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Source Monitoring and Suggestibility to Misinformation: Adult Age-Related Differences

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SUMMARY

We compared young and older adults' source monitoring performance on an explicit source identification test using the misinformation paradigm. Several age-related differences in source memory were demonstrated: (a) older adults were more likely than were young adults to say that they saw information that was actually only suggested to them; (b) older adults were more confident in their false memories than were young adults; (c) older adults were less confident in their accurate memory for the source of information than were young adults. Together, the data suggest that older adults either lacked or failed to use helpful diagnostic source information (e.g. perceptual details or temporal information), and that their confidence in their false memories reflected an over-weighting of semantic information. Copyright © 2002 John Wiley & Sons, Ltd.

A primary task for anyone remembering an event is source monitoring. For example, when an eyewitness is asked to tell what they saw or heard, they are implicitly being asked to tell only what they themselves witnessed—gating out whatever they may have thought about the event, what they heard on the news, what the police said about the events, and so on. Empirical evidence confirms that source confusion plays a major role in suggestibility to misinformation in laboratory studies of memory for complex events (see e.g. Belli and Loftus, 1994; Lindsay, 1994; Mitchell and Johnson, 2000; Zaragoza *et al.*, 1997, for reviews). That is, people often come to remember seeing in a witnessed event things that were only suggested to them later. Perhaps this should not be too surprising given that the originally witnessed event and postevent questioning episodes share a common referent: The postevent interrogation is usually about the witnessed event (cf. Allen and Lindsay, 1998). Thus, there is substantial semantic overlap between the two potential sources of information, making them objectively similar (e.g. Mitchell and Zaragoza, 2001). Moreover, unlike some other source monitoring situations—such as determining which of two speakers said something—in the eyewitness case the sources are not mutually exclusive. Any given piece of information potentially could be contained in both the original event

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and the postevent. Therefore, knowledge that some piece of information came from a postevent source is not informative with regard to whether it was also witnessed. Together, these factors provide an especially difficult source monitoring situation.

There is considerable evidence that there are often age-related deficits in source monitoring. For example, older adults typically are poorer at remembering which of two speakers said something, which of two lists a word appeared on, whether they read something or generated it, and so on (see e.g. Burke and Light, 1981; Johnson *et al.*, 1993; Kausler, 1994; Spencer and Raz, 1995, for reviews). This age-related deficit in memory for source can sometimes occur despite good old/new recognition memory. Research is beginning to identify some of the conditions that make source identification especially difficult for older adults. With regard to misinformation effects, two characteristics of older adults' source monitoring ability seem especially relevant. First, older adults sometimes, but not always, have difficulty utilizing multiple cues to source (e.g. Ferguson *et al.*, 1992; but see Bayen and Murnane, 1996). Second, older adults have a particularly hard time discriminating between sources as they become more similar (e.g. Ferguson *et al.*, 1992; Henkel *et al.*, 1998). For example, Ferguson *et al.* (1992) showed that older adults had more difficulty than young adults discriminating between two female speakers as potential sources of spoken words but older adults were as good as young adults at discriminating between a male and a female speaker. The classic misinformation procedure (Loftus *et al.*, 1978) embodies both of these characteristics—that is, it involves many cues to source (e.g. several sources of information across multiple modalities—e.g. heard, seen, read—and across time), and the two potential sources of information are inherently similar. Although the similarity between the sources of information may vary across actual eyewitness situations, it seems reasonable that older adults might find source monitoring more difficult under many conditions than do young adults—especially those instantiated in the misinformation paradigm.

Although understanding the effects of ageing on source monitoring is of practical as well as theoretical importance, there has been little research directly examining older adults' source memory using the classic misinformation paradigm (Loftus *et al.*, 1978). In fact, there have been fewer than a handful of papers published on the topic of age-related misinformation effects and the results from those studies are mixed. For example, although a study by Cohen and Faulkner (1989) demonstrated that older adults were more suggestible than young adults (see also Karpel *et al.*, 2001; Loftus *et al.*, 1992), the conclusion drawn by Coxon and Valentine (1997) was that older adults were no more suggestible than the college-aged adults in their study. So, the suggestibility of older adults, as compared to young adults, is still unclear. More important, of those few published papers comparing young and older adults using the misinformation paradigm, none used the potentially most sensitive test of participants' source memory. The published studies used recognition memory tasks rather than more explicit source identification tasks. This is an important distinction because there is evidence that older adults can sometimes do better on source identification tests—that is, they can perform source memory tasks as well as young adults—if the source monitoring requirements are made as clear as possible (e.g. Multhaup, 1995; Multhaup *et al.*, 1999). Thus, it could be the case that under conditions that emphasize the source requirements of the task, older adults would do no worse than young adults.

