

Comparing Recollective Experience in True and False Autobiographical Memories

Christopher M. Heaps
Linfield College

Michael Nash
University of Tennessee, Knoxville

This study investigated whether true autobiographical memories are qualitatively distinct from false autobiographical memories using a variation of the interview method originally reported by E. F. Loftus and J. Pickrell (1995). Participants recalled events provided by parents on 3 separate occasions and were asked to imagine true and false unremembered events. True memories were rated by both participants and observers as more rich in recollective experience and were rated by participants as more important, more emotionally intense, as having clearer imagery, and as less typical than false memories. Rehearsal frequency was used as a covariate, eliminating these effects. Imagery in true memories was most often viewed from the field perspective, whereas imagery in false memories was most often viewed from the observer perspective. More information was communicated in true memories, and true memories contained more information concerning the consequences of described events. Results suggest repeated remembering can make false memories more rich in recollective experience and more like true memories. Differences between true and false memories suggest some potentially distinct characteristics of false memories and provide insight into the process of false memory creation.

False memories can be defined as false beliefs about the past that are experienced as memories (Lampinen, Neuschatz, & Payne, 1998). False memories are accompanied by what is often referred to as *remember experiences* (see Gardiner & Java, 1993; Rajaram & Roediger, 1997). Remember experiences constitute episodic retrieval and are characterized by *recollective experience*, the awareness of aspects of the encoding event such as images, thoughts, feelings, and knowledge specific to the event; a general sense of “pastness” (Tulving, 1985). Other beliefs about the past, whether true or false, may lack such accompanying awareness. Tulving’s call for increased attention to the experience of remembering and recent demonstrations of false memories in a variety of contexts have led to the investigation of more specific questions concerning how false memories are remembered. Are there ways, for example, to distinguish between memories of authentic experiences and representations of fictitious events that have become memories (American Psychiatric Association, 1994; Conway, Collins, Gathercole, & Anderson, 1996; Johnson, Foley, Suengas, & Raye, 1988; Johnson et al., 1997; Kihlstrom, 1994; Pezdek, Finger, & Hodge, 1997; Steller & Koehnken, 1989)? Researchers have begun to evaluate recollective experience in false memories in the

hopes that potential differences between true memories¹ and false memories may provide insight into how false memories are constructed and whether such memory errors can be prevented. Indeed, a more complete understanding of the nature of false memories has implications for the theoretical conceptualization of memory and the process of remembering as well as for applied situations in which the veridicality of memories can be at issue.

Autobiographical memories represent a particularly useful set of experiences for exploring the possibility that there are characteristically distinct attributes of false memories. Simply put, memories for the experiences of one’s own life are often rich and complex representations (Barclay & Smith, 1992; Barsalou, 1988; Brewer, 1988; Conway & Rubin, 1993). Autobiographical memories are generally acknowledged as a separate type of episodic memory by virtue of the role of the self and the priority of one’s own experience in memory. Available evidence and current thinking concerning autobiographical memory (Barclay, 1996; Barclay & DeCooke, 1988; Barclay & Subramaniam, 1987) posit a strong relationship between how autobiographical experiences are remembered (and indeed which experiences are remembered) and the process of constructing personally meaningful representations of one’s past (Barsalou, 1988; Bruner, 1986; Csikszentmihalkyi & Beattie, 1979; James, 1890; Neisser, 1988a). In terms of recollective experience, autobiographical memories are often experienced as partially remembered and partially only known about (Conway, 1997). Researchers have demonstrated that unremembered portions of autobiographical memories are often reported as remembered after repeated retelling (Bartlett, 1932; Conway, 1992; Neis-

Christopher M. Heaps, Department of Psychology, Linfield College; Michael Nash, Department of Psychology, University of Tennessee, Knoxville.

We thank Andrew Felts, Kristen Kaserman, Rose LeTard, Elizabeth McSwiney, and Brenda Nelson for their assistance with data analysis. We also thank Stephen Handel, Lawrence James, Michael G. Johnson, and Howard Pollio for their thoughtful reviews and assistance with the preparation of this article.

Correspondence concerning this article should be addressed to Christopher M. Heaps, Department of Psychology, Linfield College, 900 Southeast Baker Street, McMinnville, Oregon 97128. Electronic mail may be sent to cheaps@linfield.edu.

¹ It should be noted that the term *true memory* does not denote a memorial representation’s veridicality, only the existence of corresponding previous experience.

ser, 1988b; Neisser & Fivush, 1994), and memory researchers have long recognized such memories as salient examples of the fragility of memory (Baddeley, 1989; Neisser, 1982; Neisser & Harsch, 1992). Thus, recollective experience in autobiographical memories may be particularly susceptible to reconstructive effects, and these effects may result in recollective experience distinct from that generally accompanying true autobiographical memories. At present, the precise ways in which such recollective experience may differ are unknown, but some hypotheses have been offered. These hypotheses are explored in detail below.

Investigation of false autobiographical memories has begun with techniques often used in clinical and forensic settings that are designed to produce memory recovery (Kassin, 1997; Ofshe & Watters, 1994; see also Maltz, 1991). One such technique is the imagination of unremembered or unclear events. Participants are encouraged to use prior knowledge to create novel images and narratives of unremembered events. In such cases, imagination may involve the recruitment of both general and event-specific information to construct or partially reconstruct a representation for an event (Bartlett, 1932; Conway, 1992, 1997). Participants are often encouraged to believe and report what is imagined, and the distinction between constructed and remembered representations may become blurred. Subsequent queries regarding events under consideration will result in the retrieval of previous constructions, and source attribution errors may result (see Johnson, Hashtroudi, & Lindsay, 1993). With repeated imagination or retrieval, memorial information becomes progressively more familiar, more complete, and source discrimination becomes more difficult.

Laboratory investigations of imagining autobiographical events in this way have shown that even when participants initially judge an event as very unlikely to have occurred, imagination can serve to raise subsequent likelihood judgments (Garry, Manning, Loftus, & Sherman, 1996; Heaps & Nash, 1999). Moreover, further imaginings appear to have cumulative effects on judged likelihood (Goff & Roediger, 1998). When participants initially report knowing (i.e., believing) that an event had occurred in the absence of remembering the event, imagination can produce reports of recollective experience (Hyman, Gilstrap, Decker, & Wilkinson, 1997; Hyman & Pentland, 1996). Given the ubiquitous nature of mental imagery in autobiographical memory, this process may be similar to the way in which memories for true autobiographical events are reconstructed (Brewer, 1986; Conway, 1988, 1997; Kosslyn, 1990). Explicit instructions to participants to "imagine" or use mental imagery in considering an unremembered event may only serve to increase the incidence with which participants use such imagery-based processes and thus heighten the chance the participant will report "remembering" an event.

