Amalgamations of Memories: Intrusion of Information from One Event into Reports of Another

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SUMMARY

Numerous researchers have reported that exposure to misleading postevent information (MPI) regarding details in a witnessed event can lead people to report false details from the MPI when asked to report the witnessed event. In such studies, the MPI is presented to participants in the context of information about the witnessed event. This experiment tests the hypothesis that postevent exposure to information that participants know is not about the witnessed event can, nonetheless, affect performance on tests of memory for that event. As predicted, when asked to report details of an event depicted in a slide show, participants tended to intrude details mentioned in a recent postevent narrative that described a different event. © 1998 John Wiley & Sons, Ltd.

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Bem P. Allen developed the hypothesis and designed and conducted the experiment. D. Stephen Lindsay contributed to the analysis and interpretation of the results and to their presentation in this paper.

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participants understand that it refers to the witnessed event. Lindsay and Johnson (1989) proposed that the fact that the event participants witness and the event they later read or hear about are one and the same event may increase the likelihood that they will later misidentify memories from the postevent information as memories of the event itself.

The current experiment tested the hypothesis that postevent exposure to information that participants know full well is not about the witnessed event can affect performance on tests of memory for that event. As further elaborated in the Discussion, we assume that test items can activate memory records with relevant content from numerous sources (e.g., the to-be-remembered event itself and/or postevent information). Memories of details from one source may consequently be amalgamated during remembering with memories from another (e.g., memories of a detail mentioned in a postevent narrative may be amalgamated with memories of the event itself). This notion is similar to Johnson’s source monitoring framework (e.g., Johnson, Hashtroudi and Lindsay, 1993), but differs from it in emphasizing the way memory information from multiple sources can be amalgamated during remembering.

In the current experiment, the witnessed event consisted of a narrated slide show depicting an event, including a number of ‘target details’ (e.g., can of Pepsi) and ‘control details’ (e.g., a hat). The experimental postevent narrative described a different event (i.e., involving different people, in a different setting, etc.) but included a number of ‘narrative details’ in the same semantic categories as the target details (e.g., can of Coke). Participants in a control condition read an unrelated postevent narrative that did not include any details in the same semantic categories as the target details. All participants were given a cued recall test of memory for event details 48 h after viewing the event. To assess the effects of recency of postevent information, some participants read the postevent narrative immediately after viewing the event, whereas other did so 48 h later, immediately before the test.

The hypothesis that exposure to information that participants know is unrelated to the witnessed event can affect their subsequent event reports is important from both applied and theoretical perspectives. From an applied point of view, although eyewitnesses are sometimes exposed to misleading suggestions in the context of information about the witnessed event itself (e.g., comments made by another witness), it is likely that postevent exposure to non-related material containing potentially confusable information (e.g., cop shows on television) is many times more common. From a theory-testing point of view, the procedure used in this experiment greatly attenuates the possibility that participants will knowingly use the postevent information as a source of answers to questions about the target event (because unlike participants tested in the standard procedure they have no reason to believe that information from one source provides a valid description of details in the other).

METHOD

Participants

One hundred and forty-eight male and female undergraduate students at Western Illinois University participated on the promise of extra-credit points applicable to
their final grade in an introductory psychology class. Students were quasi-randomly assigned to conditions: control-immediate \((N = 21)\), control-delayed \((N = 28)\), experimental-immediate \((N = 50)\), and experimental-delayed \((N = 49)\). An additional 26 students, spread approximately evenly across conditions, participated in the initial session but did not attend the second.

**Materials and procedure**

Two slide shows were prepared: one depicted an interaction between a female student and a male professor in a classroom, and the other depicted an interaction between a male student and a female professor in an office. There were 11 slides in each slide show, beginning with a wideangle slide that depicted all of the target details. An accompanying narrative drew attention to each of 12 target details and 6 control details. The following are samples of commentary accompanying slide presentations of corresponding target items from the two scenarios: ‘A calculator is near the professor’; ‘A computer is near the professor’. The two scenarios paralleled one another in several ways (e.g., each involved an interaction between a professor and a student, and each involved exemplars from the same 18 semantic categories, such as cola soft drinks), but it was unambiguously clear that they were two quite distinct events (e.g., office vs. classroom, male vs. female professor, etc.).

Two class sections were randomly assigned to view the classroom and office events, respectively. Booklets corresponding to four conditions were quasi-randomly distributed within each class section. After obtaining signed informed consent to participate in a study of memory for information presented in slides, the experimenter presented the slides while reading the accompanying narrative aloud. The initial wide-angle slide was displayed for approximately 25 s while the experimenter narrated the background information about the event; thereafter each slide was presented for approximately 7 s, with accompanying narration read by the experimenter. After the slide show, participants in the immediate conditions read the postevent narrative and those in the delayed conditions performed an unrelated filler task (counting backwards from 1000 by 2 s and recording the numbers in columns on a sheet).