In short, the goal of the present study was to assess older adults' source monitoring performance using a misinformation procedure and including an explicit source identification test. Participants first 'witnessed' a forensically relevant event—in this case, a

video of a house burglary. They then were asked questions about what they saw. Embedded in these postevent questions was some false information (i.e. postevent misleading suggestions). We chose to use a procedure involving repeated exposures to suggestion in which participants read some misinformation once and other misinformation three times (still other items served as never-presented control items; e.g. Zaragoza and Mitchell, 1996). Previous work has shown that young adults' suggestibility increases as a function of the number of times they read misleading information in the postevent questions (e.g. Drivdahl and Zaragoza, 2001; Mitchell and Zaragoza, 1996; Zaragoza and Mitchell, 1996), but there is some evidence in other domains that older adults' response to repeated information may differ from that of young adults (e.g. Jacoby, 1999; Schacter *et al.*, 1997). Thus, this procedure allowed us to examine the relative effect of number of exposures to suggestions on young and older participants' memory. Finally, participants were given a surprise source memory test in which they were asked directly about their memory for where they encountered the critical items, along with items from the other source categories (i.e. video only, both video and questions, neither). The general finding from studies using this paradigm is that, although they are warned that some of the information did not really occur in the video, young participants nevertheless say they remember a significant proportion of the critical items from the original event (i.e. they make source misattributions). In the present study, we were interested in examining the relative level of source misattributions made by young and older adults.

METHOD

Subjects and design

Participants were 51 college-aged students (M age $= 19.6$ yrs, $SD = 1.5$ yrs) and 51 healthy older adults recruited from the community (M age $= 76.0$ yrs, $SD = 3.8$ yrs). The two age groups were equivalent in terms of number of years of formal education ($M = 14.5$ yrs, $SD = 1.2$ yrs for the young adults; $M = 14.5$ yrs, $SD = 2.1$ yrs for the older adults; $F < 1$). Although the young adults scored higher on a modified version of the WAIS ($M = 23.21$, $SD = 3.55$ for the young adults; $M = 20.57$, $SD = 4.43$ for the older adults; maximum possible score $= 30$; $F(1, 100) = 11.08$, $MSe = 16.13$, $p < 0.01$), none of the findings reported below were qualified when WAIS scores were entered as a covariate. Therefore, this difference will not be discussed further. Young adults participated for course credit and older adults received a small monetary compensation. The experiment involved a 2 (Age: young, old) $\times$ 3 (Exposure Level: 0, 1, 3) mixed-factorial design with exposure level a within-subjects variable.

Materials and procedure

Young and older participants were tested separately in small groups ($n \leq 10$).

Phase 1 The eyewitness event

The eyewitness event was a 5-min segment of a police training video (Zaragoza and Mitchell, 1996). It depicts a burglary of a home by two youths and an ensuing police car chase.

Phase 2 Misleading postevent questions

Immediately after seeing the video, participants answered 36 printed questions about the events. The questionnaire was composed of three 12-question subsets. Each question in a subset referred to one of 12 unique events in the video (e.g. the thief leaving the home), and corresponded to one of 12 critical items (the thief wore gloves, the thief pulled a window shade, the thief stole a ring, the thief had a gun, the driver smoked a cigarette, there was a barking dog, the thief put on his seatbelt, the neighbor's name was Mrs Anderson, one of the police officers was drinking coffee, the police said they would shoot, the driver was DUI, the driver jumped a curb with the car).

