

True Photographs and False Memories

D. Stephen Lindsay Lisa Hagen J. Don Read
University of Victoria

Kimberley A. Wade Maryanne Garry
Victoria University of Wellington

Some trauma-memory-oriented psychotherapists advise clients to review old family photo albums to cue suspected “repressed” memories of childhood sexual abuse. Old photos might cue long-forgotten memories, but when combined with other suggestive influences they might also contribute to false memories. We asked 45 undergraduates to work at remembering three school-related childhood events (two true events provided by parents and one pseudoevent). By random assignment, 23 subjects were also given their school class group photos from the years of the to-be-recalled events as memory cues. As predicted, the rate of false-memory reports was dramatically higher in the photo condition than in the no-photo condition. Indeed, the rate of false-memory reports in the photo condition was substantially higher than that of any previously published study.

Psychologists have long been interested in memory illusions and distortions, because such errors can inform theories of how memory works (e.g., Bartlett, 1932; Schacter, 2001). Controversy in the 1990s regarding trauma-memory-oriented psychotherapies sharpened that interest in false memories, and led cognitive psychologists to test the hypothesis that suggestive influences can lead adults to “remember” childhood pseudoevents. Loftus and Pickrell (1995) introduced a procedure in which adult research subjects are given brief narrative descriptions of childhood events and asked to work on remembering those events. Subjects are told that all of the narratives were provided by their

This research was supported by Natural Science and Engineering Research Council of Canada (NSERC) grant OGP7920-1997 to J. Don Read, by NSERC grant OGP0121516-95 to D. Stephen Lindsay, and by a Victoria University of Wellington Strategic Development Fund travel grant and a Targeted PhD scholarship to Kimberley A. Wade. We thank the parents of our subjects for their contributions to this experiment, and Marcia K. Johnson, Colleen M. Kelly, Henry L. Roediger III, and an anonymous reviewer for helpful comments on prior drafts. Thanks also to Michael E. J. Masson for statistical advice.

Correspondence concerning this work can be addressed to D. Stephen Lindsay, Department of Psychology, University of Victoria, P.O. Box 3050 STN CSC, Victoria, B.C., Canada; e-mail:

slindsay@uvic.ca

family members, but one of the narratives describes a pseudoevent that familial informants report subjects had not experienced during childhood.

Across eight studies published in six refereed journal articles using variants of this familial-informant false narrative procedure, 116 of 374 subjects (31%) were scored as having false memories, with rates in individual conditions ranging from 0% to 56% (Hyman & Billings, 1998; Hyman, Husband, & Billings, 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek, Finger, & Hodge, 1997; Porter, Yuille, & Lehman, 1999). Some of these studies differentiated between “partial” and “complete” false memories: Although the operationalizations of these categories (and the terms used to label them) have varied across studies, the gist of the distinction is that subjects classified as having “complete” false memories provide more evidence that they genuinely believe they are remembering the pseudoevent, as opposed to merely accepting that it occurred and/or speculating about it. Across studies making this distinction, 36 of 208 subjects (17%) were classified as having partial false memories and 41 (20%) were classified as having complete false memories. The highest rate of complete false memories in an individual study was 26% (Porter et al., 1999).

Wade, Garry, Read, and Lindsay (2002) developed a new procedure in which subjects are given photographs of themselves as children and asked to remember the event depicted in each photo (see Koutstaal, Schacter, Johnson, & Galluccio, 1999, and Schacter et al., 1997, for studies of the effects of interpolated photos on memory for staged events). Most of the photos (obtained from familial informants) were of events subjects experienced during childhood, but one photo was created by digitally inserting a childhood image of the subject into the basket of a hot-air balloon (an event that familial informants indicated subjects had not experienced). Of 20 subjects, 10 (50%) were classified as reporting memories of the hot-air balloon ride (30% “partial,” 20% “complete”).

It is not altogether surprising that doctored

photographs like those used by Wade et al. (2002) are powerfully suggestive. After all, people perceive photographs as compelling evidence that the depicted events really occurred, and photos provide a rich source of information regarding the perceptual details of suggested events. These characteristics make the false-photo procedure a very useful method for studying false-memory phenomena.

