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The persistence of inferences in memory for younger and older adults: Remembering facts and believing inferences

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Research shows that younger adults have difficulty forgetting inferences that they make after reading a passage, even if the information that the inferences are based on is later shown to be untrue. The present study examined the effects of these inferences on memory in the lab and tested whether older adults, like younger adults, are influenced by the lingering effects of false inferences. In addition, this study examined the nature of these inferences, by examining younger and older adults' subjective experiences and confidence associated with factual recall and incorrect inference recall. The results showed that younger and older adults were equally susceptible to the continued influence of inferences. Both younger and older adults tended to remember facts from the stories but to believe their inferences, although confidence judgments did not differ for facts and inferences.

In the real world, inferences can have a very powerful effect on people. Consider the following example provided by Seifert (2002). The nightly news presents a story about a family of four found dead in their home. The newscaster mentions that the family had dined at a local restaurant the night before. A few days later the same newscaster provides an update on the story and announces that the medical examiner on the case concluded that the family died from carbon monoxide poisoning. However, months later the local restaurant goes out of business. In this example, the restaurant likely went out of business because people inferred that the family in the news died from food poisoning at the restaurant, even though there was a retraction indicating that the family died from carbon monoxide poisoning. This everyday example demonstrates the powerful effect that inferences have on people—so powerful, in fact, that they influence people's behavior even in the face of counterinformation.

Laboratory research shows that younger adults have a difficult time forgetting inferences that they make after reading a passage, even though they can recall that the original information had been corrected (see Seifert, 2002, for a review). Note that much research has been done to examine the ability of participants to form inferences (i.e., Harris, Sardarpoor-Bascom, & Meyer, 1989; Lea, Mulligan, & Walton, 2005; Suh & Trabasso, 1993), but the present investigation focuses, in particular, on the phenomenon in which once inferences are formed, participants have difficulty forgetting their inferences even in the face of counterinformation. The lasting effects of inferences on memory have been studied using a series of on-the-scene news reports (Wilkes & Leatherbarrow, 1988) in which a piece of information is retracted. When participants were asked to answer questions about the news reports, the results showed that they answered the questions using inferences based on the original incorrect information, even though they could recall the presence of the subsequent correction. Several studies have demonstrated the robustness of this effect (Johnson & Seifert, 1994, 1999; Wilkes & Reynolds, 1999). Despite the robustness and importance of this effect, it is not well understood. Also, it is surprising that older adults have not been examined with this paradigm, for practical and theoretical reasons.

There are reasons to predict that older adults would be more susceptible to the continued influence of inference than would younger adults. One reason why older adults may be more susceptible than younger adults is because research in the false memory literature shows that older adults are misled by false information far more often than are younger adults. A variety of paradigms have shown that older adults show more false memories than do younger adults, including an eyewitness testimony paradigm (e.g., Cohen & Faulkner, 1989; LaVoie, Mertz, & Richmond, 2007; Roediger & Geraci, 2007), a word associates, or the Deese/Roediger–McDermott (DRM), paradigm (e.g., Balota et al., 1999; McCabe & Smith, 2002; Watson, McDermott, & Balota, 2004) and a paradigm using pragmatic inferences (McDermott & Chan, 2006). The pragmatic inferences paradigm is perhaps most relevant for the present study, because research in which this paradigm has been used has shown that, as compared with younger adults, older adults are more likely to incorrectly recall words, such as *broke*, that were only inferred from the veridical

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sentences they read (e.g., "The karate champion hit the board"). Unlike in the pragmatic inference paradigm, in the present paradigm, participants are explicitly instructed that the original information is incorrect. Thus, older adults may also be expected to show a greater inference effect than younger adults because they have difficulty using this correction. Much research has shown that older adults have difficulty inhibiting information (e.g., Hamm & Hasher, 1992; Hasher & Zacks, 1988; Zacks, Hasher, Doren, Hamm, & Attig, 1987). In fact, when younger and older adults are given incorrect information, over time, older adults are more likely to believe that the information is true despite being told that it is incorrect (Skurnik, Yoon, Park, & Schwarz, 2005).

On the other hand, there are also reasons to predict that older adults will not be more susceptible to the incorrect inferences than younger adults. For example, older adults may be less susceptible to inferences than younger adults because they are not able to make initial inferences as well as younger adults (Cohen, 1979; Hasher & Zacks, 1988; Zacks et al., 1987). Also, older adults may not have problems inhibiting the incorrect information in this paradigm, because the critical information is meaningful and important for understanding the story (Castel, Benjamin, Craik, & Watkins, 2002; Castel, Farb, & Craik, 2007; Rahhal, May, & Hasher, 2002). Thus, there are theoretical reasons to make both predictions, that older adults may or may not be more susceptible than younger adults to inferences' continued influence. The present study was designed to distinguish between these two possibilities.