Perhaps the best known laboratory examples of recollective experience reported for false autobiographical events come from a handful of cases reported by Loftus and colleagues (Loftus, Coan, & Pickrell, 1996; Loftus & Pickrell, 1995) in which participants of varying ages were given brief descriptions of past events supposedly provided by a parent or other relative. Such descriptions actually had been provided for many of the events. However, one or more of the events was an event known not to have happened and created by experimenters. The participant's job was to provide his or her recollections of each event under the pretense that each event was in fact true. This work produced the often-cited case of Chris, a 14-year-old boy who was asked about being lost in the

small years earlier. This false event, later remembered by Chris, illustrates the etiology of a false memory. Although Chris initially reported not remembering the event, days later he acknowledged remembering and provided a fairly detailed account of the process and of his rescuer. Similar procedures have been used with adult participants to produce false memories of spending a night in a hospital for a high fever and an ear infection, of having a birthday party with pizza and a clown, of spilling a punch bowl on the parents of the bride during a wedding, and of having to evacuate a grocery store when the overhead sprinkler system erroneously activated (Hyman & Billings, 1998; Hyman, Husband, & Billings, 1995; Hyman & Pentland, 1996).

Although systematically measuring various aspects of recollective experience has not been a central goal of many studies concerning false autobiographical memories (but for exceptions see Conway et al., 1996; Pezdek et al., 1997), the evidence available to date suggests that there may indeed be measurable characteristic differences between recollective experience in true and false autobiographical memories. Hyman and Pentland (1996) used an interview method similar to that previously discussed with 65 participants. At the end of a series of three interviews, participants were asked to rate the quality of the mental imagery in their memories. Participants who created false memories seemed to rate the images in those memories as less clear than in true memories, although we did not make this comparison directly. Thus, it would appear that the true and false memories reported by participants in the Hyman and Pentland study were characteristically distinct on the basis of sensory or perceptual characteristics.² Loftus and Pickrell (1995) also reported that false autobiographical memories created in this way were recounted using fewer words and were rated as less clear than were true autobiographical memories. Similar results have been obtained for false memories (compared with true memories) created through other methods as well (Conway et al., 1996; Dewhurst & Conway, 1994; Johnson et al., 1988; Mather, Henkel, & Johnson, 1997). For example, Conway et al. (1996) asked two diarists to record true autobiographical events daily over a period of 5 months. Diarists were also asked to intermittently include plausible but false events in their diaries. In recognition testing 7 months later, the diarists were asked to categorize their memory as accompanied by either recollective experience, by a feeling of familiarity, or by no distinct state of awareness. True memories for events were frequently accompanied by recollective experience, whereas false memories for events were equally likely to be categorized as accompanied by recollective experience as by a feeling of familiarity or by no distinct state of awareness. Results such as these have led Conway (1997) to assert that

[When memories] are difficult to construct, poorly integrated with the autobiographical memory knowledge base, associated with weak or vague images, and which lead to feelings of familiarity rather than recollective experience, then the incidence of false memories (memories of experiences which never occurred) increases. (p. 184)

² Despite any potential characteristic distinctions between true and false memories, classifying individual memories based solely on recollective experience remains an impossibility.

Despite such reports of characteristic differences, authors and researchers have asserted that recollective experience in false memories can be as rich as, and often indistinguishable from, that found in true memories (Kassin, 1997; Loftus, 1993; Reisberg, 1997). Moreover, as Conway et al. (1996) suggested, this may be especially likely to occur in forensic situations involving "memory work" techniques, such as the interview and imagination procedures previously discussed (Lindsay & Read, 1994). These assertions regarding the potentially rich nature of recollective experience in false autobiographical memories have drawn apparently strong support from observations in selected forensic cases, as well as from anecdotal examples supplied by well-known researchers. If false autobiographical experiences can indeed be remembered with equal detail and confidence as true autobiographical experiences, the prevalence of such false memories has yet to be determined.

Moreover, the view that false memories can be remembered as well as true memories should be distinguished from the proposition that recollective experience in false memories is ipso facto phenomenologically indistinguishable from that found in true memories. The latter view is put forth by the source-monitoring model (Johnson et al., 1988; Johnson et al., 1993; Johnson & Raye, 1981), which proposes that internally generated (i.e., imagined) representations become false memories as a result of being mistaken for authentic memorial representations. The decision concerning whether a representation is from an internal or external source (i.e., experience) is termed a *source-monitoring attribution* and is made on the basis of the characteristics of recollective experience. According to the model, source-monitoring attributions are usually accurate because characteristic differences in recollective experience exist between internally and externally generated representations. Nevertheless, source attribution errors occur—and hence false memories result—when recollective experience from an internally generated representation is uncharacteristically like that typically found accompanying representations from external sources (i.e., authentic memories). Thus, imagined events falsely remembered as true autobiographical memories are compelling representations; they contain clear and distinct imagery, are well situated in time and place, and did not require great cognitive effort for their creation (Johnson et al., 1988). In other words, such representations are indistinguishable from the actual memories. Other models of false memory creation have made similar assertions, including the perception–reperception model (Payne & Blackwell, 1998) and the so-called fuzzy-trace theory (Brainerd & Mojardin, 1997; Brainerd & Reyna, 1995). Such accounts appear to fit well with findings concerning recollective experience in general episodic memories (Holmes, Waters, & Rajaram, 1998; Mather et al., 1997), but their utility with regard to autobiographical memory requires evaluation.

The picture concerning the nature of recollective experience in false autobiographical memories is far from complete. There is a general lack of consensus concerning the characteristic quality of recollective experience in false autobiographical memories and as yet a small empirical base from which conclusions may be drawn. Given the implications for the study of memory as well as for evaluation of particular memories in applied settings, the value of an appropriate characterization of the quality of recollective experience in false autobiographical memories cannot be understated. Further, the findings from existing research and theoretical ac-

counts, as well as abundant anecdotal evidence, lay out the directional nature of hypotheses regarding the qualities of recollective experience in true versus false autobiographical memories. Is remembering an autobiographical experience that never occurred generally like remembering one that did occur, or are there measurable and characteristic differences in the two experiences?

The purpose of the present investigation is to evaluate the quality of recollective experience in false autobiographical memories in as complete a way as possible. As with prior investigations of false autobiographical memories (Hyman & Pentland, 1996; Loftus & Pickrell, 1995), participants in the present study engaged in repeated recall of childhood autobiographical experiences. Participants were told that the events presented by experimenters were provided by their parent(s), whom they had previously given permission for experimenters to contact. In fact, only some events presented to participants were recalled by parents; other events were reported by parents as not having happened. Participants recalled events presented by experimenters three times over a period of 3 weeks. When participants reported not remembering an event, they were asked to imagine the event. Following the final recall session, participants rated several aspects of their memories. Ratings of recalled information were also completed by independent observers, and recalled information was also subjected to content analysis.

Method

Participants

Sixty-three undergraduate students at the University of Tennessee, Knoxville, served as voluntary participants, receiving extra course credit in exchange for their participation. Twenty-three participants (37%) met the criteria for inclusion in the analysis (see below) by creating at least one false memory and reporting at least one true memory.