One subset followed the other without interruption. Thus, the questionnaire essentially reviewed the original events for the participants three times in succession. All participants answered all 36 questions, but, by adding critical items to specific questions as necessary, number of exposures to these items was manipulated within subjects. For example, for any one participant, items assigned to the three-exposure condition were embedded in each of the three questions about the relevant scene, as shown in the following example (critical item: the thief had a gun):

6. Later, as he was leaving the house the thief, *putting his hand on the gun at his waist*, looked both ways and went out the door. Did he slam the door behind himself?
18. Before leaving the house the thief *checked the gun at his waist and* looked both ways to see if anyone was watching. After he got out the door, did he begin to run?
30. As the thief was leaving the house, he *put his hand on the gun at his waist*, looked both ways and walked out the door. Did he step out onto a porch?

For other exposure conditions, the critical items (e.g. the italicized material in the example above) were simply deleted as necessary from either all (0 exposures) or the first two (1 exposure) of the three questions, and the rest of each question remained identical. Hence, each participant received only 8 of the 12 critical items. For each participant, four critical items were presented in all three subsets of questions (three-exposure level), four were presented in only the last subset of questions (one-exposure level), and four served as never-presented control items. Note that a previous experiment (Zaragoza and Mitchell, 1996, Experiment 1) demonstrated that placement of the single-exposure suggestions (i.e. whether in the first, second, or third subset of questions) had no effect on any of the dependent measures. Counterbalancing assured that all items served at all exposure levels equally often across participants.

Participants completed the questionnaire at their own pace. They were cautioned that they should read all of the information before answering and that they should answer each and every question even if they had to guess.

Phase 3 Source memory test

A surprise source memory test followed a 10-min filled interval, during which time all participants completed an abbreviated (15-item) written version of the WAIS and engaged in small talk with the experimenter. The source test was composed of an equal number of items from each of the four possible source categories (i.e. video only, questions only, both, neither). The probes were 32 statements read on a cassette recorder in a male voice (e.g. 'The thief wore gloves'. 'It was raining'). The interitem interval was 8 sec. Twelve statements contained the critical items. For any one participant, four of these critical probes were control items (0 exposures) and eight were exposed items (i.e. 'suggestions'; four each at 1 and 3 exposures). There were also 20 filler items composed as follows: 8

video only, 8 items from both the video and questions, and 4 new items. The four new items, together with the four critical items not exposed, comprised eight *neither* source items for each participant. Probes were presented in the same random order to everyone. The constraints on randomization were that a critical item could not occupy the first two or last two positions, and no two consecutive probes could be from the same source category.

Participants were given both written and verbal instructions for the source memory test. They were explicitly informed that some of the statements they would hear contained information that was only in the video, some contained information that was not in the video but was contained in the questions they answered, some contained information that was in both the video and the questions, and finally, that some of the test statements contained information that was in neither the video nor the questions. Furthermore, participants were told that they were to base their source judgements on their own memory of the events. Including this explicit warning about misinformation increases our confidence that we are measuring false memory and not some other aspect of suggestibility such as demand. Older adults required just slightly more explanation regarding the task than the young adults, and the experimenter proceeded with the test only when she was sure all participants understood the task.

Participants responded on an answer sheet that contained two columns labeled 'VIDEO' and 'QUESTIONS'. Each column contained 7-option scales: *definitely yes*, *probably yes*, *maybe yes*, *unsure*, *maybe no*, *probably no*, *definitely no*. Note that any *yes* response to a critical item in the *Video* column signals a source misattribution error, while a *yes* response to an exposed critical item in the *Questions* column indicates a correct source judgement. The responses are not mutually exclusive; one can recognize the correct source of an item and still misattribute it.

RESULTS

Initial analyses comparing one versus three exposures showed that, for all of the primary dependent measures of interest, there was a significant main effect of exposure level (all F's ≥ 5). Critical items were recognized as old and correctly attributed to the questions more often if they were exposed three times as opposed to once, but they also were misattributed to the video more often after three exposures than after one. That is, consistent with previous studies examining the effects of repeated exposure to suggestion (e.g. Drivdahl and Zaragoza, 2001; Mitchell and Zaragoza, 1996; Zaragoza and Mitchell, 1996), both accurate and false memory increased with number of exposures. Age did not interact with exposure level (i.e. one versus three exposures) on any of these measures (all Fs < 1). Thus, it would appear that previously demonstrated effects of repeated exposure to postevent suggestion generalized to older adults' memory under these circumstances, and that older adults were not affected any more or less by repeated exposure to suggestion than were young adults. For ease of presentation, the following analyses collapsed across number of exposures (i.e. one versus three) and simply compared memory for critical items that were exposed (i.e. suggestions) to those that served as never-presented control items.