The second goal of the present study was to examine the subjective experiences associated with the erroneous use of inferences. At test, participants were asked to assign *remember* and *know* judgments (Tulving, 1985) when answering factual and inference questions. *Remembering* is defined as a personal and vivid recollection of information from the past, and *knowing* is defined as impersonal knowledge of the past. We also added a third response category, called *believing*. Although the concept of believing has been discussed before (Kihlstrom, Kim, & Dabady, 1996; Kim & Kihlstrom, 1997), as far as we know, this is the first study to examine this subjective experience experimentally. We were particularly interested in this subjective experience because previous research on the lasting effects of inferences has indicated that participants may continue to believe the original information because they have a suspicion that they would not have been told the information if it were not true (Seifert, 2002). If this is the case, participants may give *believe* judgments to inference questions because of a lingering suspicion that the original information was true. However, if the lasting effect of false inferences follows findings in the false memory literature (e.g., Gallo & Roediger, 2003; Geraci & McCabe, 2006), participants may report vividly recollecting the inferences. Each finding would have implications for the approaches one would take to reduce false inferences. In the present study, participants were instructed to make a believe judgment when the information felt plausible or they simply believed it to be true. Thus, making a believe judgment did not require participants to rely on memorial details or to be certain about their knowledge of the past, as with remembering and knowing, respectively. Rather, participants could indicate that they believed something from the past without such memorial evidence simply because the information seemed plausible and they believed it to be true, perhaps for motivational or contextual reasons. To test the suspicion theory (Seifert, 2002), we included a posttest questionnaire that asked participants to indicate why they thought that the original information had been corrected. Participants might indicate that the information had been corrected for malicious reasons, because it was an innocent mistake, or because not all the information was available. These possible responses will help us to understand why participants hang on to incorrect inferences even after the information has been corrected. We hypothesized that participants would assign more believe responses to inference questions, whereas they would assign more remember responses to factual questions. Younger adults should give more remember judgments overall than should older adults (Perfect & Dasgupta, 1997). We did not have any strong predictions about age effects in knowing and believing for younger and older adults. Finally, participants were also asked to make confidence judgments following their remember, know, and believe judgments.

METHOD

Participants

Forty younger adults ($M = 18.52$, $SD = 1.01$) from Texas A&M University and 40 older adults ($M = 71.54$, $SD = 4.13$) from the local community participated in the study. Younger adults received course credit, and older adults received a $10 honorarium. All the participants were given a vocabulary test. Older adults had higher vocabulary scores ($M = 34.33$, $SD = 3.52$) than did younger adults ($M = 29.49$, $SD = 3.04$) [$F(1,77) = 60.22$, $MS_e = 10.73$, $\eta_p^2 = .45$]. Education was also higher for older adults ($M = 17.05$ years, $SD = 2.15$) than for younger adults ($M = 13.36$ years, $SD = 0.74$) [$F(1,77) = 102.63$, $MS_e = 2.59$, $\eta_p^2 = .58$]. Both younger and older adults were given the Mini-Mental Status Examination (MMSE; Folstein, Folstein, & McHugh, 1975) before testing. As was expected, younger adults had higher scores ($M = 29.54$, $SD = 0.71$) on this test than did older adults ($M = 28.79$, $SD = 1.28$), and this difference was significant [$F(1,77) = 7.93$, $MS_e = 1.07$, $\eta_p^2 = .09$]. The older adults' MMSE scores were within normal ranges.

Design

The study used a 2 × 2 mixed design with age (younger and older adults) as the between-subjects variable and condition (control and corrected) as the within-subjects variable. All the participants read two incident files (one describing an office fire and the other describing a missing person). One file was used for the control condition, and the other was used for the correction condition. The order of the incident files was counterbalanced, as well as the condition (control or correction) assigned to each file.

Materials and Procedure

Two versions of two different incident files, modified (using more standardized American English) from Wilkes and Leatherbarrow (1988), were used (see Appendices A and B). These incident files were chosen because they have been used to demonstrate the persistence of incorrect inferences in memory. We also used the same materials as those in the Wilkes and Leatherbarrow study, so that we might attempt to replicate the younger adult data. Each incident file

consisted of 13 discrete messages. The first file sequence dealt with the progress of a fire at a commercial premise, and the second dealt with a missing person and his subsequent accident.

