–117.

Janet, P. (1889). L'automatisme continue. *Revue Generale des Sciences, 4*, 167–179

Kassin, S. M., Ellsworth, P., & Smith, V. L. (1989). The "general acceptance" of psychological research on eyewitness testimony. *American Psychologist, 44*, 1089–1098.

Kleinsmith, L. J., & Kaplan, S. (1963). Paired-associate learning as a function of arousal and interpolated interval. *Journal of Experimental Psychology, 65*, 190–193.

Kleinsmith, L. J., & Kaplan, S. (1964). Interaction of arousal and recall interval in nonsense syllable paired-associate learning. *Journal of Experimental Psychology, 67*, 124–126.

Kluft, K. P. (1998). Reflections on the traumatic memories of dissociative identity disorder patients. In S. J. Lynn & K. M. McConkey (Eds.), *Truth in Memory* (pp. 304–322). New York: Guilford Press.

Koss, M. P., Tromp, S., & Tharan, M. (1995). Traumatic memories: Empirical foundations, clinical and forensic implications. *Clinical Psychology: Research and Practice, 2*, 111–132.

Krystal, J. H., Southwick, S. M., & Charney, D. (1995). Post traumatic stress disorder: Psychobiological mechanisms of traumatic remembrance. In D. L. Schacter (Ed.), *Memory distortions* (pp. 150–172). Cambridge, MA: Harvard University Press.

LeDoux, J. E. (1992). Emotion as memory: Anatomical systems underlying indelible neural traces. In S.-A. Christianson (Ed.), *The handbook of emotion and memory: Research and theory* (pp. 269–288). Hillsdale, NJ: Erlbaum.

LeDoux, J. E. (1995). Emotion: Clues from the brain. *Annual Review of Psychology, 46*, 209–235.

Lindsay, D. S., & Briere, J. (1997). The controversy regarding recovered memories of childhood sexual abuse: Pitfalls, bridges, and future directions. *Journal of Interpersonal Violence, 12*, 631–647.

Lindsay, D. S., & Read, J. D. (1994). Psychotherapy and memories of child sexual abuse: A cognitive perspective. *Applied Cognitive Psychology, 8*, 281–338.

Livingston, R. B. (1967). Brain circuitry relating to complex behavior. In G. C. Quarton, T. Melnechuck, & F. O. Schmitt (Eds.), *The neurosciences: A study program* (pp. 499–514). New York: Rockefeller University Press.

Loftus, E. F., & Burns, T. E. (1982). Mental shock can produce retrograde amnesia. *Memory & Cognition, 10*, 318–323.

Loftus, E. F., & Ketcham, K. (1994). *The myth of repressed memory: False memories and allegations of sexual abuse.* New York: St. Martin's Press.

Loftus, E. F., Loftus, G. R., & Messo, J. (1987). Some facts about "weapon focus." *Law and Human Behavior, 11*, 55–62.

Loftus, E. F., & Pickerel, J. (1995). The formation of false memories. *Psychiatric Annals, 25*, 720–724.

Loftus, E. F., Polonsky, S., & Fullilove, M. T. (1994). Memories of childhood sexual abuse: Remembering and repressing. *Psychology of Women Quarterly, 18*, 67–84.

Mazzoni, G., & Loftus, E. F. (1998). Dream interpretation can change beliefs about the past. *Psychotherapy, 35*, 177–187.

McClelland, J. (1995). Constructive memory and memory distortions: A parallel-distributed processing approach. In D. L. Schacter (Ed.), *Memory distortions* (pp. 69–90). Cambridge, MA: Harvard University Press.

McClelland, J. L., McNaughton, B. L., & O'Reilly, R. C. (1995). Why there are complimentary learning systems in the hippocampus and neocortex: Insights from the successes and failures of connectionist models of learning and memory. *Psychological Review, 3*, 419–457.

McCloskey, M., Wible, C. G., & Cohen, N. J. (1988). Is there a special flashbulb-memory mechanism? *Journal of Experimental Psychology: General, 117*, 171–181.

Metcalfe, J., & Jacobs, W. J. (1998). Emotional memory: The effects of stress on "cool" and "hot" memory systems. In D. Medin (Ed.), *The psychology of learning and motivation, Volume 38* (pp. 187–222). San Diego: Academic Press.

Nadel, L., & Jacobs, W. J. (1998). Traumatic memory is special. *Current Directions in Psychological Science, 7*, 154–157.

Neisser, U., & Harsch, N. (1992). Phantom flashbulbs: False recollections of hearing the news about Challenger. In E. Winograd & U. Neisser (Eds.), *Affect and accuracy in recall: Studies of "flashbulb memories"* (pp. 9–31). Cambridge: Cambridge University Press.

Neisser, U., Winograd, E., Bergman, E. T., Schreiber, C. A., Palmer, S. E., & Weldon, M. S. (1996). Remembering the earthquake: Direct experience vs hearing the news. *Memory, 4*, 337–357.

Nelson, E. L., & Simpson, P. (1994). First glimpse: An initial examination of subjects who have rejected their recovered visualizations as false memories. *Issues in Child Abuse, 6*, 123–133.

Ofshe, R. J., & Watters, E. (1994). *Making monsters: False memories, psychotherapy, and sexual hysteria.* New York: Charles Schribner's Sons.

Park, J. (1995). *The effect of arousal and retention delay on memory: A meta-analysis.* Unpublished manuscript, Yale University.