Old–new recognition of critical items

We first examined young and older adults' old–new recognition for having experienced the critical items in the experiment, measured as the proportion of *yes* responses for the

critical items to either the video probe or the question probe, or both. This measure looks at recognition regardless of source accuracy or confidence. Although all participants were more likely to recognize critical items they had been exposed to (i.e. suggestions) than they were to false alarm to never-presented control items ($F(1, 100) = 788.03$, $MSe = 0.02$, $p < 0.0001$), there was a significant age × exposure interaction ($F(1, 100) = 41.51$, $MSe = 0.02$, $p < 0.0001$). Whereas older adults were more likely than young adults to call control items old ($M = 0.20$ and 0.11 for older and young adults, respectively; $t(100) = 2.29$, $p < 0.05$), they were less likely than young adults to recognize suggested items as old ($M = 0.66$ and 0.85 for older and young adults, respectively; $t(100) = 5.78$, $p < 0.0001$).

Misattributions of critical items to the video

In practical terms, one might expect that older adults' lower old–new recognition memory for exposed critical items (i.e. suggestions) would prove beneficial in that they cannot report misinformation if they do not remember it. In reality, however, this potential benefit was offset by older adults' tendency, compared to young adults, to misattribute more of the suggestions that they did recognize to the video. Figure 1 presents, for young and older adults, the proportion of recognized suggestions misattributed to the video compared to the base rate of misattributing the never-presented control items, collapsed across confidence level. A significant age × exposure interaction ($F(1, 100) = 7.72$, $MSe = 0.07$, $p < 0.01$) indicated that older adults exhibited a greater suggestibility effect than did young adults. That is, the difference between never-presented critical items and suggested items was greater for older than young adults (suggested items minus control = 0.59 for older adults, $t(50) = 11.22$, $p < 0.001$, and 0.39 for young adults, $t(50) = 7.53$, $p < 0.001$). There was also a main effect of age ($F(1, 100) = 22.57$, $MSe = 0.07$, $p < 0.0001$) and a main effect of exposure ($F(1, 100) = 176.67$, $MSe = 0.07$, $p < 0.0001$).

We will discuss young and older adults' confidence in these errors later. We turn now to consideration of why older adults exhibited increased suggestibility. One hypothesis is that older adults had less source information to specify that they read the information in the questions than did young adults. That is, remembering reading the suggestions in the questions might help to qualify, or offset, the effects of the memorial characteristics (e.g. semantic qualities) that lead participants to remember that the suggestions were also in the video (e.g. it might create doubt about whether the information was in the video). Indirect evidence for this hypothesis comes from closer examination of the patterns of young and older adults' misattributions to the video.

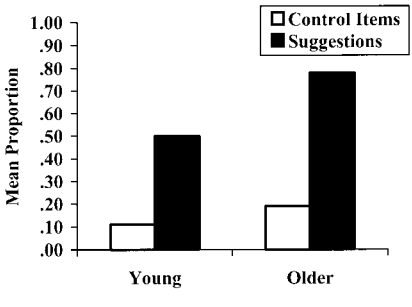

Figure 1. Mean proportion of recognized critical items misattributed to the video

Table 1. Source misattribution errors on critical items for young and older adults

	Both sources errors		Video-only errors	
	Control items	Exposed items (suggestions)	Control items	Exposed items (suggestions)
Young	0.00	0.50	0.10	0.06
Older	0.07	0.57	0.09	0.17

There are two ways that one could make a source misattribution of suggested items in this procedure. One could remember the suggested items, which were only read in the questions, as having occurred in *both* the video and the questions. One can also err by remembering that the items were *only* seen in the video—that is, one could not remember reading the items in the questions and attribute the memory to seeing the items only in the video—a complete misattribution of source. Previous research suggests that most of young adults' errors in this paradigm are of the *both sources* type, with young adults seldom remembering suggestions as coming from the video only (e.g. Belli *et al.*, 1994; Fiedler *et al.*, 1996; Zaragoza and Mitchell, 1996).