The participants reading the control fire file read messages describing the fire, its progress, and its consequences. The 5th message in the sequence stated that the police received reports of an empty side room adjoining a storage hall, which was full of paper and photocopying equipment. The 12th message was an inquiry from the police concerning how the firemen were progressing. For the corrected version of the fire file, the materials were the same, except that, on Message 5, the participants were informed that the police reported that the side room contained carelessly stored paint cans and gas cylinders. This initial information was corrected in Message 12, indicating, instead, that the side room was empty.

The participants read the first incident file and were then given an immediate free recall test, followed by a 20-item questionnaire. The procedure was repeated using the other incident file. Half of the questions in the questionnaire were designed so that they could be answered by recalling the literal content (e.g., "When was the fire department dispatched?"), whereas the other half required the use of an inference to answer them (e.g., "What could have caused the explosions?"). All inference questions could be answered using the initial incorrect information. The participants were also given a final question, which directly queried their memory for the correction (for the fire file, they were asked, "What was the point of the second message from the police?"). The order of the test questions was randomized for each participant, except that the question about the correction message always came at the end.

For each response on the questionnaire, the participants made remember/know/believe judgments (instructions given immediately before the questionnaire test; see Appendix C). Remember/know instructions were taken from Rajaram (1993). The participants were instructed to make a believe judgment "if you do not specifically recall the information, but you believe this particular information. This may mean that it feels plausible, or you simply believe it to be true." For each question, the participants also rated their confidence on a scale from 1 to 7, with 7 indicating the *highest level of confidence*. The participants were also given a demographic questionnaire to complete between reading each incident file and a vocabulary test at the end of the experiment.

RESULTS

The alpha level was set at $p < .05$ for the following analyses. Effect size (η_p^2) and mean square error (MS_e) are reported for each statistic. We also examined whether the questionnaire data were influenced by condition order (the control vs. the correction story first), by examining the data for only the first story (control and correction conditions). However, these results were not different from the collapsed results, so all the subsequent analyses used collapsed data.

Factual and Inference Questionnaire Responses

Half of the questions on the questionnaire were factual questions. Results from the 2 × 2 ANOVA (for the effect of condition and age on memory for facts) showed that younger adults remembered more factual information than did older adults [$F(1,77) = 8.95$, $MS_e = .55$, $\eta_p^2 = .10$]. There was no effect of condition [$F(1,77) < 1$] and no interaction between the two variables [$F(1,77) < 1$]. Next, we examined younger and older adults' susceptibility to inferences. Inference questions were scored as using the old (original message) subtheme, the new (corrected message) subtheme, or an *other* subtheme not mentioned. To clarify, although the control group was never exposed to an *old* subtheme, questions could be answered in a manner that would be scored as *old*. This was an important condition to include because it served as a baseline in the control condition.

Next, we examined the critical data, looking at younger and older adults' responses to the inference questions in the control and correction conditions. The means for the use of the old subtheme in the control condition were very low for both younger ($M = .04$, $SD = .08$) and older ($M = .01$, $SD = .05$) adults, and there were no significant differences between the age groups [$F(1,77) = 2.94$, $MS_e = .01$, $\eta_p^2 = .04$]. The younger adult data replicated the baseline results found in Wilkes and Leatherbarrow (1988). In the correction condition, the results showed that both younger ($M = .28$, $SD = .19$) and older ($M = .25$, $SD = .20$) adults used the old subtheme to answer inference questions, even though that information had been corrected [$F(1,77) < 1$]. Thus, this finding demonstrates that both younger and older adults continued to use the original information, even though it had been corrected.

Next, we examined the participants' use of the new subtheme to answer inference questions. The participants in both conditions were exposed to the new subtheme, but in the control condition, the new subtheme was the only explanation provided. In the control condition, younger adults ($M = .52$, $SD = .17$) answered more inference questions using the correct new subtheme than did older adults ($M = .41$, $SD = .19$) [$F(1,77) = 7.11$, $MS_e = .24$, $\eta_p^2 = .09$], consistent with the factual question data and, to anticipate, the free recall data. In the correction condition, there was no difference between younger ($M = .33$, $SD = .23$) and older ($M = .32$, $SD = .22$) adults' use of the new subtheme [$F(1,77) < 1$]. Thus, having an alternate explanation, even if it was later said to be untrue, decreased the use of the new subtheme for both younger and older adults.