The following are excerpts from the three postevent narratives: ‘He bends over and reaches out to touch the Hypnosis book on his table-top’; ‘Bending over, she reaches out and touches the Human Sexuality book on the desk-top’; ‘It is time to visit Grammie again . . . the children find a way to make a game of the trip’. The postevent narratives for the office and classroom events were similar to the narratives that accompanied the slide shows except that they included additional descriptive information, did not mention the 6 control details, and named 12 narrative details (e.g., can of Coke), each of which corresponded to a target detail in the slide show (e.g., can of Pepsi). Among participants in the experimental conditions, those who had viewed the slide show of the classroom event read the office narrative, whereas those who had viewed the office event read the classroom narrative. The grandmother narrative, used as the postevent narrative in the control condition, did not include any details corresponding to target details in the slide shows. Approximately 5 min were given to read the narrative or perform the filler task, after which participants were told that the first phase of the experiment was over and that they should write a well-remembered code number on the cover of the booklet and then return the booklet to the experimenter.
A second booklet, marked with each participant’s code number, was distributed 48 h later. Participants in the immediate conditions performed the filler task while those in the delayed conditions were reading the postevent narrative, after which all participants performed the test. The test consisted of 23 cued-recall questions. The following is a representative item from the test: ‘In the slides you saw earlier, what object that is useful to professors and secretaries was seen in about the middle of the surface where the professor was working?’ The first four questions concerned very salient information that differed between the classroom and office events (e.g., ‘In the slides you saw earlier, what was the gender (sex) of the professor?’); responses to these questions (henceforth referred to as the ‘easy’ questions) were used to determine whether or not participants correctly understood which of the two events the test concerned. Question 22 (‘What type of surface was the professor working on?’) was dropped because it was ambiguous. Of the remaining 18 questions, 12 concerned target event details (e.g., ‘In the slides you saw earlier, what brand of soft-drink was contained in the can the professor was holding?’) and 6 concerned control event details (e.g., ‘What was worn over the professor’s shirt?’). Instructions printed on the test stated that the postevent narrative was irrelevant to the to-be-remembered event and that ‘Thus, you will be incorrect and your score will be lowered if you answer the following slide questions with any of the information contained in the narrative you read’ (cf. Lindsay, 1990). Test instructions also encouraged participants to answer every question even if they were unsure of the correct answer.

RESULTS

Preliminary analyses

A multivariate analysis of variance (MANOVA) was performed to compare performance of participants in the control-immediate and control-delayed conditions in terms of proportion correct on questions regarding easy items, proportion correct on questions regarding control items, and proportion correct on questions regarding target items. As expected, there was no effect of the timing of the irrelevant grandmother story on the multivariate $F$ or any of the univariate measures, all $Fs < 1$. Consequently the control-immediate and control-delayed conditions were collapsed for all subsequent analyses and will henceforth be referred to simply as the control condition.

A second MANOVA was performed to examine possible interactions between class-section/witnessed event (office vs. classroom event) and condition (control vs. experimental-immediate vs. experimental-delayed) for the same dependent variables as in the foregoing analysis. This analysis indicated that there were no reliable differences between the two class-sections/events: no interactions involving class-section/event approached significance (all $Fs < 1.6$; smallest $p = 0.21$). Therefore all subsequent analyses are collapsed across this variable.

A one-way between-subjects analysis of variance (ANOVA) compared the control, experimental-immediate and experimental-delayed conditions in terms of proportion correct for the four ‘easy’ questions (e.g., the gender of the professor, which differed between the classroom and office events). As expected, there was no reliable effect of condition, $F(2,145) = 2.28$, $MS_e = 0.009$, $p = 0.11$, and performance was near ceiling in both conditions (see Table 1). This demonstrates that participants in the
Table 1. Mean proportions on a variety of measures as a function of condition (with standard deviations)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Control</th>
<th>Experimental-immediate</th>
<th>Experimental-delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion correct on easy items</td>
<td>0.93 (0.11)</td>
<td>0.98 (0.08)</td>
<td>0.95 (0.10)</td>
</tr>
<tr>
<td>Proportion correct on control items</td>
<td>0.51 (0.25)</td>
<td>0.59 (0.25)</td>
<td>0.52 (0.23)</td>
</tr>
<tr>
<td>Proportion correct on target items</td>
<td>0.48 (0.14)</td>
<td>0.52 (0.21)</td>
<td>0.38 (0.18)</td>
</tr>
<tr>
<td>Proportion false report of MPI on target items</td>
<td>0.03 (0.04)</td>
<td>0.08 (0.10)</td>
<td>0.13 (0.14)</td>
</tr>
</tbody>
</table>

Experimental conditions had little difficulty differentiating between the two events at a global level.