However, an interesting pattern emerged when we examined these two types of errors separately in our groups (see Table 1). When we examined participants' *both* errors collapsed across confidence level—that is, the proportion of recognized critical items for which people said *yes* to the video probe and *yes* to the questions probe, regardless of confidence, we found that there was a main effect of exposure ($F(1, 100) = 131.03$, $MSe = 0.10$, $p < 0.0001$). Participants were more likely to misattribute critical items that they were exposed to in the questions ($M = 0.54$) than never-presented control items ($M = 0.03$). However, there was no effect of age and the age $\times$ exposure interaction was not reliable (p's > 0.10). Thus, for critical items that participants remembered reading in the questions, the older adults were no more likely to misremember seeing the items in the video than were young adults.

When we examined *video only* errors (i.e. proportion of recognized suggestions for which participants said *yes* to the video probe but *no* to the questions probe, regardless of confidence), there was a significant age $\times$ exposure interaction ($F(1, 100) = 8.17$, $MSe = 0.02$, $p < 0.01$; Table 1). This interaction obtained because older adults said *yes* more often to critical items that they had read (i.e. suggestions) than to never-presented control items ($t(50) = 2.23$, $p < 0.05$), whereas young adults showed a numerical decrease in video only errors for suggestions as compared to control items ($t(50) = 1.80$, $p = 0.08$) (see Table 1). Note that although older adults were more likely than young adults to make *video only* errors for suggested items ($t(100) = 3.19$, $p < 0.01$), they were no more likely than young adults to make such errors for control items ($p > 0.10$). Hence, the age difference in *video only* errors is not simply an overall difference in older adults' willingness to attribute information to the video, compared to young adults.

Correct attribution of the critical items to the questions

A more direct test of the hypothesis that older adults' increased suggestibility arises from poor memory for reading the critical items in the questions would be to examine

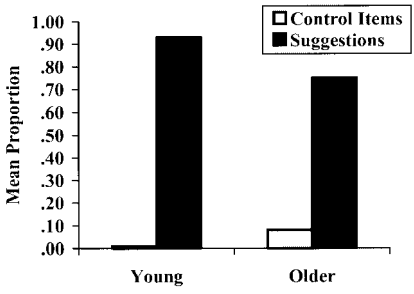

Figure 2. Mean proportion of recognized critical items attributed to the questions

participants' responses to the questions probe. If we look at young and older adults' memory for the actual source of the critical items (see Figure 2), that is, their tendency to say *yes* for recognized critical items to the *questions* probe, regardless of whether they also said the items were in the video, collapsed across confidence level, we see that main effects of age ($F(1, 100) = 4.20$, $MSe = 0.03$, $p < 0.05$) and exposure ($F(1, 100) = 1362.54$, $MSe = 0.02$, $p < 0.0001$) were superseded by a reliable age × exposure interaction ($F(1, 100) = 34.20$, $MSe = 0.02$, $p < 0.0001$). This interaction (see Figure 2) arose because the young adults' rate of saying that never-presented critical items were read in the questions was significantly lower than that of the older adults ($t(100) = 3.32$, $p < 0.01$) but the young adults were more likely than the older adults to remember reading the items they actually had read in the questions ($t(100) = 4.23$, $p < 0.001$). This age-related deficit in memory for the actual source of the critical items is consistent with the notion that one reason the older adults were making more source errors than the young adults was that they had poorer memory for the actual source of the suggestions.

Source memory for actually witnessed items

Although our primary interest was in age effects on memory for the critical items, it is informative to note that older adults also exhibited poorer memory for the source of actually witnessed events (i.e. items that were in the video only) than the young adults. These items were chosen to be salient members of their source category so that they might serve as a benchmark against which participants could judge their memories of the critical items. No attempt was made to equate these items with the critical items on any dimension (e.g. length of exposure, overall memorability). Therefore, direct comparison between memory for the critical items and memory for the actually witnessed items would be inappropriate. Nevertheless, examination of the actually witnessed items showed that young adults were far more likely than older adults to correctly remember that these items were only seen in the video (M's = 0.81, 0.33 for young and older adults, respectively; $t(100) = 9.31$, $p < 0.0001$), while older adults were more likely than young adults to make source errors by saying that these items were both seen in the video and read in the questions or were in the questions only (M's = 0.06 and 0.46 for young and older adults, respectively; $t(100) = 8.20$, $p < 0.0001$). Most of these errors for both age groups were of the 'both sources' type; 'questions only' responses were negligible ($M = 0.00$, 0.01 for young and older adults, respectively).

