Reducing Misinformation Effects in Older Adults With Cognitive Interview Mnemonics

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We examined the effect of a prior Modified Cognitive Interview on young and older adults’ recall of a short film of a staged crime and subsequent reporting of misinformation. Participants viewed the film followed the next day by misinformation presented in a postevent summary. They were then interviewed with either a Modified Cognitive Interview or a control interview followed by a recognition memory test. A Modified Cognitive Interview elicited more correct details and improved overall accuracy compared to a control interview in both age groups, although the young adults recollected three times more correct information in a Modified Cognitive Interview than the older adults. In both age groups, correct recollections of person and action details were higher in a Modified Cognitive Interview than a control interview. Importantly, older adults who were interviewed with a Modified Cognitive Interview were not susceptible to misinformation effects.

Keywords: aging, Cognitive Interview, misinformation effect, eyewitness, suggestibility

Obtaining reliable eyewitness testimony from older witnesses has become a key concern to policy makers and professionals in recent years. Clearly, there is a need for a set of protocols that is specifically designed to maximize accurate testimony from older individuals. Such protocols should be theoretically based and be subject to rigorous empirical testing. Given the difficulties surrounding interviewing older witnesses (rapid forgetting, attention problems), shortened, developmentally appropriate interview protocols would be extremely useful. We examined whether a Modified Cognitive Interview modeled on Holliday’s (2003b) protocol was effective in increasing older witness’s memories of a simulated robbery. We also examined whether this interview protocol reduced older adults’ subsequent acceptance of misinformation as has been reported with other vulnerable witness groups such as young children (Holliday, 2003b; Holliday & Albon, 2004).

What Is Known About Older Adults’ Memories?

In general, research reports that memory accuracy declines with advancing age in a number of contexts. For example, older adults tend to perform worse than young adults when recalling statements (Nyberg, Baekman, Erngrund, Olofsson, & Nilsson, 1996), prose (Carlesimo et al., 1998), and long word lists (Cohen, Sandler, & Schroeder, 1987). Although only a handful of studies have compared young and older adults’ memories in an eyewitness context, for the most part the results of this research mirror the findings from conventional memory tests. Older adults are less accurate and less complete in their recollections of simulated crimes whether questioned immediately or up to 1 week later (Aizpurua, Garcia-Bajos, & Miguel, 2009; Brimacombe, Quinton, Nance, & Garrlic, 1997; Craik, Byrd, & Swanson, 1987; List, 1986; Yarmey & Kent, 1980).1 Why is this so?

A number of theoretical accounts have been proposed to explain these ubiquitous findings (for a review, see Luo & Craik, 2008). Typically, such accounts have focused on cognitive deficits in terms of speed of processing (e.g., Salhouse, 1985), available processing resources (e.g., Hastroud, Johnson, & Chrosniak, 1990), reduced cognitive control (e.g., Park & Hedden, 2001), semantic knowledge (e.g., Wegesin, Jacobs, Zubin, Ventura, & Stern, 2000), associate deficits (Naveh-Benjamin, 2000), feature binding (e.g., Chalfonte & Johnson, 1996), effortful self-initiated processing (e.g., Craik, 1994), and environmental support (e.g., Craik, 1986, 1994). The environmental support account of memory recall proposes that older adults’ memories will be enhanced if contextual cues are available at the time of recall. If this theory is correct, it is expected that the context reinstatement instruction of

1 For a discussion of face identification research with older adults (which is beyond the scope of this paper), see Bartlett and Memon (2007) and Memon, Gabbert, and Hope (2004).
the Cognitive Interview should increase recall in the older participants during this interview.

The Cognitive Interview

The original Cognitive Interview was developed to improve eyewitness testimony of adults (Geiselman et al., 1984). The four cognitive components are based on two memory principles, encoding specificity (Tulving & Thomson, 1973) and varied retrieval (Tulving, 1974). Retrieval of a particular memory is more effective if there is an overlap in specific features from the encoding and retrieval contexts (Flexner & Tulving, 1978). This overlap is facilitated by two of the components: (1) context reinstatement: Mental reconstruction of the physical and personal contexts surrounding the event to be recalled, and (2) report all: Relate all details regardless of their perceived relevance. Distinct memory traces can also be accessed via retrieval methods that minimize reliance on expectations and prior knowledge (Bower, 1967; Tulving, 1974). Varied retrieval is facilitated by a further two components: (3) change perspective: Recall the event from the perspective of another participant or location in the same event, and (4) change order: For example, recall the event in reverse order, from the last temporal detail recalled to the first detail recalled.