Materials

Life Events Inventory (LEI). The LEI (Garry et al., 1996) consists of 42 childhood events (e.g., Met someone famous; Went on a hot air balloon ride with classmates; Garry et al., 1996; Heaps & Nash, 1999). The inventory was used by experimenters when interviewing parents to prompt general recall.

Memory Test. The Memory Test consisted of six pairs of autobiographical events. For an example, see Figure 1.

Participant ratings of recollective experience. Participants rated several aspects of recollective experience for all events both before and after providing narrative recall. Responses to questions were either given as ratings on a 5-point scale (rated 0–4, with higher numbers indicating greater amounts) or were categorical (see below). Administration was oral and tape-recorded. Questions and their corresponding response options were as follows:

1. How much of the event do you remember? (amount remembered; 0 = none, 1 = little, 2 = some, 3 = most, 4 = all)
2. How much confidence do you have in the accuracy of your memory? (confidence in accuracy; 0 = none, 1 = little, 2 = some, 3 = a lot, 4 = extreme/complete)
3. How frequently have you thought about or talked about this event with others? (rehearsal frequency; 0 = none, 1 = little, 2 = some, 3 = often, 4 = frequently/family lore)
4. How typical of your childhood behavior (i.e., how much like other behavior) is this event? (event typicality; 0 = very untypi-

A1	Broke a lamp while playing. (true, selected)
A2	Found some keys your dad had lost. (false)
B1	Had to spend the night in hospital. (false, selected)
B2	Adopted a lost rabbit. (true)
C1	Met someone famous. (false)
C2	Had a surprise birthday party. (true, selected)
D1	Won a spelling contest at school. (false)
D2	Had a lifeguard pull you out of the water. (false, selected)
E1	Ran away from home. (false, selected)
E2	Participated in a wedding. (false)
F1	Found a shark's tooth while walking on the beach. (true, selected)
F2	Went on a hot air balloon ride with classmates. (false)

Figure 1. Sample participant data for the Memory Test completed in Step 3 of Procedure. For each of six pairs of events (e.g., A1 & A2), participants chose which event was recalled by parents. Pairs 1–3 and Pair 6 consisted of one true and one false event; Pairs 4 and 5 consisted of two false events. Information in parentheses indicates whether events were true or false and which event in each pair was selected.

cal, 1 = somewhat untypical, 2 = neither typical nor untypical, 3 = somewhat typical, 4 = very typical)

5. How important were the consequences of this event? (importance of consequences; 0 = very unimportant, 1 = somewhat unimportant, 2 = neither important nor unimportant, 3 = somewhat important, 4 = very important)
6. How intense are your emotions concerning the event? (emotional intensity; 0 = no intensity, 1 = little intensity, 2 = some/moderate intensity, 3 = a lot of intensity, 4 = extreme/complete intensity)
7. How are your emotions best described (negative/positive)? (emotional valence; 0 = very negative, 1 = somewhat negative, 2 = neither negative nor positive, 3 = somewhat positive, 4 = very positive)
8. Does your memory for this event contain visual images? (image presence; *yes/no*)
9. How clear is your visual image for this event? (image clarity; 0 = no clarity/image, 1 = little clarity, 2 = some/moderate clarity, 3 = a lot of clarity, 4 = extreme/complete clarity)
10. How much effort did it take for you to recall this image? (recall effort; 0 = no effort, 1 = little effort, 2 = some effort, 3 = a lot of effort, 4 = extreme/complete effort)
11. Does your image involve movement? (image movement; *yes/no*)
12. Is your image seen from a field (first person) or observer (third person) perspective? (image perspective; *field/observer*)

If the response to Question 1 was "0," then only Question 4 was subsequently asked, because the participants' response to Question 1 indicated

that none of the actual event was remembered. Questions 9–12 were not asked if the response to Question 8 was "No."

The questions appearing above were based on aspects of recollective experience discussed or measured previously by various researchers (Conway et al., 1996; Hyman & Pentland, 1996; Johnson et al., 1988; Loftus & Pickrell, 1995; for a review, see Lampinen et al., 1998). Given that the frequency with which an event was rehearsed (Question 3) is logically much greater for previously remembered events than for newly remembered events, frequency ratings were used as a covariate.

Procedure

The procedure is based on ones reported by Loftus and colleagues (Loftus et al., 1996; Loftus & Pickrell, 1995) and by Hyman and colleagues (Hyman & Billings, 1998; Hyman & Pentland, 1996). For ease in explanation, the procedure is divided into several steps.

Step 1: Recruitment. Participants volunteered to participate in a study concerning the similarities and differences in how parents and children remember childhood events. Participants provided names, addresses, and phone numbers of both parents (whenever possible). Parents were sent (a) a letter explaining the study as one comparing how parents and children remember childhood events, (b) a copy of their son's or daughter's signed informed consent form, (c) an informed consent form for their signature should they agree to participate, and (d) a stamped, self-addressed return envelope.

Step 2: Parent interviews. On receipt of the signed parental informed consent form, parents were contacted by phone and interviewed concerning events regarding their son's or daughter's childhood. Specifically, parents were asked to indicate whether a set of events taken from the LEI or ones similar to them had happened to their son or daughter up to or before the age of 10 and, if so, what they recalled from such events. Other events provided spontaneously by parents were recorded as well.

Step 3: Memory Test. Participants made appointments to give their accounts of events provided by their parents. Participants were first presented with a Memory Test consisting of six pairs of events. Participants were asked to choose, for each pair of events, the event provided by their parent(s). Participants were also asked to give their age at the time of each selected event. A sample Memory Test is seen in Figure 1.

Four of the six pairs of events consisted of one event recalled by the participant's parent(s) and one event reported by the participant's parent(s) as not having happened. Events selected by participants that were also recalled by the parent(s) were considered potentially true events, but were required to meet additional criteria for inclusion in analyses as true events (see below). Participants were asked to recall these events in Step 4 (see below). Events selected by participants that were reported by the parent(s) as not having happened were eliminated from further consideration.

The remaining two pairs of events consisted of two events reported as not having happened by the participant's parent(s). Thus, participants were twice required to choose an event reported by their parent(s) as not having happened. Events selected from these pairs were considered potentially false events, but were required to meet additional criteria for inclusion in analyses as false events (see below). When participants reported that they did not remember either event in a pair, they were told to choose the event that seemed most familiar to them and to estimate their age as best they could. Participants were asked to recall these events in Step 4 (see below).

Step 4: Participant interviews. Participants took part in three tape-recorded interviews, each 1 week apart. For each selected event in turn, participants were read the event description from the Memory Test and were then read the following statement, "Please start at the beginning and describe in as much detail as you can what happened during this event." Participants then provided narrative accounts of what was remembered. If any event was not remembered, participants were told that imagination could help in the recovery of initially unremembered events. Participants were asked to imagine what unremembered events "might have been like" and to report what was imagined.