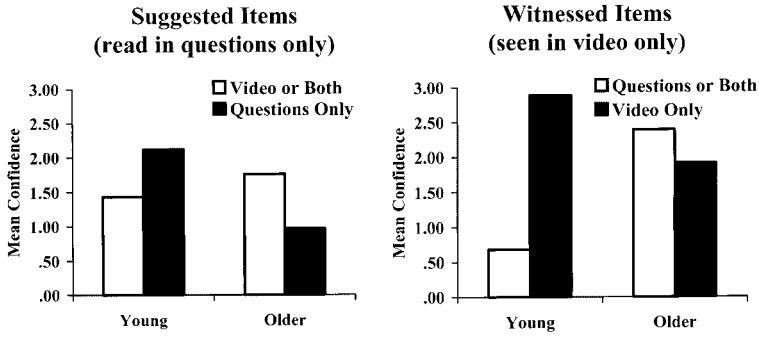

Figure 3. Young and older adults' mean confidence in their accurate and false memories for suggestions (left panel) and actually witnessed items (right panel); the black bars indicate the correct answer (i.e. accurate memory) in both cases, the white bars indicate source errors (i.e. false memory) in both cases

Confidence

Figure 3 summarizes young and older adults' confidence in their true and false memories for both suggestions (i.e. critical items that were only read in the questions) and witnessed items (i.e. items that were only seen in the video). We calculated mean confidence by scoring *definitely yes* responses as 3, *probably yes* as 2, and *maybe yes* as 1, and computing the average score among each participant's *yes* responses.[1] This figure shows that:

(1) Older adults were more confident than were young adults in their false memories (compare the white bars in each panel; $t(100) = 2.92$ and 8.51 for suggested and witnessed items, respectively, p's < 0.01).
(2) Older adults were less confident than were young adults in their completely accurate source decisions (compare the black bars in each panel; $t(100) = 5.07$ and 4.97 for suggested and witnessed items, respectively, p's < 0.001).
(3) Older adults were more confident in their false memories than their accurate source decisions (compare older adults' white and black bars in each panel; $t(50) = 4.20$, $p < 0.0001$ for suggested events, $t(50) = 1.77$, $p = 0.08$ for witnessed items), whereas the young adults showed the opposite pattern (compare young adults' white and black bars in each panel; $t(50) = 3.28$ and 14.61 for suggested and witnessed items respectively, p's < 0.01).

Analysis of the most confident responses yielded converging results. Older adults made a higher proportion of *definitely yes* responses to the video probe for the critical items that were in the questions (i.e. suggestions) than did young adults ($M = 0.49$ and 0.24 for older and young adults, respectively; $t(100) = 4.19$, $p < 0.0001$). On the other hand, older adults were significantly less likely than the young adults to say *definitely yes* to the questions probe for the critical items that they had read (Ms $= 0.52$ and 0.85 for older and young adults, respectively, $t(100) = 6.24$, $p < 0.0001$).

[1]We chose to use only clear assents (i.e. *yes* responses) in calculating confidence; use of the *unsure* response did not differ between the groups (Fs < 1 for both the main effects of age and the age $\times$ exposure interactions).

GENERAL DISCUSSION

The present study demonstrates several interesting age-related decrements in source memory. Older adults were more suggestible than were young adults. That is, although older adults recognized fewer of the critical items, they misattributed a greater proportion of suggested items they did recognize to the video than did young adults, even under conditions that made the source monitoring requirements as clear as possible. Older adults were also more confident in their source misattributions than were the young adults. Thus, although older adults have been shown to be less confident than young adults on some indices of eyewitness memory, such as perpetrator identification (e.g. Yarmey, 1984), on the present memory task older adults were more confident in their illusory memories than were the young adults. This replicates misinformation studies using recognition tests in which older adults were shown to have higher confidence in their memory errors (e.g. Cohen and Faulkner, 1989; Karpel *et al.*, 2001). The elevated confidence level on the part of the older adults is especially notable because jurors often take a witness's confidence in their memory as a sign of the accuracy of their memory (e.g. Wells *et al.*, 1979). In addition, not only were the older adults less likely than the young adults to remember reading the suggestions in the questions, they were less confident in their correct source attributions for these items. Finally, there were similar age-related decrements in memory for the source of actually witnessed items.