**Main analyses**

A one-way ANOVA assessed the effect of condition (control vs. experimental-immediate vs. experimental-delayed) on proportion correct for questions regarding control details. As expected, there was no reliable effect of condition on performance on control items, $F < 1$ (see Table 1).

An ANOVA of the effect of condition (control vs. experimental-immediate vs. experimental-delayed) on proportion correct on target details revealed a reliable effect, $F(2,145) = 7.71$, $MSe = 0.03$, $p = 0.001$ (see Table 1). Post-tests using the Tukey statistic revealed that correct recall of target items was reliably lower in the experimental-delayed condition than in either of the other conditions and that no other differences were statistically reliable at the 0.05 level.

This pattern of results was mirrored in an analysis of the proportion of questions regarding target details for which participants responded incorrectly by reporting the corresponding narrative detail (e.g., 'Pepsi' for 'Coke'): there was a reliable effect of condition, $F(2,144) = 11.46$, $MSe = 1.55$, $p = 0.0001$. Tukey post-tests indicated that such errors were reliably more common in the experimental-delayed condition than the experimental-immediate or the control condition, and the latter two conditions were not reliably different (see Table 1).

**DISCUSSION**

The central finding of this experiment is that exposure to postevent information that participants know is not about a witnessed event can impair performance on a subsequent test of memory for that event by leading them to report details from the postevent information in place of witnessed details. This finding is important from an applied perspective because virtually all eyewitnesses are exposed to multiple sources of information that include details that are potentially confusable with the details of a

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1The error data for a randomly selected subject in the experimental-immediate condition were withdrawn to equate the $N$ per condition in a preliminary analysis and were subsequently lost. Thus, in this analysis, the experimental-immediate condition had 49 observations.
witnessed event (e.g., other witnessed events, events described by others, etc.). In terms of theoretical accounts of the effects of MPI, the finding is important because there is no reason to believe that participants knowingly relied on memory for the narrative as a source of answers to questions regarding the event; consequently, it is likely that the effect reflects genuine memory errors.

Although novel in the context of research on eyewitness suggestibility, this finding is not entirely surprising. Earlier research on retroactive inhibition (RI) demonstrates effects of memory information from one source on performance on tests of memory for information from another source, even though the two sources in RI paradigms are not ‘about’ one another. Also, research on ‘list differentiation’ (see Abra, 1972, for a review) and, more recently, source monitoring (see Johnson et al., 1993, for a review) demonstrates that memories from non-related sources are sometimes confused.

According to the source monitoring (SM) framework, memory probes (e.g., the cued recall questions used in the current experiment) activate memory records in accord with the encoding specificity principle. Any given probe may activate memories from the target source and/or from other sources. Activated memory records are said to be attributed to particular sources via decision processes based on qualitative characteristics of the content of the activated information. These SM processes are described as being analogous to the processes that underlie identification of current perceptual stimuli. For example, activated memory records of hearing an utterance may include representations of the perceptual qualities of the sound of the speaker’s voice, and this memorial perceptual content can be used to recognize the speaker of the remembered utterance just as current perceptual input can be used to recognize a person’s voice. On occasion, SM engages conscious and strategic deliberation regarding one or more aspects of a memory’s source (e.g., one may consciously struggle to remember whether a particular statement was said by Kathy or by Liz, just as one may struggle to identify a voice heard over the telephone). However, most SM attributions are made quickly and without conscious deliberation. From the SM perspective, any manipulation that increases the extent to which memories from one source resemble memories from another will increase the likelihood of SM misattributions.

The central finding of the current experiment accords well with the SM perspective: apparently, memory records of details from the postevent narrative were misidentified at test as memory records from the slide show’s depiction of a different professor-student interaction. The global semantic overlap of the two scenarios, the fact that details from the two scenarios were from the same semantic categories, and the fact that the two scenarios were presented under similar conditions would all be expected to contribute to the likelihood of such intrusions.