Step 5: Participant ratings of recollective experience. Following completion of Interview 3, participants provided ratings concerning recollective experience (see *Participant ratings of recollective experience* in the *Materials* section) in all selected events.

Step 6: Debriefing. At the end of their participation, participants were told the following:

Imagination may allow the remembering of forgotten memories, but it can also produce false memories. The purpose of this study was to examine how false memories are remembered. No one can know for sure whether the memories you reported after imagining are true, but we created these events because we believed they hadn't happened to you. It is quite common and normal for people to create memories after imagining events from the distant past. In fact, we set up circumstances that made it likely you would report remembering. You may have had similar experiences to the one you remembered after imagining, or you may have had the actual experience. Do you have any concerns about the events you remembered or about the study in general?

Step 7: Parental verification. For cases in which participants recalled information relating to a selected event from an invalid event pair, the parent(s) were contacted again. Recalled information was relayed to parents, and they were asked whether they could verify the information.

Analysis

Criteria for establishing that a remembered event was true or false. Selected events were classified as true and thus included for subsequent analysis if they were (a) recalled by parents during parental interviews (Step 2), (b) selected by participants and reported by participants to have been 10 years old or younger during the Memory Test (Step 3), (c) remembered by participants in the initial interview prior to imagination during the initial participant interview (Step 4), (d) given a rating of 1–4 on the following question by participants during participant ratings of recollective experience (Step 5): How much of the event do you remember? (0 = none, 1 = little, 2 = some, 3 = most, 4 = all), and (e) subsequently remembered content could be verified by parents as having happened (Step 7).

It should be noted that these criteria exclude true memories recovered during the course of experimental participation. Thus, all true memories in the present investigation were remembered prior to experimental participation, and the results obtained cannot be considered generalizable to recovered memories.

Selected events were classified as false if they were (a) reported by parents as not having happened during parental interviews (Step 2), (b) selected by participants and reported by participants to have been 10 years old or younger during the Memory Test (Step 3), (c) not remembered by participants prior to imagination in the initial participant interview (Step 4), (d) given a rating of 1–4 on the following question by participants during participant ratings of recollective experience (Step 5): How much of the event do you remember? (0 = none, 1 = little, 2 = some, 3 = most, 4 = all), and (e) subsequently remembered content could not be verified by parents as having happened (Step 7).

Independent ratings of amount remembered. In addition to ratings provided by the participants themselves, three independent raters made ratings for all events based on Question 1 (amount remembered; see *Participant ratings of recollective experience* in the *Materials* section). Disagreements were resolved by calculating the mean of the ratings.

Narrative recall. For each memory, three independent raters divided recall content into idea units and tallied idea unit frequency. Frequencies of identified idea units are highly reliable across raters (Gudjonsson, 1984). Because idea units identified by individual raters are often unique, disagreements concerning idea unit frequency were resolved by calculating the mean of the ratings. Raters then classified individually identified idea

units as comprising one of four types of event-related information, as follows:

1. Setting: the situation immediately before the event, including time and place of the event, relative location of actors and objects, and intentions of actors. The setting consists of all information leading up to the central action sequence.
2. Central action sequence: actions that constitute the basic episode(s) defining the event, along with mental actions (e.g., thoughts, feelings) that occurred during the basic episode(s) defining the event.
3. Peripheral details: remembered characteristics of actors, places, or objects (e.g., color, size, weather) that are ancillary to the event or central action sequence.
4. Consequences: any results of the event, or any events occurring after the central action sequence that were related to it somehow.

Raters then tallied frequencies of idea units for each type of event-related information. Again, because idea units identified by individual raters are often unique, disagreements concerning idea unit frequencies for each type of event-related information were resolved by calculating the mean of the ratings.

For all dependent measures, comparisons of true and false memories were conducted within-subjects. This had two major consequences for analysis. First, the problem of consistent use of rating scales was avoided. Second, data were analyzed only for participants who reported remembering at least one true and one false event. When participants remembered more than one true or false event, dependent measures were averaged to provide overall scores for each memory type. Analysis focused on comparing true and false memories on the major dependent measures of independent ratings of amount remembered, participant ratings of recollective experience, and analyses conducted on narrative recall text.

Results

Twenty-three of 63 participants (37%) reported false memories, a rate similar to that of Hyman and Pentland (1996), who also used imagination to aid in memory creation. Of the 23 participants who reported false memories, 16 reported one false memory, and 7 (30%) reported two false memories. Of the 23 participants who reported false memories, 2 (9%) recalled one true memory, 7 (30%) recalled two true memories, 9 (39%) recalled three true memories, and 5 (22%) recalled four true memories.

The 23 participants who reported false memories recalled an average of 2.74 ($SD = 0.92$) true memories (out of a possible four). This number did not differ from the 40 participants who did not report any false memories ($M = 2.68$ events, $SD = 1.01$). Examples of false memories created by 3 participants can be seen in the Appendix.

Independent Ratings of Amount Remembered

Reliability. Reliability for independent remember ratings was acceptable ($\alpha = .90$, $N = 112$).

Comparing true and false memories. A paired-samples t test was performed comparing independent ratings of amount remembered (rated 0–4, with higher values indicating more remembered) given to true memories ($M = 2.72$, $SD = 0.14$) and false memories ($M = 2.30$, $SD = 0.15$). Results of evaluation of assumptions of normality and equal variances were satisfactory. The paired-samples t test revealed a significant difference between indepen-

dent ratings of amount remembered for true and false memories in amount remembered, $t(22) = 2.04, p < .03$ (one-tailed). Thus, independent raters indicated that significantly more was remembered in true memories than was remembered in false memories.

Participant Ratings of Recollective Experience

Table 1 shows means and standard deviations of each recollective experience rating for true and false memories. Correlational analysis revealed that although many of the ratings were mildly intercorrelated for both true and false memories, only amount remembered and confidence in accuracy ratings were highly correlated for both true ($r = .80, p < .0001$) and false ($r = .67, p < .0001$) memories. To avoid multicollinearity, confidence in accuracy ratings were eliminated from consideration in subsequent analyses. Because virtually all true memories and all false memories were accompanied by imagery, presence of imagery data were also eliminated from consideration in subsequent analyses. Responses to questions regarding image movement (i.e., static/dynamic) and perspective (i.e., field/observer) in event-related imagery, both dichotomous measures, do not meet the assumption of normality; their distributions are significantly nonnormal. As such, these measures were not included in multivariate analyses but were evaluated separately using nonparametric tests.

A repeated-measures multivariate analysis of variance (MANOVA) was performed with amount remembered, event typicality, importance of consequences, emotional intensity, emotional valence, image clarity, and recall effort as dependent variables and true or false memory status as a within-subjects independent variable. Results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory. The MANOVA revealed significant differences on the dependent measures between true and false memories, $F(1, 22) = 4.98, p < .04$. Post hoc tests were performed as one-sample t tests on difference scores using a

Bonferroni correction with a critical alpha value of .007. Tests of amount remembered ratings, $t(22) = 3.13, p < .005$, event typicality ratings, $t(22) = -3.09, p < .005$, and emotional intensity ratings, $t(22) = 4.85, p < .0001$, revealed significant differences between true and false memories. Amount remembered and emotional intensity ratings were both higher in true memories than in false memories. Event typicality ratings, by contrast, were higher in false memories than in true memories.