The Enhanced Cognitive Interview (Fisher & Geiselman, 1992) retains these four cognitive instructions. The Enhanced Cognitive Interview also underlines the importance of social dynamics and communication principles such as building rapport, witness compatible questioning, focused retrieval, and Transfer of Control of the interview to the interviewee (Wright & Holliday, 2003). Social factors such as negative stereotypes about memory in older age can make older adults overly cautious about reporting information (Hess & Hinton, 2006). The Enhanced Cognitive Interview may ameliorate this because the importance of reporting all remembered details regardless of their perceived relevance (Report all instruction) is emphasized to the interviewee, and because the Transfer of Control instruction stresses that the witness is the expert about the to-be-remembered event. What is known about older adults’ memories when they are interviewed with an Enhanced Cognitive Interview?

Older Adults and the Enhanced Cognitive Interview

A handful of studies have assessed the effectiveness of the Cognitive Interview techniques (Fisher & Geiselman, 1992) with older adults and some of these have limitations (for reviews, see Holliday, Brainard, Reyna, & Humphries, 2009; Memon, Meissner, & Fraser, in press). In an early study, young (18–35 years) and older (65–80 years) adults viewed a film of a simulated robbery (Mello & Fisher, 1996). Thirty minutes later, they were given a standard police interview, a full Cognitive Interview comprising all four cognitive instructions, or the shorter Cognitive Interview in which the change perspective instruction was omitted. Older adults recalled more correct information than young adults when given Cognitive Interviews. However, these findings should be interpreted cautiously because the young and older groups were given different types of Cognitive Interview instructions; the older adults were given the shorter Cognitive Interview whereas young adults were given the full Cognitive Interview. In addition, the interviewers of the older adults slowed the pace of the interview and used simple vocabulary, both of which could be taken as condescending and, potentially harmful to the establishment of good rapport (e.g., La Tourette & Meeks, 2000).

Dornburg and McDaniel (2006) reported increased recall of correct details with Cognitive Interview instructions when young and older adults were tested repeatedly on their memories for a story. There are a number of methodological differences between this research and others discussed in this paper. Participants were not interviewed using the phased approach characteristic of Cognitive Interview protocols and there was no question phase. Moreover, they were given one Cognitive Interview instruction per retrieval attempt over some weeks. We know that much new information is recollected in the question phase of Cognitive Interviews (Holliday, 2003b). In the current study, interviewers asked open-ended and specific closed questions (cf. Achieving Best Evidence, 2001) about details recollected in the free recall phase.

Two studies by Wright and Holliday (2007a, 2007b) provided further evidence that a revised Cognitive Interview can increase correct remembering in older witnesses. In the first, very older adults’ (75–95 years) memories of a filmed car theft were increased by 30% with Cognitive Interview instructions (Wright and Holliday, 2007a). In a second study, Wright and Holliday (2007b) compared the recollections of very older adults (75–96 years) who had cognitive impairments detected on the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975) with very older adults without cognitive impairments on this test. Those with low MMSE scores (under 27) recalled fewer correct details and were less accurate than those with high (normal) scores (between 27 and 30). Importantly, however, both high and low MMSE older adults reported substantially more correct information about action, person, object, and location details when given revised a Cognitive Interview.

Two studies have reported no improvements in remembering with Cognitive Interviews (McMahon, 2000; Searcy, Bartlett, Memon, & Swanson, 2001). In the first, McMahon (2000) compared the amount of correct, incorrect, and confabulated details reported by young (18–50 years) and older adults (60–88 years) when each was given a full Cognitive Interview (using all four cognitive instructions) or a control interview 30 min after viewing a simulated crime film. Young adults reported more correct details than older adults in a control interview, but no advantage of a full Cognitive Interview was found. It is possible that the small numbers of participants in each experimental condition (n = 10) were not sufficient to detect an effect. Furthermore, the age range in McMahon’s “young” group was quite different from other studies, and included middle-aged participants. In the second study, Searcy et al. examined whether the context reinstatement instruction facilitated young (18–30 years) and older (62–79 years) adults’ correct identifications of a confederate in a line-up, 1 month after they had met this person. It did not. Wright and Holliday (2007a) suggested that the context reinstatement instruction may be useful only after short delays when meaningful associations between the event and the context are strong.