The finding that performance in the experimental-immediate condition did not reliably differ from performance in the control condition is somewhat problematic for the SM framework. In general, SM performance declines with delay, so if all else was held constant one would expect that intrusions would be more rather than less common in the experimental-immediate than in the experimental-delayed condition. Consistent with this, Lindsay (1990) found that when subjects were explicitly and emphatically told not to report any detail mentioned in the postevent narrative (as in Jacoby’s ‘logic of opposition’ procedure, e.g., Jacoby, Woloshyn and Kelley, 1989), those who had heard the tape-recorded narrative immediately before test successfully excluded misleading suggestions whereas those who had heard the narrative 2 days
earlier, immediately after viewing the event, often reported misleading suggestions as
details witnessed in the event. Given that Lindsay’s (1990) participants who received the postevent narrative
immediately before the test did not erroneously report MPI, why did participants in
the experimental-delayed condition of the current experiment do so? Although partici-
pants in the current experiment were told not to use the postevent narrative as a
source for answers, they were not explicitly told that each and every detail in the
postevent narrative that was relevant to any question on the test was a misleading
suggestion and should not be reported. Thus, in the current experiment, participants
who believed that a particular detail (e.g., Coke can) had been presented in both
sources would go ahead and report that detail. In contrast, Lindsay’s (1990) partici-
pants understood that even if they felt that a particular detail had been witnessed in
the event they should not report it if they also remembered that it had been mentioned
in the postevent narrative. Lindsay’s subjects often spontaneously reported, during
debriefing, that they had withheld report of a detail because they remembered hearing
it described in the postevent narrative, even though they were quite sure (erroneously)
that they had also seen that detail in the event itself. This is a draw-back of the logic
of opposition approach, because false beliefs that a suggested item was witnessed cannot
be observed in participants’ reports if they also have a correct belief that the item was
encountered in the postevent information (see Lindsay, Gonzales and Eso, 1995).

Why would misled participants both accurately remember encountering a detail in
the postevent narrative and inaccurately ‘remember’ seeing that detail in the event? Presumably, some aspects of the activated memory information representing the
encounter with a detail in the postevent narrative provide accurate cues to source
(e.g., memory records indicative of having read the information) but other aspects
provide misleading cues to source (e.g., memory records of a visual image spontane-
ously formed when the MPI was encountered). Therefore, participants might believe
that they both remember reading about and viewing that detail. Consistent with this
account, some studies have found effects of MPI on performance on a source-
monitoring test, in which participants are asked to indicate, for each test item,
whether they remember that item from the event, from the postevent narrative, from
both sources, or not at all (e.g., Lindsay, 1989; Zaragoza and Lane, 1994; Zaragoza
and Mitchell, 1996). Interestingly, when participants err on such tests by claiming to
have witnessed a detail from the MPI, they usually do so by claiming that the detail
was in both sources, rather than by claiming it was only in the event. Thus, we suspect
that when participants in the experimental-delayed condition of the current experi-
ment erroneously reported a detail from the postevent narrative as something wit-
nessed in the event, they were typically aware (or at least could have become aware if
asked) that the detail had also been mentioned in the postevent narrative.

Given that the SM framework holds that, all else being equal, SM performance
declines with delay, why were intrusions in the experimental-immediate condition not
reliably more common than the guessing baseline indexed by the control condition? It
is possible that participants in the experimental-immediate condition spontaneously
noted the large number (12) of complementary items in the event and postevent
narrative (e.g., Pepsi – Coke, Newsweek – Time, etc.) and that this in turn led them
to differentiate between the two sources in ways that later reduced SM errors.
Participants in the experimental-delayed condition would be less likely to spontane-
ously note that details in the postevent narrative corresponded to, and yet differed

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from, details in the event, and so would be less likely to differentiate between the two sources. This explanation of the null effect of MPI in the experimental-immediate condition fits with Tousignant, Hall and Loftus's (1986) finding that conditions that increase the likelihood that participants will detect discrepancies between the event and the postevent narrative decrease the likelihood of later false reports. It may also be the case that self-paced reading of the postevent narrative in a large classroom setting led to generally poor memory for narrative details; that is, perhaps intrusions were rare in the experimental-immediate condition simply because participants rarely remembered the postevent details at all when tested 2 days after reading the narrative. Whatever the explanation of the null effect obtained in the experimental-immediate condition of the current experiment, we think it very likely that intrusions of memories of details from one event into reports of another event do occur under a variety of conditions, not only when the MPI is presented immediately before the test.

The central point of the current report is a simple one: memories of details in one event can intrude into reports of another. This finding underscores the need for a more refined model of SM processes. Such a model would improve ability to predict (and, ideally, postdict) the likelihood that information in memory from one source will erroneously be amalgamated with information in memory from another source in eyewitnesses’ reports, and suggest ways of testing memory that would minimize the likelihood of such intrusions without reducing the amount of accurate information reported.

REFERENCES