Despite these strengths, the false-photo procedure suffers an obvious limitation in terms of ecological validity and generalizability: People rarely encounter doctored photos of themselves doing things they have never really done. People do, however, sometimes review old family photo albums. Moreover, some trauma-memory-oriented psychotherapists and self-help books have recommended reviewing family photo albums for adults who think they may have been abused in childhood but do not recall such abuse (e.g., Dolan, 1991; cf. Poole, Lindsay, Memon, & Bull, 1995). The idea is that viewing photos of oneself and others in the childhood environment may cue long-forgotten memories of trauma. That may sometimes occur, but reviewing childhood photos could, when combined with other suggestive influences, also contribute to the formation of false memories. If a person believes that certain kinds of events occurred in childhood, and is motivated to recall such events, childhood photos constitute a source of detailed and vivid perceptual images that may be combined with products of imagination to yield compelling pseudomemories. The current research tested this hypothesis.

Method

Subjects

The subjects were 45 undergraduates (36 women and 9 men) who volunteered to participate and were rewarded with optional bonus points in an introductory psychology course.

Procedure

Subjects' parents provided brief narratives describing two unique, school-related events experienced by their children, with one event experienced in grade 5 or 6 and the other in grade 3 or 4. Parents were asked to avoid events that were oft-told family stories, in favor of events that they thought their child might have some difficulty remembering. All parents reported that their child never experienced our target pseudoevent (putting Slime [a brightly colored gelatinous compound manufactured by Mattel as a toy] in the teacher's desk in grade 1 or 2). Parents also provided the school class group photo (see Figure 1) for

each of the school years corresponding to target events, and the name and gender of their child's grade 1 or 2 teacher.

In an initial one-on-one interview, the experimenter read each narrative aloud and asked the subject to recall it, starting with the grade 5 or 6 event and working back in time to the grade 1 or 2 pseudoevent. By random assignment, 23 of the subjects (18 women and 5 men) were given a photocopy of their school class group photo for each year before the corresponding narrative was read to them (the photo and its copy were in color for all but one subject). The interviewer encouraged subjects to recall as much as they could about each event, using mental context reinstatement and guided imagery exercises. Subjects then rated their memories of the event as to (a) the extent to which their memory experience resembled reliving the event (from 1 = "not at all" to 7 = "as clearly as if it were happening right now"); (b) the extent to which they felt they were remembering the event (same scale as reliving question); and (c) their confidence that the event had occurred as described in the narrative (from 1 = "0% confident" to 7 = "100% confident"). This procedure was then repeated for the Grade 3/4 event and then again for the Grade 1/2 pseudoevent. The pseudoevent narrative was customized to use the subject's name and his/her teacher's name, as per the following example:

I remember when Jane was in grade 1, and like all kids back then, Jane had one of those revolting Slime toys that kids used to play with. I remember her telling me one day that she had taken the Slime to school and slid it into the teacher's desk before she arrived. Jane claimed it wasn't her idea and that her friend decided they should do it. I think the teacher, Mrs. Smollett, wasn't very happy and made Jane and the friend sit with their arms folded and legs crossed, facing a wall for the next half hour.

At the end of Session 1, subjects were told that for the rest of the experiment they were to focus their efforts on recalling the oldest of the events (i.e., the pseudoevent). They were asked to spend some time each day over the next week working at remembering more about that event, and were given a printed copy of the narrative (and, for those in the photo condition, a copy of the class photo) to use as a memory cue. Subjects were asked not to talk to others about the event. Four days later the interviewer telephoned the subject to check on progress and encourage additional effort, again reading the narrative of the pseudoevent and fostering "recall" with mental context reinstatement and guided imagery. One week after the initial interview, subjects

returned to the lab and were again encouraged to remember as much as possible about the pseudoevent, after which they rated their memories of it on the same scales used in Session 1. Subjects' spoken memory reports were tape recorded during both sessions.

Two trained judges (blind to the photo/no-photo manipulation) independently reviewed typed transcripts of subjects' spoken reports of their memories of the pseudoevent and judged whether the subject experienced (a) no images or memories, (b) images but not memories, or (c) memories of putting Slime in the teacher's desk. The images-but-no-memories category corresponded to what other researchers have termed "partial false memories," and applied to cases in which the subject described images associated with the suggested event but did not appear to experience those images as memories of the event per se. Judges were to classify a report as "memories" only if the subject appeared to believe that s/he was remembering the suggested event. For the Session-1 reports, judges agreed in their categorizations for 42 (93%) of the subjects, and for Session 2 they concurred for 44 (98%) of the subjects. Disagreements were settled via discussion. Judges rated their mean confidence in each categorization, on a scale ranging from 1 (low) to 3 (high); for Session 1 the mean was 2.83 ($sd = 0.38$), and for Session 2 the mean was 2.80 ($sd = 0.27$).