The current study addressed some of the limitations of the studies discussed above. First, sample size was increased. Second, older participants were recruited from the community rather than from a university course, and hence were representative of the older adult population in general. Third, young and older partici-
plicants were given the exact same interview protocols. Fourth, in addition to obtaining measures of the total correct, incorrect, and confabulated details, recollected information was classified according to whether it was provided during the free recall or question phases of the interview, and in the categories of action, person, object, or the location. Such information provides a more precise evaluation of recall (Holliday, 2003b; Stein & Memon, 2006; Wright & Holliday, 2007a, 2007b). Fifth, because cognitive decline could lead to an overestimation of age-related effects, all participants completed the MMSE (Folstein et al., 1975) (cf. Mueller-Johnson & Ceci, 2004; Wright & Holliday, 2007a, 2007b) that evaluates cognitive status; the picture scale from the Pyramids and Palm Trees test (PPT; Howard & Paterson, 1992) that tests understanding of meaning, and the Beck Depression Inventory–Short form (BDI-SF; Beck & Beck, 1972) between the presentation of the postevent summary and the interview phase.

The Misinformation Effect

The current research adopted a broad definition of the misinformation effect, which states that memories of a witnessed event can be influenced by cognitive factors such as memory and attention and social factors such as social pressure, compliance with authority figures, and acquiescence (Ceci & Bruck, 1993; Holliday, 2003a, 2003b; Reysen, 2007). Much of the evidence concerning the mechanisms underlying the misinformation effect has been collected using an adaptation of the standard three-stage paradigm introduced by Loftus, Miller, and Burns (1978). In this paradigm, participants witness an event (e.g., film, slides) followed by misinformation about that event in a postevent summary before they take a memory test on their memories for the originally witnessed event. When asked to choose between the original event and the postevent misleading details, research with adults (e.g., Loftus, Donders, Hoffman, & Schoeler, 1989; Loftus et al., 1978) and children (e.g., Ceci, Ross, & Toglia, 1987; Holliday, 2003a, 2003b; Holliday & Albon, 2004; Holliday, Douglas, & Hayes, 1999; Holliday & Hayes, 2000; Lampinen & Smith, 1995; Odegard, Cooper, Holliday, & Ceci, 2010) has consistently found that misled participants are significantly more likely than controls who have not been misled to report the misinformation as having been part of the original event (for a review, see Reyna, Holliday, & Marche, 2002). In the current study, the standard three-stage paradigm was adopted.

Why do people report the misinformation rather than the original details? There is still no clear consensus in the literature to answer this question. Candidate theoretical explanations can be broadly classified as memory interference or response bias/social demand accounts. For example, the memory trace-alteration account proposes that the original event memories are altered, updated, or replaced by the postevent misinformation (e.g., Loftus et al., 1978). Retrieval interference accounts, on the other hand, argue that access to the original event memories is blocked by (e.g., Morton et al., 1985) or co-exist with (e.g., Christianson & Ochalek, 1993; Reder & Schunn, 1996) the postevent misinformation memory trace. Memory trace-strength accounts hold that postevent misinformation degrades memory by altering the original trace or by preventing its retrieval or both, with the amount of degradation dependent upon the strength of the original event memory (e.g., Brainerd & Reyna, 1998; Holliday et al., 1999; Marche, 1999). Both the co-existence and trace-strength accounts assume dual memory traces (original and postevent misinformation) at the point of retrieval. According to the source-monitoring framework, the misinformation effect occurs when people claim to have seen information in the original event that was suggested afterwards (Johnson, Hashtroudi, & Lindsay, 1993). Source misattributions can occur if there is no memory for the original event because it was not encoded, or it has been forgotten (Lindsay & Johnson, 1989; for recent reviews, see Lindsay, 2008; Mitchell & Johnson, 2009). Other theorists propose that the misinformation is reported for social demand reasons such as social pressure (Reysen, 2007), social influence (e.g., Hoffman, 2001), conformity (Gabbert, Memon, & Wright, 2006; Wright & Klump, 2004), compliance and/or response biases inherent in the standard (Loftus) test paradigm (e.g., McCloskey & Zaragoza, 1985; see Ayers & Reder, 1998; Holliday, Reyna, & Hayes, 2002, for reviews).

The current research concerning older adults’ acceptance of misinformation is small in comparison to the large body of child research. Nonetheless, the picture that emerges is one of greater susceptibility to misinformation in older age (Cohen & Faulkner, 1989; Gabbert, Memon, Allan, & Wright, 2004; Karpel, Hoyer, & Toglia, 2001; Loftus, Levidow, & Duensing, 1992; Marche, Jordan, & Owre, 2002; Mitchell, Johnson, & Mather, 2003; Mueller-Johnson & Ceci, 2004; Roediger & Geraci, 2007), which is confidently held (Dodson & Krueger, 2006; Mitchell et al., 2003). Only two studies have reported no misinformation effects in older adults (Bornstein, Cherry, Witt, & Greene, 2000; Coxon & Valentine, 1997). It should be noted that older adults’ memories for original (control) details on which no misinformation was given was near floor in these studies. To detect an effect of misinformation, control item accuracy needs to be higher than accuracy on misled items (Mueller-Johnson & Ceci, 2004; see Payne, Toglia, & Anastasi, 1994, for a review).