Knowledge of the Correction

At the end of each questionnaire, the participants were asked about the point of the critical correction message. A 2 × 2 ANOVA (for age and condition) showed that younger adults were more likely than older adults to recall the point of the critical message [$F(1,77) = 4.56$, $MS_e = 1.08$, $\eta_p^2 = .06$]. All the participants had better memory for the critical message when it was a correction than when it was a control message [$F(1,77) = 21.43$, $MS_e = 4.30$, $\eta_p^2 = .22$], but younger and older adults were not differentially influenced by the condition manipulation [$F(1,77) = 1.26$, $MS_e = .25$, $\eta_p^2 = .02$]. Thus, these data show that despite the fact that the participants, and the younger adults in particular, knew that the original information had been corrected, both younger and older adults continued to rely on incorrect inferences from the original message to answer questions about the stories. The younger adult data replicated previous data (e.g., Wilkes & Leatherbarrow, 1988), and we showed that older adults are similarly susceptible to this error.

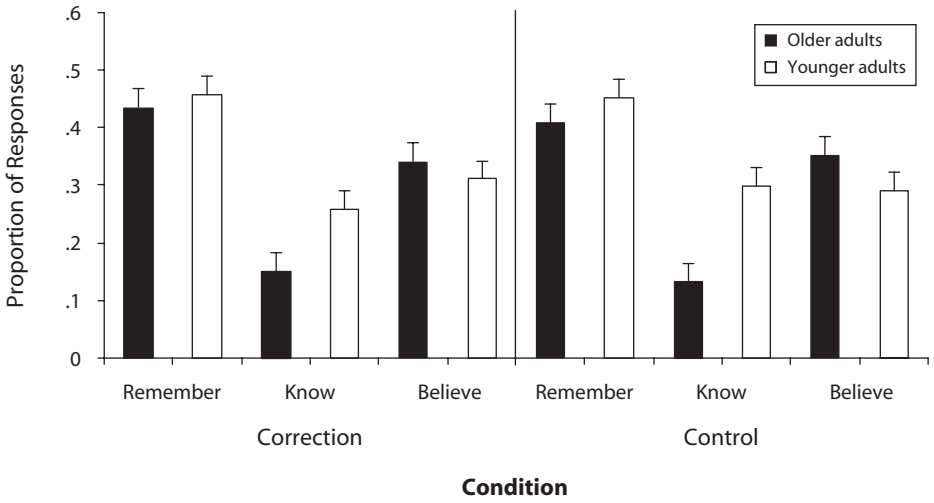

Figure 1. Remember/know/believe judgments for factual questions.

Subjective Memory Judgments

We also examined the subjective experiences associated with answering factual and inference questions. Figure 1 illustrates how often the participants used each judgment to answer factual questions for both the control and correction conditions. Younger and older adults in both conditions gave more remember judgments than know or believe judgments to factual questions (see Figure 1). A $2 \times 2 \times 2$ ANOVA (for condition, question type, and age) showed that remember judgments were most often associated with answering factual questions [$F(1,77) = 53.32$, $MS_e = 2.90$, $\eta_p^2 = .41$], rather than inference questions. However, remembering was not influenced by condition (control or correction) [$F(1,77) = 2.05$, $MS_e = 3.17$, $\eta_p^2 = .03$] or age [$F(1,77) < 1$]. There was no main effect of age and no significant interactions between age, condition, and question type (all Fs < 1). Interestingly, the data also show that believe judgments were more often associated with answering inference questions than factual questions in both the control and correction conditions [$F(1,77) = 39.53$, $MS_e = 3.15$, $\eta_p^2 = .34$]. Believe judgments were not influenced by condition ($F < 1$; see Figure 2), showing that the participants gave believe judgments to inference questions regardless of whether there had been a correction. Believing was not different for the two age groups ($F < 1$), and there were no significant interactions between condition, question type, and age [all Fs < 1, except question type $\times$ age, which was $F(1,77) = 1.99$, $MS_e = 3.15$, $\eta_p^2 = .03$]. Finally, for the know judgments, there was no significant effect of question type [$F(1,77) = 2.81$, $MS_e = 1.56$, $\eta_p^2 = .04$] or condition [$F(1,77) < 1$]. However, there was a main effect of age [$F(1,77) = 5.17$, $MS_e = 11.14$, $\eta_p^2 = .06$], showing that younger adults gave more know responses than did older adults. There was no interaction between condition and age [$F(1,77) = 1.34$, $MS_e = 2.76$, $\eta_p^2 = .02$], condition and question type [$F(1,77) = 1.30$, $MS_e = 2.18$, $\eta_p^2 = .02$], or condition, question type, and age ($F < 1$). However, the interaction