From the source monitoring perspective, there are several reasons older adults may be more suggestible than young adults. They may have less source-discriminating information (e.g. perceptual information) available than do young adults to help them make accurate source decisions (e.g. Hashtroudi *et al.*, 1990). There is some evidence that older adults show less differentiation than do young adults in their reports of memorial characteristics for true and false memories (e.g. Norman and Schacter, 1997; Karpel *et al.*, 2001). These differences could be due to an age-related deficit in binding the multiple features of an experience together to form a coherent complex event memory (e.g. Chalfonte and Johnson, 1996; Mitchell *et al.*, 2000), or an age-related deficit in accessing or evaluating multiple cues at test (e.g. Ferguson *et al.*, 1992), or both (e.g. Mitchell *et al.*, 2000, Experiment 2). Older adults' increased suggestibility could also be due to age-related differences in the weights given to various memorial characteristics (e.g. Johnson and Multhaup, 1992). That is, older adults may have as much information available as young adults, and may be able to use it all, but they may inappropriately weight less- discriminating source cues at the expense of more diagnostic cues in making their attributions. The present data cannot assess the relative contributions of these potential mechanisms for older adults' increased suggestibility; in fact, these mechanisms are probably interactive (e.g. if older adults have fewer perceptual characteristics available they may rely more on semantic information).

Older adults' poor memory for having read the critical items in the questions suggests they had fewer accurate source-specifying details (e.g. perceptual information, temporal information) associated with these items than did young adults. Their lower confidence in their accurate source judgements also suggests that on average the source-diagnostic information they had was less vivid compared to young adults. Thus, older adults' high level of misattributions suggests that their source judgements were influenced by some other, presumably less diagnostic, source cues. A reasonable hypothesis is that they were using semantic information even though the misinformation paradigm results in high overlap between the video and questions on this dimension.

Under normal circumstances we would expect a more limited range of source information to result in somewhat lower confidence than a fuller range of source cues. In addition, ideally, confidence in a source decision should be a function of both the amount of information available and the diagnosticity of that information. On the contrary, older adults presumably were taking the substantial amount of semantic information associated with the suggestions as an indication that the critical information came from the primary or referent source—the video. What they were failing to take into account when assigning confidence was the fact that semantic information is not a particularly good discriminatory source cue in this setting. Whereas the young adults had their memory of reading the critical items in the questions to offset the impact of the semantic information, the older adults did not. The combination of poor diagnostic information and over-weighting of available but non-diagnostic information led older adults to make more errors, and to be more confident in those false memories, than young adults.

Evidence from other domains supports the idea that older adults may be more likely to rely on semantic information in making memory judgements than are young adults. For example, older adults show higher error rates than young adults in experiments using the Deese–Roediger–McDermott paradigm (e.g. Balota *et al.*, 1999; Norman and Schacter, 1997). This procedure produces false memories for never-presented words that are semantically related to studied word lists. In addition, Mather *et al.* (1999) recently provided data showing that older adults were more likely than young adults to make schema-consistent source misattributions when assigning spoken statements to speakers, for example to misattribute a liberal political statement to a Democrat rather than the Republican who actually said it. Furthermore, older adults' confidence in their schema-driven erroneous source decisions was greater than was young adults' confidence.

In short, compared to young adults, older adults had more false memories based on suggested information, presumably because they relied on the availability of semantic information as an indication that information came from the video. They either lacked helpful diagnostic source information (e.g. perceptual details or temporal information) or made source misattributions in spite of having such information available. Their poor memory for having read the suggestions in the questions would argue for the former explanation. Future work might manipulate young and older adults' focus at study and/or test to see if older adults could be induced to encode, or persuaded to use, more source-diagnostic information (e.g. Johnson *et al.*, 1996; Multhaup *et al.*, 1999). In addition, future studies should examine more directly young and older adults' subjective experiences in this situation, for example using a Memory Characteristics Questionnaire (e.g. Hashtroudi *et al.*, 1990; Johnson *et al.*, 1988). Such work is just now beginning (e.g. Karpel *et al.*, 2001).

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