A second repeated-measures MANOVA was performed with amount remembered, event typicality, importance of consequences, emotional intensity, emotional valence, image clarity, and recall effort as dependent variables, true or false memory status as a within-subjects independent variable, and rehearsal frequency ratings as a covariate. The MANOVA revealed no difference on the dependent measures between true and false memories, $F(1, 21) = 0.20, p < .66$. Thus, true and false memories did not differ according to several major aspects of recollective experience once the effects of rehearsal frequency were accounted for. However, because the MANOVA involved a between-subjects comparison of rehearsal frequency ratings, caution concerning interpretation of results is in order.

A Wilcoxon signed-ranks test was performed between imagery movement (i.e., static/dynamic) for true versus false memories. Using a Bonferroni correction, the critical alpha level was .025. This test revealed no difference between the two groups ($Z = -0.03, p < .98; N = 23$). Thus, there were no differences in the likelihood that true or false memory would be accompanied by images involving movement. A Wilcoxon signed-ranks test was performed between imagery perspective (i.e., field/observer) for true versus false memories, also using a Bonferroni corrected alpha level of .025. This test revealed a significant difference between the two groups ($Z = -3.30, p < .001; N = 23$). Thus, false memories were significantly more likely to be accompanied by imagery viewed from the observer perspective. To ensure that this effect could not be attributed to overall differences in how well true and false events were remembered, matched comparisons of imagery perspective were made within cases according to independent ratings of amount remembered. Cases with true and false memories with independent ratings of remembered amount within .5 of one another (e.g., rating for false event = 2.5; rating for true event = 2.0) were paired. These data can be seen in Table 2. Because these data were binary, a McNemar Test was performed. This test revealed a significant difference between imagery perspective for true and false memories matched according to independent remember rating ($p < .02$). Thus, true and false memories that were remembered equally well were significantly different in how the perspective of associated imagery was characterized. False memories were more likely than true memories to be viewed from the observer perspective.

Narrative Recall

Reliability. Reliabilities for setting ($\alpha = .85, N = 112$), central action sequence ($\alpha = .97, N = 112$), ($\alpha = .92, N = 112$), and consequences ($\alpha = .87, N = 112$) information were all acceptable.

Comparing true and false memories. Table 3 shows the mean number of idea units reported in narrative recall of true and false memories, as well as the relative proportions of each type of information reported in true and false memories. A paired-sample

Table 1
Means and Standard Deviations of Recollective Experience
Ratings Made by Participants for True and False Memories

Rating	True memories		False memories	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Amount remembered ^{a*}	2.90	0.61	2.35	0.63
Confidence in accuracy ^a	3.08	0.76	2.11	0.95
Rehearsal frequency ^a	1.76	0.71	0.50	0.56
Event typicality ^{a*}	1.33	1.00	2.24	1.14
Importance of consequences ^a	1.43	0.87	0.80	0.84
Emotional intensity ^{a*}	2.67	0.66	1.63	0.84
Emotional valence ^a	1.61	0.98	1.43	1.14
Image presence (%) ^{b,c}	96	12	100	0
Image clarity ^a	2.62	0.57	2.13	0.59
Recall effort ^a	1.01	0.60	1.32	1.09
Image: static/dynamic (%) ^{b,d}	57	34	57	48
Image: field/observer (%) ^{b,e}	18	34	74	40

^a Rated 0–4, with higher numbers indicating greater amounts. ^b Dichotomous measures, expressed as proportions. ^c Proportion of events accompanied by imagery. ^d Proportion of events in which imagery was characterized as dynamic. ^e Proportion of events in which imagery was characterized as viewed from the observer perspective.

* $p < .007$.

Table 2
*Imagery Perspective Reports for True and False Events Paired
 Within-Subjects by Independent Remember Rating Value*

Mean independent remember rating		Imagery perspective self-report	
True	False	True	False
3.00	3.00	field	observer
4.00	4.00	observer	field
4.00	4.00	field	observer
3.00	2.50	field	observer
3.00	3.00	field	observer
2.50	1.50	field	observer
2.50	2.50	field	field
3.50	3.00	observer	observer
2.00	2.00	field	field
1.00	1.00	field	observer
3.00	3.00	field	observer
2.25	2.00	field	observer
3.00	3.00	field	observer
1.50	1.00	field	observer
3.00	2.50	observer	observer
2.00	2.00	observer	field
3.00	3.00	field	observer

Note. All pairs have independent remember ratings within 1 point. True and false refer to memory type.

t test was performed with total number of idea units reported between true versus false memories. Results of evaluation of assumptions of normality and homogeneity of variances were satisfactory. This test showed a significant difference between the number of idea units reported in true and false memories, $t(22) = 3.70, p < .001$. Thus, significantly more idea units were reported in recalling true memories than in recalling false memories. Distributions of relative proportions of setting, central action sequence, peripheral, and consequences information were all significantly nonnormal. As such, a nonparametric Friedman test was performed to test for differences in the relative proportion of the four types of information between true versus false memories. This test revealed overall significance in relative proportions of information types reported between true and false memories, $\chi^2(3, N = 23) = 11.46, p < .01$. Post hoc tests were performed as Wilcoxon signed-ranks tests on difference scores using a Bonferroni correction with a critical alpha value of .01. These tests revealed differences in the amount of consequences information reported in true and false memories ($Z = -3.54, p < .0001$). Significantly more information concerning the consequences of events were reported for true memories than for false memories.

Discussion

Several differences in recollective experience between true and false memories were found. First, true memories were rated by participants as more rich in recollective experience and more emotionally intense than false memories. Thus, true and false memories were phenomenologically distinct in ways similar to those suggested by Conway (1997; Conway et al., 1996). Nevertheless, these effects were eliminated once the role of rehearsal frequency was accounted for. The effect of rehearsal on qualities of recollective experience suggests that certain phenomenological

differences between true and false memories discernable less than 3 weeks after false memories are initially remembered are likely to lessen with greater opportunity for rehearsal. Given the likely frequency of rehearsal for many autobiographical events, it is perhaps not surprising that false memories remembered over a period of 3 weeks or less were relatively impoverished in recollective experience. Perhaps more important, however, is the possibility that repeated remembering of false memories over greater periods of time may make recollective experience more complete and more like that found in true autobiographical memories. Such changes in recollective experience may be accompanied by increases in subjective certainty regarding the details of false memories, making frequently remembered false memories strongly believed in and making rememberers resistant to considering the possibility that false memories are indeed false. The nature of changes in recollective experience in autobiographical memories over greater periods of time deserves further scrutiny, as does the notion that clearly remembered false memories will be resistant to challenges regarding their status as authentic records of experience.