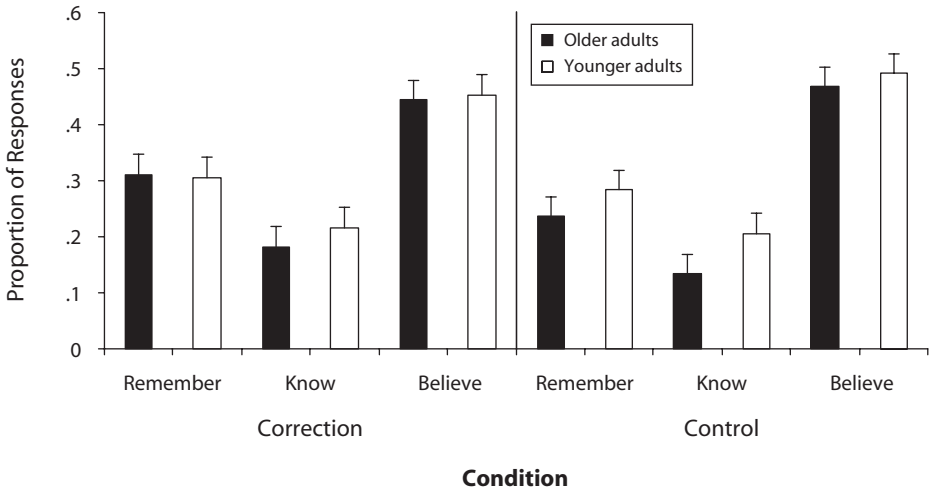

Figure 2. Remember/know/believe judgments for inference questions.

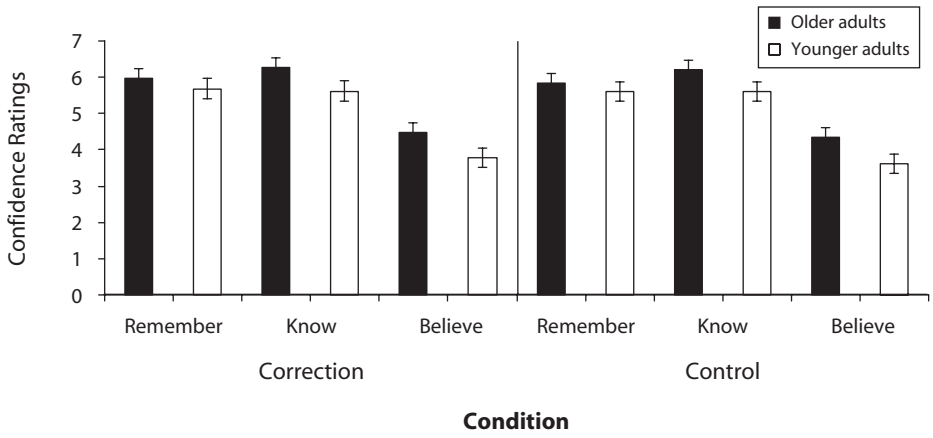

Figure 3. Average confidence ratings associated with remember/know/believe judgments for factual questions.

between question type and age was significant [$F(1,77) = 7.18$, $MS_e = 1.56$, $\eta_p^2 = .09$], showing that younger adults gave more know judgments to factual questions than did older adults, whereas this difference was not as large for inference questions.

The participants were also asked to rate their confidence on a scale of 1–7 (with 7 being the highest) for each response following their remember, know, and believe judgments (see Figures 3 and 4). Visual examination of these figures shows that the pattern of data for confidence ratings was very similar for the two conditions (control and correction) and the two types of questions (factual and inference). Therefore, for ease of comprehension, we collapsed across these variables and examined the average confidence ratings for remember, know, and believe responses for both younger and older adults. There was a main effect of response type [$F(1,77) = 94.47$, $MS_e = 0.68$, $\eta_p^2 = .62$] but no effect of age [$F(1,77) = 2.24$, $MS_e = 3.17$, $\eta_p^2 = .04$] and no interaction between the two variables [$F(1,77) = 2.12$, $MS_e = 0.68$, $\eta_p^2 = .04$]. Planned comparisons showed that younger and older adults gave lower confidence ratings for believe judgments than for remember judgments [$t(72) = 10.08$, $SE = 0.14$] and know judgments [$t(64) = 11.05$, $SE = 0.13$], whereas remember and know judgments [$t(60) < 1$, $SE = 0.13$] did not differ from each other.