Results

Means of subjects' Session-1 memory ratings of the true events from grades 5/6 and 3/4 are shown in Table 1. A mixed-model analysis of variance (ANOVA) of the effects of condition (photo vs. no photo) and event (grade 5/6 vs. 3/4) on these measures indicated a nonsignificant tendency for ratings to be slightly higher for the more recent event ($F(1, 43) = 3.57$, $MSe = 6.64$, $p = .07$, $\eta^2 = .08$). In five of the six comparisons the mean rating was directionally higher in the photo than the no-photo condition, but this effect did not approach significance ($F < 1$). There were no interactions (all $F_s < 1$).

Figure 2 depicts judges' categorizations of subjects' memory reports regarding the pseudoevent. The no-photo condition of our experiment is analogous to prior studies using the familial-informant false narrative paradigm. Consistent with those studies, in Session 1 13.6% of the subjects in the no photo condition were judged to have memories of the pseudoevent, with an additional 31.8% classified as having images but no memories. Also consistent with prior research, these values increased somewhat in Session 2, with 27.3% of the subjects in the no-photo condition judged as having

memories of the pseudoevent, and an additional 18.2% classified as having images but not memories. Most prior publications have collapsed across "partial" and "complete" false memories. By that standard, 45.5% of the subjects in our no-photo condition would be said to have developed false memories of the Slime event by Session 2.

We hypothesized that false reports would be even more common in the photo condition. The data pattern from Session 1 fit that prediction, but the tendency for Session-1 false-memory reports to be more common in the photo than no-photo condition did not approach statistical significance: When measured with the relatively strict "memories" criterion, $\chi^2(1, N = 45) = 1.84$, Fisher's exact $p = .28$, $\phi = .20$; when either memories or images were classified as false memories, $\chi^2(1, N = 45) = 1.78$, $p = .18$, $\phi = .20$. In Session 2, however, 65.2% of the subjects in the photo condition were judged to have memories of the pseudoevent, with an additional 13% scored as having images but not memories, for a total of 78.2%. False reports in Session 2 were significantly more common in the photo than no-photo condition, both when measured with the relatively strict "memories" criterion, $\chi^2(1, N = 45) = 6.50$, $p < .02$, $\phi = .38$, and with the less strict criterion that combines reports classified as "memories" and as "images but not memories," $\chi^2(1, N = 45) = 5.15$, $p < .03$, $\phi = .34$.

Subjects rated their memories of the suggested event, using the same scales with which they rated their memories of the true events (see Table 2). The key finding is that ratings were significantly higher in the photo than no-photo condition, $F(1, 43) = 5.31$, $MSe = 8.97$, $p = .03$, $\eta^2 = .11$. Also, ratings increased across sessions, $F(1, 43) = 19.83$, $MSe = 1.99$, $p < .001$, $\eta^2 = .30$, and there was a nonsignificant tendency for that increase to be slightly greater in the photo than no-photo condition, $F(1, 43) = 2.65$, $p = .11$, $\eta^2 = .04$.

Even in the Session-2 photo condition, mean ratings for the suggested event were lower than ratings for the true events (especially the grade 5/6 event). Of course, one would expect memory ratings of a true grade 1/2 event to tend to be lower than memory ratings of events in later grades. Moreover, the means in Table 2 collapse across subjects whom the raters judged to have versus not have false memories of the suggested event. Figure 3 depicts subjects' mean memory ratings as a function of judges' categorization of subjects' reports, collapsed across the photo and no-photo conditions. Three things are worth emphasizing about these data. First, there was strong convergence between the judges' categorizations

and subjects' self ratings (e.g., subjects who were judged to have neither images nor memories indeed selected ratings near the bottom of the scale on each measure). Second, ratings of memories of the pseudoevent by subjects categorized as having false memories were equivalent to (and sometimes directionally greater than) ratings of memories of the true events. This indicates that these subjects' false memories were as compelling as memories of the true events, at least on these dimensions. Third, ratings of subjects classified as reporting images but not memories were more similar to ratings of subjects classified as having neither memories nor images than they were to ratings of subjects classified as having memories. This suggests that the "images but no memories" category should not be considered tantamount to false memories.