False memories were also rated by participants as more typical of their previous experience than were true memories. This difference may reflect the fact that only events seen by the rememberer as highly typical of his or her previous experience are accepted as potentially authentic. This assessment may in turn influence whether the individual is able to construct a meaningful and believable representation of the event under consideration. Construction of false memories may be enabled by the similarity of one's current self-representation and autobiographical knowledge to the nature of the suggested event. In order to create a memory when an event is originally not remembered, the individual must first consider the event and accept that it could have happened to him or her. Further, the individual must draw on relevant schematic knowledge concerning the particular actions involved in the event. This judgment has been referred to as one of *plausibility* (Barclay & DeCooke, 1988; Barclay & Wellman, 1986; Hyman & Billings, 1998; Hyman & Pentland, 1996; Pezdek et al., 1997). If an event is not accepted as plausible by an individual, he or she may not be able to create a believable representation of the event and may be consequently less willing to report remembering the event (Pezdek et al., 1997).

Table 3
Mean and Standard Deviation of Total Number of Idea Units and Relative Proportions of Setting, Central Action Sequence, Peripheral, and Consequences Information in Narrative Recall of True and False Memories

Rating	True memories		False memories	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Idea units	28.1	12.5	19.4	9.1
Setting	.214	.079	.203	.126
CAS	.659	.097	.731	.166
Peripheral	.076	.059	.062	.142
Consequences	.060	.049	.004	.014

Note. Proportions do not add to 1 because of rounding. CAS = central action sequence.

Despite greater typicality ratings for false memories, these memories were judged to have less content related to the consequences of the event. That is, although they were seen by participants as highly typical of previous experience, false memories were less well integrated with the autobiographical knowledge base. Thus, participants were less often able to specify what the implications of events described in false memories were for their lives, their relationships, and for other actors' lives. Such differences indicate a distinct status for false memories within the structure of autobiographical knowledge. This status is similar to what would be expected for memories that are not central to one's self-concept, or for memories of infrequent events. Whether autobiographical experiences highly definitive of one's self-concept are more resistant to creation as false memories is a question requiring further investigation.

Imagery accompanying true and false memories differed in the perspective from which it was viewed. Images in false memories were far more likely to be viewed from the perspective of an observer even when false events were matched with highly similar (in terms of quality of recollective experience) true events. Because images whose source is memory must necessarily be viewed from the field (first-person or phenomenal) perspective, images viewed from the observer perspective cannot be entirely memorial records of previous experience. Such images logically must be the result of constructive processes (Freud, 1899/1950), although their depiction of events need not necessarily be inaccurate. Instructions to participants in the present investigation to imagine unremembered events resulted in the presence of visual images in every false event that was judged to have been remembered. Imagination resulted in observer imagery in approximately three quarters of false memories, even though no instructions were given regarding how imagination should be conducted. By contrast, observer imagery was seen in less than 20% of true (and not-imagined) memories.

These differences between true and false memories may result from differences in the mode of remembering used when recalling true as opposed to false memories (Nigro & Neisser, 1983; Robinson & Swanson, 1993). Previous evidence indicates that observer imagery is associated with greater self-awareness and with attempts to remember the objective circumstances of events (Nigro & Neisser, 1983). When participants did not remember all or part of an event in the present investigation, they were instructed to focus on recalling as much of the event as possible. Such instructions were given with both true and false unremembered events, but the majority of unremembered events were false events. Although participants were also instructed to report as much as possible of remembered events, the emphasis on recalling objective circumstances and one's role in unremembered events may constitute a distinct mode of remembering and one that has been shown to produce reports of observer imagery (Nigro & Neisser, 1983).

A second potential explanation for differences in imagery perspective between true and false memories reported in the present investigation stems from differences in the overall quality of imagery reported with such memories. Memories with clearer imagery may also be more likely to have imagery viewed from the field perspective (Kim, Ciovia, Cho, St. Clair, 1999), and such imagery may allow recall of more information (Robinson & Swanson, 1993). A third plausible explanation arises from differences

between true and false memories in rehearsal frequency. Conway (1996) hypothesized that rehearsal can have the effect of changing imagery perspective, although his hypothesized change is in the opposite direction expected if rehearsal frequency were responsible for the differences discovered in the present investigation. Thus, for a variety of reasons, the differences uncovered in the present investigation may represent evidence of the processes involved in memory construction.

True memories were rated by independent raters as more rich in recollective experience than false memories, and more information was remembered by participants in true memories. These differences are similar to those reported in previous investigations of false memories (Hyman & Pentland, 1996; Loftus & Pickrell, 1995) and to those reported by Johnson et al. (1988) when comparing autobiographical memories with event representations knowingly created by imagination. Whether such differences would be ameliorated with subsequent rehearsal, as was true with some aspects of recollective experience rated by participants, is uncertain. Measuring recollective experience in newly remembered memories over longer periods of time could provide more definitive evidence concerning the stability of these differences. However, a newly remembered memory may be either a false memory or a recovered memory. Recovered autobiographical memories may be relatively common (Conway, 1997). Of importance, recovered memories apparently share several characteristics of false memories (Hyman & Pentland, 1996; Hyman & Billings, 1998). Subsequent work is needed to establish whether novel differences between false and true memories reported in the present investigation also represent characteristic differences between false and recovered memories.

Another implication of the present results concerns current models of false memory creation. The source-monitoring model predicts that for a source attribution error to occur—that is, for a false memory to be remembered—the characteristics of the false representation must be indistinguishable from the characteristics typically found in true representations. In accord with prior evidence (Hyman & Pentland, 1996; Loftus & Pickrell, 1995), the present data demonstrate that such a state of affairs may not always occur with autobiographical memories. True and false memories reported in the present investigation were similar in many respects, but recollective experience of false events accepted as true and remembered was initially impoverished by the standard of participants' own autobiographical memories. Further, true and false memories were largely distinct from one another in terms of imagery perspective. Such a stark distinction between true and false memories may provide evidence to assist in some profitable refinement of the popular source-monitoring model. Perhaps some aspects of recollective experience are generally not considered when making reality monitoring judgments. A more precise account of which aspects of recollective experience are used in reality-monitoring judgments, and how they are used, could provide a better understanding of how such errors result and may be prevented.

The outcomes of the present investigation suggest that the construction of false autobiographical memories is driven not entirely by characteristics of the memorial representation per se but by additional factors. These factors might include the ease with which representations can be constructed (Heaps & Nash, 1999), the individual's initial acceptance of the event as potentially true

(i.e., influence reliance on authority of parents, experimenter, and fit with previous experience, as previously discussed), his or her desire to bring the contents of memory in line with belief (i.e., internal motivation to remember; e.g., "If this happened, then I can probably remember it, especially using special techniques"), and the individual's desire to please the experimenter (e.g., external motivation and interrogative suggestibility). Each of these potentially contributing factors must be systematically sorted out in subsequent work.