Pendergrast, M. (1996). *Victims of memory: Sex abuse accusations and shattered lives* (2nd ed.). Hinesburg, VT: Upper Access.

Persinger, M. A. (1992). Neuropsychological profiles of adults who report "Sudden remembering" of early childhood memories: Implications for claims of sex abuse. *Perceptual and Motor Skills, 75*, 259–266.

Pillemer, D. B. (1984). Flashbulb memories of the assassination attempt on President Reagan. *Cognition, 16*, 63–80.

Polusny, M. A., & Follette, V. M. (1996). Remembering childhood sexual abuse: A national survey of psychologist's clinical practices, beliefs, and personal experiences. *Professional Psychology Research and Practice, 27*, 41–52.

Poole, D. A., Lindsay, D. S., Memon, A., & Bull, R. (1995). Psychotherapy and the recovery of memories of childhood sexual abuse: U.S. and British practitioners beliefs, practices, and experiences. *Journal of Consulting and Clinical Psychology, 63*, 426–437.

Pope, H. G., & Hudson, J. I. (1995). Can memories of childhood sexual abuse be repressed? *Psychological Medicine, 25*, 121–126.

Putnam, W. H. (1979). Hypnosis and distortions in eyewitness memory. *International Journal of Clinical and Experimental Hypnosis, 28*, 426–437.

Pynoos, R. S., & Nader, K. (1989). Children's memory and proximity to violence. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*, 236–241.

Ramachandran, V. S. (1995). Anosognosia in parietal lobe syndrome. *Consciousness and Cognition, 4*, 22–51.

Roe, C. M., & Schwartz, M. F. (1996). Characteristics of previously forgotten memories of sexual abuse: A descriptive study. *Journal of Psychiatry and Law, 24*(2), 189–206.

Schacter, D. L. (1996). *Searching for memory.* New York: Basic Books.

Schooler, J. W. (1994). Seeking the core: The issues and evidence surrounding recov-

ered accounts of sexual trauma. *Consciousness and Cognition, 3*, 452–469.

Schooler, J. W. (2000). Discovered memories and the "delayed discovery doctrine": A cognitive case based analysis. In S. Taub (Ed.), *Recovered memories of child sexual abuse: Psychological, legal, and social perspectives on a twentieth century controversy* (pp. 121–141). Springfield, IL: Charles C. Thomas.

Schooler, J. W., Ambadar, Z., & Bendiksen, M. A. (1997). A cognitive corroborative case study approach for investigating discovered memories of sexual abuse. In J. D. Read & D. S. Lindsay (Eds.), *Recollections of trauma: Scientific research and clinical practice* (pp. 379–388). New York: Plenum.

Schooler, J. W., Bendiksen, M. A., & Ambadar, Z. (1997). Taking the middle line: Can we accommodate both fabricated and recovered memories of sexual abuse? In M. Conway (Ed.), *False and recovered memories* (pp. 251–292). Oxford: Oxford University Press.

Shobe, K. K., & Kihlstrom, J. F. (1997). Is traumatic memory special? *Current Directions in Psychological Science, 6*, 70–74.

Spiegel, D., & Cardena, E. (1991). Disintegrated experience: The dissociative disorders revisited. *Journal of Abnormal Psychology, 100*, 366–378.

Terr, L. C. (1988). What happens to early memories of trauma? A study of twenty children under age five at the time of documented traumatic events. *Journal of the American Academy of Psychiatry, 27*, 96–194.

Tromp, A., Koss, M., Figueredo, A., & Tharan, M. (1995). Are rape memories different? A comparison of rape, other unpleasant, and pleasant memories among employed women. *Journal of Traumatic Stress, 8*, 607–627.

Vaillant, G. (1992). *Ego mechanisms of defense: A guide for clinicians and researchers.* Washington, DC: American Psychiatric Press.

van der Kolk, B. A. (1994). The body keeps score: Memory and the evolving psychobiology of post traumatic stress. *Harvard Review of Psychiatry, 1*, 253–265.

van der Kolk, B. A., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: Overview and exploratory study. *Journal of Traumatic Stress, 8*, 505–525.

van der Kolk, B. A., & van der Hart, O. (1991). The intrusive past: The flexibility of memory and the engraving of trauma. *American Imago, 48*, 425–454.

Wagenaar, W. A., & Groeneweg, J. (1990). The memory of concentration camp survivors. *Applied Cognitive Psychology, 4*, 77–87.

Wegner, D. M., & Gold, D. B. (1995). Fanning old flames: Emotional and cognitive effects of suppressing thoughts of a past relationship. *Journal of Personality and Social Psychology, 68*, 782–792.

Widom, C. S., & Morris, S. (1997). Accuracy of adult recollections of childhood victimization: Part II. Childhood sexual abuse. *Psychological Assessment, 9*, 34–46.

Williams, L. M. (1994). Recall of childhood trauma: A prospective study of women's memories of child sexual abuse. *Journal of Consulting and Clinical Psychology, 62*, 1167–1176.

Williams, L. M. (1995). Recovered memories of abuse in women with documented child sexual victimization histories. *Journal of Traumatic Stress, 8*, 649–673.

Yuille, J. C., & Cutshall, J. L. (1986). A case study of eyewitness memory of a crime. *Journal of Applied Psychology, 71*, 291–301.