During debriefing, subjects were informed that one of the three events they had been asked to remember in the experiment was a made-up false event, and asked which event they thought was the false one. All but 3 subjects (1 in the photo condition and 2 in the no-photo condition) correctly identified the grade 1 or 2 event as the pseudoevent. The facts that (a) most of the experiment had focused on the grade 1 or 2 event and (b) subjects typically had to work at it before "remembering" anything about that event may have made it obvious to subjects, when informed that one of the events was false, that it was the grade 1/2 event. That these sorts of analytic bases may have contributed to selection of the grade 1/2 event as the false event is supported by spontaneous expressions of surprise by several subjects during debriefing. That is, even subjects who chose the "Slime" event as the false event often expressed surprise when the experimenter confirmed that it had not really occurred (e.g., "I had no idea;" "I can't believe that . . . I can remember parts of it;" "You mean that didn't happen to me?;" "Oh really? Holy!;" "No way! I remember it! That is so weird!;" "It was? Oh, really?;" "If you didn't tell me it was a false event, I would have left here thinking I did this.").

Discussion

The results from our no-photo condition converge with prior evidence that combining a plausible narrative attributed to a family member with social pressure, demand characteristics, and sustained memory-recovery techniques can lead a substantial percentage of undergraduate subjects to report memories of a childhood pseudoevent. Additional research is needed to assess the relative contributions of the various components of these suggestive influences in fostering false-memory reports.

Our central finding is that supplementing the other suggestive influences with a photo associated with (but not depicting) the suggested pseudoevent doubled the rate of false-memory reports, yielding a substantially higher rate of false-memory reports than any prior study. Even with a relatively strict criterion of being judged to have experienced memories of the suggested event (as opposed to merely reporting images of that event), two thirds of the subjects in the photo condition were classified as having developed false memories (more than twice the previous high, reported by Porter et al., 1999, of 26%). These findings are particularly dramatic in that subjects judged as having false memories gave quite high ratings of the extent to which they felt they were remembering the event, of the extent to which remembering the event was like reliving it, and of their confidence that the event had actually occurred. Indeed, this group of subjects' ratings of their memories of the pseudoevent were comparable to ratings of memories of the later-childhood true events. Of course, this finding does not mean that our subjects' false memories were in all ways indistinguishable from accurate autobiographical recollections, but it does suggest that the pseudomemories were often experienced as quite compelling.

What explains the dramatic effect of the true-photo manipulation? One possibility (suggested by Marcia K. Johnson, personal communication, 19 July 2002) is that having the photos encouraged subjects in the photo condition to spend more time at the remembering task between Sessions 1 and 2 (e.g., because seeing the photo around one's residence might act as a prompt to work on the task or because having the photo made the task more engaging). At the end of Session 2, subjects were asked how many times they had worked on the remembering task between Sessions 1 and 2. The photo ($M = 6.00$, $sd = 3.58$) and no-photo ($M = 5.68$, $sd = 2.59$) conditions did not differ on this measure, $F < 1$. This self-report measure is of unknown validity, but these findings do not support the idea that subjects in the photo condition spent more time working at remembering the pseudoevent.

We speculate that three different mechanisms may have contributed to the dramatic effect of the photo. First, it may be that the photo added to the authoritativeness of the suggestive narrative. That is, even though the photo did not depict the Slime prank, its presentation may have added to subjects' confidence that the suggested event really happened (cf. Paddock & Terranova, 2001). Second, the photo may have enabled subjects to speculate about details of the pseudoevent (e.g., "Who would my collaborator in the Slime prank

have been?”). Hyman and Billings (1998) reported that subjects who freely speculated about a suggested pseudoevent during an initial interview were more likely than other subjects to later be scored as reporting false memories. Subjects in our no-photo condition may have had difficulty entering into such speculations due to inability to recall relevant details, such as the appearances of their grade 1/2 classmates and teacher. Finally, memories of perceptual details from the photo (e.g., the teacher’s appearance) may have subsequently been blended with products of imagination to produce vivid images of the pseudoevent, thereby contributing to subjectively compelling false memories (as per the source monitoring framework of Johnson and coauthors, e.g., Johnson, Hashtroudi, & Lindsay, 1993).