The Current Study

A major aim was to test a developmentally Modified Cognitive Interview protocol adapted from Holliday (2003b) on a group of older participants to see whether a shorter but effective interview protocol, in terms of correct recollections, accuracy, and completeness than is currently available to interview older adults, was viable. This Modified Cognitive Interview omitted the change perspective instruction (Holliday, 2003b; Mello & Fisher, 1996; Searcy et al., 2001; Wright & Holliday, 2007a) because of the concern that it may promote fabrication in adult witnesses (Boon & Noon, 1994). A second aim was to categorize the reported details in terms of action, object, person, and location (Holliday, 2003a, 2003b). We expected that the young adults would provide more correct details than the older adults (Wright & Holliday, 2007a). Third, we wanted to test whether a Modified Cognitive Interview would reduce misinformation acceptance in adults as has been found with children (Holliday, 2003b).

Method

Participants

Thirty-one young males and females (M age = 22 years; age range: 19–24 years) and 28 old males and females (M age = 66
years; age range: 60–73 years) took part in this study. The young adults were college students who participated for course credits. The older adults resided in the community of a large city and were recruited in response to leaflets, newspaper advertisements, and radio broadcasts. Groups were matched on years of education (between 15 and 16 years) and ethnicity (95% White, 5% other). All participants achieved normal scores on tests of cognitive functioning (see below). All participants were tested individually in a quiet room at the college.

Design

The design was a 2 (age group: young adults, older adults) × 2 (item type: control, misled) with the first two factors between-subjects and the last factor within-subjects.

Materials

A 2-min, 36-sec film of a purse-snatch robbery, which contained a large number of quantifiable details, was chosen as the stimulus event. Adults were administered one of two interview protocols: a Structured Interview as a control interview modified from that of Khikhe (1993), or a Modified Cognitive Interview containing the Context Reinstatement, Report All, Change Order instructions (see Appendix for interview protocols). For counterbalancing purposes, there were two versions of the postevent narrative each of which was a summary of the film (presented in the same temporal order) and contained six misleading details about previously seen details from the film (misled items), and neutral information about the other six details (control items). The misled items were consistent with the syntactic and semantic context of the film (see Appendix, for postevent narratives and recognition test questions). Three tests to assess cognitive impairment were given to all participants in Phase 3 (in the same order). The MMSE (Folstein et al., 1975) consists of 21 items that assess memory recall, the ability to follow verbal commands, and the ability to orientate oneself in one’s environment. A person who scores 26 or lower (out of 30) is considered to have a significant cognitive impairment (Whitlatch, Feinberg, & Tucke, 2005). All our participants scored above 26. The Pyramids and Palm Trees test (PPT: Howard & Paterson, 1992) is a nonverbal scale that assesses the ability to extract semantic meaning from pictures and words. We used the picture subscale in which three cards are given for each test item; a target picture and two pictures from which the testee is asked to select the picture that goes with the target picture. For example, the target picture “waistcoat” is placed above a picture of a “necklace” and a picture of a “bow tie”; the testee chooses which item goes with the waistcoat. Scores of 46 or below (out of 52) are indicative of significant cognitive impairment (Hodges & Patterson, 1995). All our participants scored above 46. Depression has been linked to memory deficits (e.g., Burt, Zember, & Niedereche, 1995). Hence, all our participants completed the 13-item Beck Depression Inventory—Short Form (BDI-SF: Beck & Beck, 1972). The BDI-SF is a self-report scale in which respondents rate the severity of symptoms on a four-point scale ranging from: “I do not feel I am a complete failure” (score 0) to “I feel I am a complete failure as a person” (score 3). A score higher than 10 points is viewed as indicative of depression. All our participants scored below 10. Importantly, scores on these three tests did not vary by age group or interview condition.