Free Recall

Next, we examined whether there were age differences in free recall. Free recall was scored using component idea units (using an adaptation of procedures described by Kintsch, 1974). The scoring was carried out by two judges acting independently. There were only two discrepancies, which were resolved by clarifying a rule that was applied when all of the free recall tests were scored. As was expected, the 2 × 2 (age × condition; corrected vs. control) ANOVA showed that recall was higher for younger adults ($M = .58$, $SD = .15$) than for older adults ($M = .39$, $SD = .18$) [$F(1,77) = 23.73$, $MS_e = 1.29$, $\eta_p^2 = .24$]. Overall, recall was not influenced by condition [$F(1,77) < 1$], and there was no interaction between age and condition on recall [$F(1,77) < 1$]. So there was an overall age effect in recall, but younger and older adults had similar recall of the critical information regarding the correction.

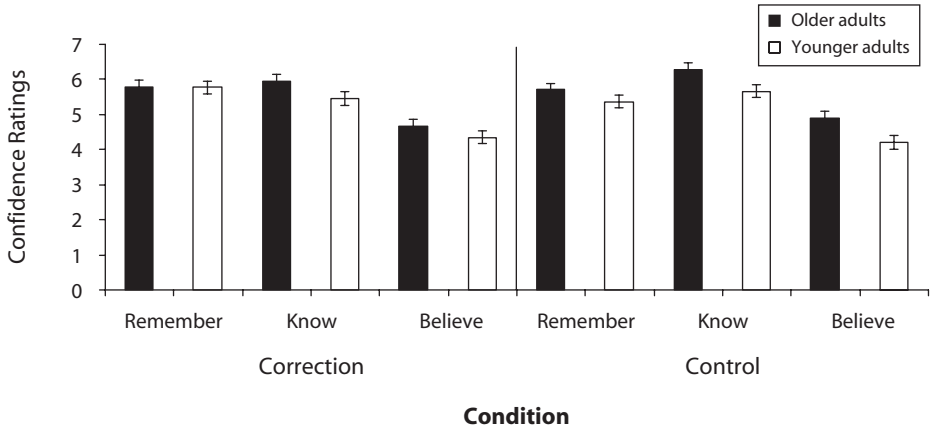

Figure 4. Average confidence ratings associated with remember/know/believe judgments for inference questions.

Posttest Questionnaire

At the end of the experiment, the participants were given a posttest questionnaire that asked them to describe why they believed that there was a correction in the story. The results showed that for younger adults, 15 participants thought that the correction was a cover-up, 18 thought that it was a mistake, and 7 thought that it was something other than a cover-up or mistake. For older adults, 12 participants thought that the correction was a cover-up, 21 thought that it was a mistake, and 7 thought that the correction was something other than a cover-up or mistake.

If the participants had believed that the correction was a cover-up and that the incorrect information was true, they might have been more likely to continue using the original, incorrect information when answering inference questions about the story, relative to people who believed that the correction was a mistake. To test for this possibility, we examined the use of the old (incorrect) subtheme in the correction condition for people who said that the correction was a mistake, as compared with those who believed that it was a cover-up. Although the participants who thought that the correction was a cover-up were slightly more likely to continue using the incorrect original message than were the participants who said that the correction was a mistake [.26 (SD = .18) vs. .23 (SD = .19)], this difference was small and not significant [$F(1,77) < 1$].

DISCUSSION

The present study examined younger and older adults' susceptibility to the continued influence of inferences. The results are consistent with those of previous studies (Wilkes & Leatherbarrow, 1988) showing that younger adults have a difficult time forgetting inferences they make, even though the information that the inferences are based on is later shown to be untrue. In addition, we found that older adults were equally influenced by the lingering effects of false inferences, even though they had worse overall recall for the stories. Both younger and older adults continued to use the old subtheme even though they remembered that this information had been corrected.