In sum, cognitive processes involved in the construction of recollective experience may leave some potentially detectable traces of their operation. These differences may be subtle and require precise assessment for detection, as when less information concerning the consequences of an event is communicated with reporting of false memories. Such differences may frequently remain unnoticed or rarely communicated, as is likely to be the case with the perspective of one's imagery. Further, rehearsal or retelling of false memories may lessen such differences and make false memories appear more like true memories and consequently more authentic. The general similarity between newly remembered and previously remembered memories (i.e., true and false, respectively) in the present investigation indicates the ubiquitous nature of constructive processes within memory resulting from imagination and rehearsal. This similarity should serve to reinforce the fact that there is currently no way to determine whether individual memories are true or false based on the characteristics of recollective experience. Conversely, potentially characteristic differences between true and false memories may provide an additional basis of refinement for current models of episodic retrieval and false memory creation. Given the methodological limitations inherent in the present investigation, additional work is necessary in order to more definitively characterize these potential differences.

References

- American Psychiatric Association. (1994). 1993 Statement on Memories of Sexual Abuse. Reprinted in *International Journal of Clinical and Experimental Hypnosis*, 42, 261–264.
- Baddeley, A. D. (1989). The psychology of remembering and forgetting. In T. Butler (Ed.), *Memory: History, culture, and the mind* (pp. 403–484). Oxford, England: Basil Blackwell.
- Barclay, C. R. (1996). Autobiographical remembering: Narrative constraints on objectified selves. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 94–125). Cambridge, England: Cambridge University Press.
- Barclay, C. R., & DeCooke, P. A. (1988). Ordinary everyday memories: Some of the things of which selves are made. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 91–125). New York: Cambridge University Press.
- Barclay, C. R., & Smith, T. S. (1992). Autobiographical remembering: Creating personal culture. In M. A. Conway, D. C. Rubin, H. Spinnler, & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory* (pp. 75–97). Dordrecht, the Netherlands: Kluwer Academic.
- Barclay, C. R., & Subramaniam, G. (1987). Autobiographical memories and self-schemata. *Applied Cognitive Psychology*, 1, 169–182.
- Barclay, C. R., & Wellman, H. M. (1986). Accuracies and inaccuracies in autobiographical memories. *Journal of Memory & Language*, 25, 93–103.
- Barsalou, L. W. (1988). The content and organization of autobiographical memories. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 193–243). New York: Cambridge University Press.
- Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge, England: Cambridge University Press.
- Brainerd, C. J., & Mojardin, A. H. (1997). *What is the nature of the verbatim traces?* Manuscript submitted for publication.
- Brainerd, C. J., & Reyna, V. F. (1995). Autosuggestibility in memory development. *Cognitive Psychology*, 28, 65–101.
- Brewer, W. F. (1986). What is autobiographical memory? In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 25–49). New York: Cambridge University Press.
- Brewer, W. F. (1988). Memory for randomly sampled autobiographical events. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 21–90). New York: Cambridge University Press.
- Bruner, J. (1986). *Actual minds, possible words*. Cambridge, MA: Harvard University Press.
- Conway, M. A. (1988). Images in autobiographical memory. In M. Denis, M. J. Engelkamp, & J. T. E. Richardson (Eds.), *Cognitive and neuropsychological approaches to mental imagery* (pp. 337–346). Dordrecht, the Netherlands: Martinus Nijhoff.
- Conway, M. A. (1992). A structural model of autobiographical memory. In M. A. Conway, D. C. Rubin, H. Spinnler, & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory* (pp. 167–194). Dordrecht, the Netherlands: Kluwer.
- Conway, M. A. (1996). Autobiographical knowledge and autobiographical memories. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 67–93). Cambridge, England: Cambridge University Press.
- Conway, M. A. (1997). Past and present: Recovered memories and false memories. In M. A. Conway (Ed.), *Recovered memories and false memories* (pp. 150–191). New York: Oxford University Press.
- Conway, M. A., Collins, A. F., Gathercole, S. E., & Anderson, S. J. (1996). Recollections of true and false autobiographical memories. *Journal of Experimental Psychology: General*, 125, 69–95.
- Conway, M. A., & Rubin, D. C. (1993). The structure of autobiographical memory. In A. E. Collins, S. E. Gathercole, M. A. Conway, & P. E. M. Morris (Eds.), *Theories of memory* (pp. 103–137). Hillsdale, NJ: Erlbaum.
- Csikszentmihalkyi, M., & Beattie, O. V. (1979). Life themes: A theoretical and empirical exploration of their origins and effects. *Journal of Humanistic Psychology*, 19, 45–63.
- Dewhurst, S. A., & Conway, M. A. (1994). Pictures, images, and recollective experience. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20, 1088–1098.
- Freud, S. (1950). Screen memories. In S. Freud (Ed.), *Collected papers*. London: Hogarth Press. (Original work published 1899)
- Gardiner, J. M., & Java, R. I. (1993). Recognising and remembering. In A. F. Collins, S. E. Gathercole, M. A. Conway, & P. E. Morris (Eds.), *Theories of memory* (pp. 163–188). Hillsdale, NJ: Erlbaum.
- Garry, M., Manning, C. G., Loftus, E. F., & Sherman, S. J. (1996). Imagination inflation: Imagining a childhood event inflates the confidence that it occurred. *Psychonomic Bulletin & Review*, 3, 208–214.
- Goff, L. M., & Roediger, H. L., III. (1998). Imagination inflation for action events: Repeated imaginings lead to illusory recollections. *Memory & Cognition*, 26, 20–33.
- Gudjonsson, G. H. (1984). A new scale of interrogative suggestibility. *Personality and Individual Differences*, 5, 303–314.
- Heaps, C., & Nash, M. (1999). Individual differences in imagination inflation. *Psychonomic Bulletin & Review*, 6, 313–318.
- Holmes, J. B., Waters, H. S., & Rajaram, S. (1998). The phenomenology of false memories: Episodic content and confidence. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24, 1026–1040.
- Hyman, I. E., Jr., & Billings, J. F. (1998). Individual differences and the creation of false childhood memories. *Memory*, 6, 1–20.