Articles reporting false-memory induction studies (and citations of such studies in secondary sources) sometimes collapse across “partial” and “complete” false-memory reports, either by not distinguishing the two categories at all or by emphasizing the sum of both when summarizing the false-memory rate. Our findings suggest that this may not be appropriate, because the self-ratings of subjects classified as having images but not memories (analogous to what others have termed “partial” false memories) more closely resembled the self-ratings of subjects judged to have neither memories nor images than they resembled the ratings of subjects judged to have false memories. Casual inspection of the transcripts reveals that subjects categorized as experiencing images but not memories often appeared to be speculating about, rather than remembering, the suggested event (e.g., they said things along the lines of “Well, it probably would have been...” or “I probably would have felt...”). Such speculations may be an important step toward developing pseudomemories (as per Hyman & Billings, 1998), but given the low ratings such subjects reported on measures of remembering, reliving, and confidence, they do not appear to warrant the term “false memories.”

The pseudoevent in our study was designed to be a distinctive, memorable, one-off event with a modicum of emotional “zing,” and to be neither entirely implausible nor likely actually to have occurred. Extant research indicates that the likelihood of false memories is moderated by numerous variables, including the nature of the suggested event (see Lindsay & Read, 2001). Our “Slime” event differs dramatically and in numerous ways from childhood sexual abuse, so the absolute rate of false memories in our study cannot be used to predict the probability of false memories of childhood sexual abuse. Indeed, it cannot even be assumed that the true-photo effect obtained with the particular event and

photos used in this study will generalize to other relatively innocuous childhood pseudoevents. Nonetheless, there is little reason to doubt that the mechanisms involved in our effect can contribute to other sorts of false memories, and therefore our results warrant concern about the riskiness of encouraging clients to review old photo albums during attempts to “recover” suspected but non-remembered histories of childhood sexual abuse.

References

- Bartlett, F. C. (1932). Remembering: A study in experimental and social psychology. Cambridge, England: Cambridge University Press.
- Dolan, Y. M. (1991). Resolving sexual abuse: Solution-focused therapy and Ericksonian hypnosis for adult survivors. New York: Norton.
- Hyman, I. E., Jr., & Billings, F. J. (1998). Individual differences and the creation of false childhood memories. Memory, *6*, 1-20.
- Hyman, I. E., Jr., Husband, T. H., & Billings, F. J. (1995). False memories of childhood experiences. Applied Cognitive Psychology, *9*, 181-197.
- Hyman, I. E., Jr., & Pentland, J. (1996). The role of mental imagery in the creation of false childhood memories. Journal of Memory and Language, *35*, 101-117.
- Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. Psychological Bulletin, *114*, 3-28.
- Koutstaal, W., Schacter, D. L., Johnson, M. K., & Galluccio, L. (1999). Facilitation and impairment of event memory produced by photograph review. Memory & Cognition, *27*, 478-493.
- Lindsay, D. S., & Read, J. D. (2001). The recovered memories controversy: Where do we go from here? In G. Davies & T. Dalgleish (Eds.), Recovered memories: Seeking the middle ground (pp. 71-94). London: Wiley.
- Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. Psychiatric Annals, *25*, 720-725.
- Paddock, J. R., & Terranova, S. (2001). Guided visualization and suggestibility: Effect of perceived authority on recall of autobiographical memories. Journal of Genetic Psychology, *162*, 347-356.
- Pezdek, K., Finger, K., & Hodge, D. (1997). Planting false childhood memories: The role of event plausibility. Psychological Science, *8*, 437-441.
- 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' opinions, practices, and experiences. Journal of Clinical and Consulting Psychology, *63*, 426-437.
- Porter, S., Yuille, J. C., & Lehman, D. R. (1999). The nature of real, implanted, and fabricated memories for emotional childhood events: Implications for the recovered memory debate. Law and Human Behavior, *23*, 517-537.
- Schacter, D. L. (2001). The seven sins of memory: How the mind forgets and remembers. Boston, MA: Houghton Mifflin Co.
- Schacter, D. L., Koutstaal, W., Johnson, M. K., Gross, M. S., et al. (1997). False recollection induced by photographs: A comparison of older and younger adults. Psychology & Aging, *12*, 203-215.
- Wade, K. A., Garry, M., Read, J. D., & Lindsay, D. S. (2002). A picture is worth a thousand lies: Using false photographs to create false childhood memories. Psychonomic Bulletin and Review, *9*, 597-603.