The present results are consistent with findings from the text comprehension and aging literature, which have shown that older adults form text representations similar to those of younger adults (see Radvansky & Dijkstra, 2007, for a recent review). Perhaps most relevant is the finding that there were no age differences associated with the participants' ability to incorporate new information (spatial and temporal information) into their situation model of the text (Radvansky, Copeland, Berish, & Dijkstra, 2003). Although this work used a paradigm different from the present one and examined the online measures of participants' comprehension, its findings are consistent with the present data, showing that, despite overall recall differences between younger and older adults, these two groups appear to be able to encode and remember critical text information similarly. The present work is also consistent with research using garden path sentences. This work has suggested that older adults can recall inferences about the meaning of a word as well as can younger adults, particularly when the inference is easy to make and the study pace is controlled by the participant (Zacks & Hasher, 1988: Zacks et al., 1987), although older adults may keep active the incorrect inference longer during reading before settling on the correct inference (Hamm & Hasher, 1992). Previous studies have also shown that when participants are asked to recall a story, younger adults' recall is often more reproductive and text based (using specific details), whereas older adults' recall is more reconstructive and interpretive (Adams, 1991; Adams, Smith, Nyquist, & Perlmutter, 1997). In fact, some have argued that there may be motivational or strategic differences between younger and older adults that could explain these different patterns of data (e.g., Perlmutter & Mitchell, 1982; Reder, Wible, & Martin, 1986). Similarly, with inference recall, it appears that older adults have a fairly good memory for inferences, whereas their recall of factual information is worse than younger adults' recall.

The present data are relevant to research on false memories and provide an exception to the typical finding that older adults experience more false memories than do younger adults (e.g., Balota et al., 1999). However, the present paradigm is unique in that the messages in the stories are relatively engaging and meaningfully integrated, and some research has shown that age effects in memory are not obtained for more meaningful or goal-related information (see Castel, 2007, for a review).

The posttest questionnaire data indicated that several younger and older adults believed the original message and thought that the correction was a cover-up. If participants do not believe the correction, they may continue to rely on inferences from the original, incorrect message. Thus, one way to reduce the lingering memory effects of erroneous inferences might be to make the correction more believable. More research is needed, but for now, our data provide preliminary evidence that many participants do not believe the correction.

In the present experiment, we also examined the participants' subjective experiences. We found that both younger and older adult participants gave more remember judgments to factual questions and more believe judgments to inference questions. This is interesting because it demonstrates that subjective experience can discriminate between memory for factual information and memory for inferences. We found that people remember facts but believe inferences. On the basis of the false memory literature (e.g., Gallo & Roediger, 2003; Geraci & McCabe, 2006; Roediger & McDermott, 1995), one would have predicted that people would report remembering incorrect inferences. This large literature shows that people often report remembering erroneous information, rather than knowing it or guessing that it occurred. In contrast, we found that with the false inference paradigm, given the option, people believe (rather than remember or know) false inferences. The fact that participants gave believe judgments (rather than remember or know judgments) to inference questions suggests that participants judged their inferences to be plausible even in the face of counterinformation. This finding is also notable because it shows that people may go against what they remember or know occurred in the past because of a lingering suspicion or hope that the informa-

tion might be true. In addition, the finding that participants gave more believe responses to inference questions is important because it demonstrates that there is a third state of awareness that people readily use when making inferences about the past. As far as we know, this is the first empirical demonstration of the subjective experience of believing.

Finally, the confidence judgments showed that both younger and older adults gave lower confidence ratings for believe judgments than for remember and know judgments, suggesting that both remember and know judgments can be associated with high confidence and that a believe judgment is phenomenally distinct from remember and know judgments.

AUTHOR NOTE

We thank Niki Quinn for her help with data coding. We also thank Beth Marsh for comments on an earlier version of the manuscript. Correspondence should be sent to J. J. Guillory, Department of Psychology, Texas A&M University, 4235 TAMU, College Station, TX 77843-4235 (e-mail: jguillory@psych.tamu.edu).

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APPENDIX A
Fire

Control Version

Message 1: January 25th 9:00pm/ Alarm call received from premises of a Whole-Sale Stationers/ Premises consist of Offices, Display room, and Storage hall/

Message 2: A serious fire reported in the storage hall already out of control and requiring instant response/ Fire appliance dispatched at 9:00pm/

Message 3: The alarm was raised by the Night Watchman/ who referred to the presence of thick, oily smoke and sheets of flame/

Message 4: January 26th 4:00am/ Attending Fire Officer suggests that the fire was started by a short circuit in the wiring/ of a side room off the main storage hall./ Police now investigating./

Message 5: 4:30am/ Police message received to say that they have reports that the side room was empty before the fire/

Message 6: Fireman attending the scene report that the fire developed an intense heat that made it particularly difficult to bring under control/