- Hyman, I. E., Jr., Gilstrap, L. L., Decker, K., & Wilkinson, C. (1998). Manipulating remember and know judgments of autobiographical memories: An investigation of false memory creation. *Applied Cognitive Psychology, 12*, 371–386.
- Hyman, I. E., Jr., Husband, T. H., & Billings, J. F. (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 & Language, 35*, 101–117.
- James, W. (1890). *Principles of psychology*. New York: Holt.
- Johnson, M. K., Foley, M. A., Suengas, A. G., & Raye, C. L. (1988). Phenomenal characteristics of memories for perceived and imagined autobiographical events. *Journal of Experimental Psychology: General, 117*, 371–376.
- Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological Bulletin, 114*, 3–28.
- Johnson, M. K., Nolde, S. F., Mather, M., Kounis, J., Schacter, D. L., & Curran, T. (1997). The similarity of brain activity associated with true and false recognition memory depends on test format. *Psychological Science, 8*, 250–257.
- Johnson, M. K., & Raye, C. L. (1981). Reality monitoring. *Psychological Review, 88*, 67–85.
- Kassin, S. M. (1997). The psychology of confession evidence. *American Psychologist, 52*, 221–233.
- Kihlstrom, J. F. (1994). Hypnosis, delayed recall, and the principles of memory. *International Journal of Clinical and Experimental Hypnosis, 42*, 337–345.
- Kim, I. K., Ciovica, A., Cho, E., & St. Clair, T. (1999, June). *Accuracy of field and observer modes of memory*. Paper presented at the annual meeting of the American Psychological Society, Denver, CO.
- Kosslyn, S. (1990). Mental imagery. In D. N. Osherson, S. M. Kosslyn, & J. M. Hollerbach (Eds.), *Visual cognition and action: Vol. 2. An invitation to cognitive science* (pp. 73–97). Cambridge, MA: MIT Press.
- Lampinen, J. M., Neuschatz, J. S., & Payne, D. G. (1998). Memory illusions and consciousness: Examining the phenomenology of true and false memories. *Current Psychology: Developmental, Learning, Personality, Social, 16*, 181–224.
- Lindsay, D. S., & Read, J. D. (1994). Psychotherapy and memories of childhood sexual abuse: A cognitive perspective. *Applied Cognitive Psychology, 8*, 281–338.
- Loftus, E. F. (1993). The reality of repressed memories. *American Psychologist, 48*, 518–537.
- Loftus, E. F., Coan, J. A., & Pickrell, J. E. (1996). Manufacturing false memories using bits of reality. In L. M. Reder (Ed.), *Implicit memory and metacognition* (pp. 195–220). Mahwah, NJ: Erlbaum.
- Loftus, E. F., & Pickrell, J. (1995). The formation of false memories. *Psychiatric Annals, 25*, 720–725.
- Maltz, W. (1991). *The sexual healing journey: A guide for survivors of sexual abuse*. New York: Harper Collins.
- Mather, M., Henkel, L. A., & Johnson, M. K. (1997). Evaluating characteristics of false memories: Remember/know judgments and memory characteristics questionnaire compared. *Memory & Cognition, 25*, 826–837.
- Neisser, U. (1982). Snapshots or benchmarks? In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 43–48). San Francisco: Freeman.
- Neisser, U. (1988a). Five kinds of self-knowledge. *Philosophical Psychology, 1*, 35–59.
- Neisser, U. (1988b). What is ordinary memory the memory of? In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 356–373). New York: Cambridge University Press.
- Neisser, U., & Fivush, R. (Eds.). (1994). *The remembered self: Construction and accuracy in the self-narrative*. Cambridge, England: Cambridge University Press.
- 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, England: Cambridge University Press.
- Nigro, G., & Neisser, U. (1983). Point of view in personal memories. *Cognitive Psychology, 15*, 467–482.
- Ofshe, R., & Watters, E. (1994). *Making monsters: False memories, psychotherapy, and sexual hysteria*. New York: Scribner.
- Payne, D. G., & Blackwell, J. M. (1998). Truth in memory from human memory: Caveat emptor. In S. J. Lynn & N. P. Spanos (Eds.), *Truth in Memory*. New York: Guilford Press.
- Pezdek, K., Finger, K., & Hodge, D. (1997). Planting false childhood memories: The role of event plausibility. *Psychological Science, 8*, 437–441.
- Rajaram, S., & Roediger, H. L. (1997). Remembering and knowing as states of consciousness during retrieval. In J. D. Cohen & J. W. Schooler (Eds.), *Scientific approaches to consciousness* (pp. 213–240). Mahwah, NJ: Erlbaum.
- Reisberg, D. (1997). *Cognition: Exploring the science of the mind*. New York: Norton.
- Robinson, J. A., & Swanson, K. L. (1993). Field and observer modes of remembering. *Memory, 1*, 169–184.
- Steller, M., & Koehnken, G. (1989). Criteria-based statement analysis. In D. C. Raskin (Ed.), *Psychological methods in criminal investigation and evidence* (pp. 217–245). New York: Springer.
- Tulving, E. (1985). Memory and consciousness. *Canadian Psychologist, 26*, 1–12.

(Appendix follows)

Appendix

Narrative "Recall" of False Memories Provided by 3 Participants

Event: Had a Lifeguard Pull You Out of the Water

I: How about getting rescued by the lifeguard?

P: We went to the pool at the N the year we lived there. And my parents were laying by the pool, and I was in the shallow end with this kid I knew. And we started swimming toward the deep end, but we didn't get very far. I think we got to like the five feet mark. And I remember he started to go under, and he grabbed me and pulled me under with him. And I remember being under water and then hearing this big splash. He jumped in and just grabbed both of us at once and pulled us over to the side. Then he got out and made us get out. And he was yelling at us. He told us that we had to have patches to go in the deep end, and that we couldn't go back in the pool for a while, and that we had to stay in the shallow end when we did.

And I remember my dad asking me about what had happened, and I told him that we didn't mean to go out that far so he wouldn't get mad.

Event: Got Lost in a Public Place

I: Can you tell me about getting lost again, please?

P: Well, I guess I was four or five, because it was after we had moved to R. And it was in D's, I think. My mom was looking at clothes, and I just wandered away. I remember walking around the store. I just remember, basically, I could see, racks of clothes, you know. And I was standing in between a bunch of racks of clothes. And I'm kind of . . . not that I don't know, I can't think of what we're wearing or what type of clothes are on the racks or anything like that. I see myself really, really like short and small. And then her just kind of standing over me, you know. I remember I was looking up at her. I can see her like pointing at me, and maybe holding on to my hand or arm, and her eyes. And she asked me where I was and she told me not to leave her again.

I: OK. Anything else from that one?

P: I kind of remember a table there that I went to, and was looking at something on the table. And then I walked and towards the left, I guess, to the clothes. I can see the clothes and I remember myself looking at a table in the center.

Event: Got Lost in a Public Place

I: Tell me about getting lost?

P: Mostly I remember how scared I was. I was really scared. I couldn't find my mom anywhere. I remember looking all over the store for a really long time. I was asking people where she was, if they'd seen her. And nobody knew.

I: Then what happened?

P: Well, I eventually found her.

I: How did you find her?

P: I think she was . . . like, I asked someone at one of the counters, and they found her.

I: What happened to get you away from her?

P: I don't know. I just remember realizing she was gone, then looking.

I: What store was it?

P: I think it was P's. It was definitely a clothes store.

I: How old were you at the time?

P: I was really little. Probably only five.

I: Is there anything else you can remember from that one?

P: No.

Note. I = interviewer; P = participant.

Received January 14, 2000
 Revision received August 7, 2000
 Accepted August 21, 2000 ■