Table 1

Means (and Standard Deviations) of Subjects' Ratings of Their Memory Experiences for the True Events as a Function of Condition (Scales Ranged from 1 [Low] to 7 [High])

Measure	Grade 5 or 6		Grade 3 or 4	
	No Photo M (SD)	Photo M (SD)	No Photo M (SD)	Photo M (SD)
Reliving	4.14 (1.64)	4.26 (0.96)	3.55 (1.90)	3.70 (1.55)
Remembering	4.86 (1.58)	4.91 (1.41)	4.23 (1.59)	4.17 (1.59)
Confidence	6.00 (1.63)	6.35 (0.98)	5.46 (1.82)	5.87 (1.79)

Table 2

Means (and Standard Deviations) of Subjects' Ratings of Their Memory Experiences for the Suggested Event as a Function of Session and Condition (Scales Ranged from 1 [Low] to 7 [High])

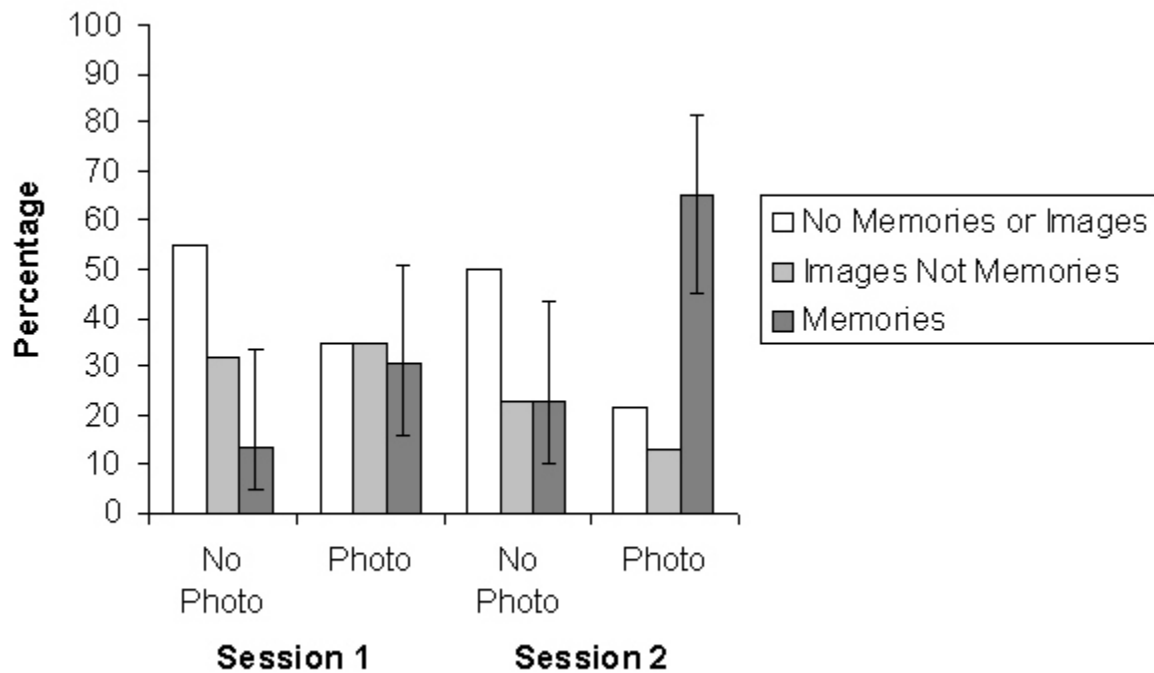
Measure	Session 1		Session 2	
	No Photo M (SD)	Photo M (SD)	No Photo M (SD)	Photo M (SD)
Reliving	1.41 (0.73) ^a	2.09 (1.35) ^b	2.00 (1.31) ^b	3.22 (1.54) ^c
Remembering	1.50 (1.01) ^a	1.96 (1.26) ^a	1.91 (1.48) ^{ab}	2.83 (1.61) ^b
Confidence	1.91 (1.19) ^a	2.46 (1.51) ^a	2.36 (1.81) ^a	3.59 (1.99) ^b

Note: Means within a row not sharing a superscript differ at the $p < .05$ level.