Message 7: It has been learned that a number of explosions occurred during the blaze/ which endangered firemen in the vicinity, but no casualties resulted from this cause/

Message 8: Two firemen are reported to have been taken to hospital/ as a result of breathing toxic fumes that built up in the area in which they were working/

Message 9: 10:00am/ The owner of the affected premises estimates that total damage will amount to many thousands of pounds (dollars)/ although the premises were insured/

Message 10: The works Foreman has disclosed that the storage hall contained bales of paper and a large amount of photo copying equipment/

Message 11: A small fire had been discovered on the same premises, six months previously./ It had been successfully tackled by the workmen themselves/

Message 12: 11:00am/ A second message received from the police enquiring how the Brigade's investigation into the fire was progressing/

Message 13: 11:30am/ Attending Fire Officer reports that the fire is now out and that the storage hall has been completely gutted/

File Ends

Corrected Version

Message 5: 4:30am/ Police received message saying that they have reports that inflammable material, including paint and gas cylinders, had been carelessly stored in the side room before the fire/

Message 12: 11:00am/ A second message received from the Police enquiring how the Brigade's investigations into the fire were progressing/ and also stating that their earlier message was incorrect./ The side room had been empty before the fire./

(The units scored at free recall are indicated by /……/).

APPENDIX B
Accident

Control Version

Message 1: There has been a report of a missing person (MP), a male 21 years old/ filed with the police by his parents./ They have not seen him since the previous day/ and there is no reason for his absence./

Message 2: MP employed as a messenger by a local chemist/ who describes him as a good employee./

Message 3: A road accident outside the town/ has been reported to the police./ The victim has been injured and fits the description of MP./

APPENDIX B (Continued)

Message 4: Police measurements at the scene of the accident indicate that the vehicle overshot the corner/ and then traveled through a hedge into a field./ It is now being checked for mechanical faults./

Message 5: Employer reports that he had last seen MP on Monday evening when he had finished work at 7:00pm/

Message 6: A witness traced who describes seeing MP hurriedly leaving the town centre/ at 7:15pm/

Message 7: A motorcyclist was located who reports being overtaken on the outskirts of town/ around 7:25pm/

Message 8: A motorist reports that MP raced past him near the crash scene/ at 7:45pm on Monday/

Message 9: The hospital reports that the victim's injuries include limb injuries and a concussion./

Message 10: Girlfriend of MP states that she had arranged to meet him on Monday/ at 8:00pm./ He had not turned up./

Message 11: Reports of oil on the road near the accident spot had been received by the AA on Monday/

Message 12: Second message from MP's employers enquiring how he is./

Message 13: The parents of MP have visited the hospital/ and have confirmed his identity./

File Ends

Corrected Version

Message 5: The employer reports that he had last seen MP on Monday evening when/ he had been sent on an emergency drug delivery to a hospital some miles away./

Message 12: Second message from MP's employers enquiring how he is/ and also stating that their earlier message was incorrect./ In fact MP had finished work at 7:00pm./

(The units scored at free recall are indicated by /……/).

APPENDIX C
Remember/Know/Believe Instructions

Remember

You should make a remember judgment if you can consciously recollect its prior occurrence. Remember is the ability to become consciously aware again of some aspect or aspects of what happened or what was experienced at the time the report was presented (e.g., aspects of the physical appearance of the information, or of something that happened in the room, or of what you were thinking or doing at the time). In other words, the "remembered" information should bring back to mind a particular association, image, or something more personal from the time of study, or something about its appearance or position (i.e., what came before or after that message).

Know

You should make a know judgment if you recognize the information from the report, but you cannot consciously recollect anything about its actual occurrence or what happened or what was experienced at the time of its occurrence. In other words, write "know" when you are certain that you recognize the information, but it fails to evoke any specific conscious recollection from the study time.

Believe

When making a believe judgment you don't have to specifically recall the information, but you are indicating that you believe this particular information, it feels plausible, or you simply believe it to be true.

To further clarify the difference between these three judgments (remembering, knowing, and believing) here are a few examples. If someone asks you who was the first president of the U.S. you would typically respond in the "know" sense, without becoming consciously aware of anything about a particular event or experience of learning that information. When asked about the last movie you saw, you would typically respond in the "remember" sense that is, becoming consciously aware again of some aspects of the experience of seeing the movie. For example, you might remember where you sat, or what you were thinking. Alternatively, if someone asks you whether t.v. is bad for you, you may not recollect having learned about this issue and you may not know for sure. Rather you simply believe this to be true.

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