Figure 1. Example of the sort of school class group photos used in the experiment. Note that this example, being that of the first author's grade-2 class, is of somewhat older vintage than those used in the experiment, and that the original of the example and the photos used in the study were in color.

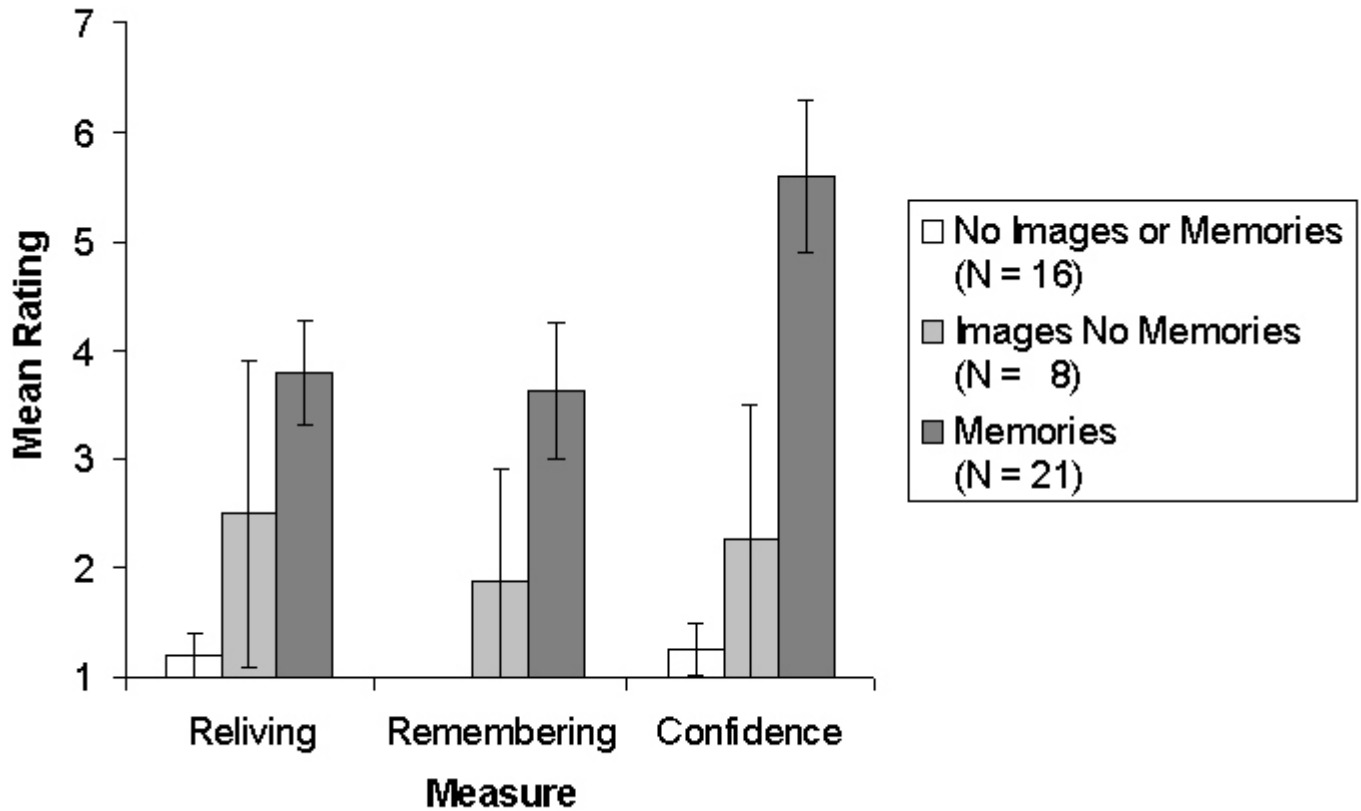


Figure 2. Percentage of subjects classified as having no memories or images, images but not memories, and memories, as a function of experimental condition and session.



Note: The error bars represent 95% confidence intervals around the proportion of subjects classified as having memories of the suggested event, calculated using a method recommended by Richard Lowry on his VassarStats website (<http://faculty.vassar.edu/lowry/VassarStats.html>).

Figure 3. Mean ratings (and 95% confidence intervals^a) as a function of judges' categorization of subjects' memory reports.



^aConfidence intervals were calculated around the individual cell means and so are not specific to particular comparisons.