Procedure

The study was conducted by two female researchers (aged 22 years) in five phases over 2 days. These researchers were trained in all aspects of the experimental procedure by a senior researcher, and they received 20 hr of training in each interview technique by a trained interviewer. Participants were tested individually. In Phase 1, a researcher showed the short film that depicted a simulated robbery. Participants were told to pay attention to the film because they would be asked questions about it at a later stage. In Phase 2, the next day, a different researcher read the participant a postevent summary of the film they had seen the previous day. In Phase 3, this researcher administered the three screening instruments that are documented above. After ~40 min, the researcher who showed the film in Phase 1 interviewed the participant with either the Modified Cognitive or Structured (control) Interview (Phase 4). Interviews were audio-taped and began with 5 min of rapport-building. Next, in the Structured Interview, participants were asked to report the film content without making up anything up. In the free recall phase, participants were asked: “Tell me about the film in your own words,” which was followed by a second request for more information (remember more?). In the question phase that followed, participants were asked open-ended, specific, and closed questions only about the details they had reported in the free recall phase. In the closure phase, the interviewer summarized the remembered details and invited questions.

The Modified Cognitive Interview and the Structured Interview protocols were the same with the exception that in the former the three Cognitive Interview instructions were implemented in the free recall phase of the interview, and the instruction to form a mental image before questions about specific details recalled in the question phase. After rapport was established, the Report All instruction was given: “I want you to tell me everything you can remember, every detail you can remember even if you think it may be irrelevant.” The Report All instruction was immediately followed by the Context Reinstatement instruction in which the participant was asked to mentally reinstate the personal and physical context in which the film was shown, as follows, “Close your eyes. Picture yourself back in the room where you watched the film. How were you feeling? What could you see in the room? What could you hear in the room?” The participant then recalled all they could remember. Next, the Change Order instruction was given to recall the film details in reverse order beginning from the last temporal detail reported: “Now I want you to tell me the very last thing you remember in the film” (recall), then “What happened just before that?” This latter prompt was continued until no further details could be recollected or the beginning of the film was reached. The question phase began with the instruction to form a mental image before questions about specific details recalled in the free recall phase. An important point to note about information recalled in the question phase of both interviews is that such information is new and is based on information reported in the free

2 For a discussion of control interviews in this literature, see Fisher (1996) and Memon and Stevenage (1996).
recall phase (cf. Holliday, 2003a, 2003b; Holliday & Albon, 2004; Wright & Holliday, 2007a, 2007b). For example, if the participant reported seeing a woman who was robbed in the free recall phase, the interviewer asked the participant to form an image in their mind of this woman: “Close your eyes. Get a picture in your mind of this woman.” When they indicated they had done this the interviewer asked a series of questions about this woman to obtain new information, for example: “you said the woman was carrying a bag. Tell me more about this bag?” The closure phase followed the same procedure as for the Structured Interview. After the interview, the participant completed a recognition memory test to assess acceptance of original event details and postevent misinformation (Phase 5). This test contained 12 questions about 12 items: 6 original (control) from the film clip viewed in Phase 1, and 6 items on which misinformation was given in the postevent narrative in Phase 2 (see Appendix). Participants were told that they would be asked questions about the film some of which were old and some new; they should respond “yes” if they remembered the detail (old) and “no” if they did not (new).

Coding and Scoring of the Interviews

Film details reported during interviews were coded as correct, incorrect, and confabulated in the categories of person, action, object, and location, with one point given for each unit of information reported in the free recall and question phases (cf. Holliday, 2003a, 2007b). Every piece of information was scored the first time it was mentioned whether it was correct or not. For example, the statement, “a woman stood at a cash machine at a supermarket” was coded as - “woman” (1-person), “stood” (1-action) “cash machine” (1-object) “at the supermarket” (1-location). This coding system produced a total of 647 details in the film: 249 person, 117 action, 166 object, and 115 location. A detail was coded as correct if it corresponded with the film (e.g., “red bag” when this was shown), as incorrect if it was discrepant from the film (e.g., “green bag” instead of “red bag”), and confabulated if it did not appear in the film (e.g., “a cat”). Interviews were transcribed, coded, and scored by three independent coders who were blind to the experimental hypotheses about the interview protocols. Inter-coder reliabilities were calculated for total correct, total incorrect, and total confabulations and were all around 95% agreement. Cohen’s Kappa coefficient of agreement was moderate, 0.577, and above chance levels. The duration of each interview (in minutes) and the number of questions asked were noted. The recognition test data were scored by a new researcher who was blind to the interview condition in which participants were placed.

Results

Interview Analyses

Initially, three separate 2 (age group) × 2 (interview) ANCOVAs with duration, number of questions asked, and interviewer as covariates were performed on the total numbers of correct, incorrect, and confabulated details. For total correct and total confabulated details, no main effects were found hence all subsequent analyses of these details omitted the three covariates. Similarly, for total incorrect details, no main effect of number of questions or interviewer was found. However, a main effect was found for duration; Modified Cognitive Interviews were significantly longer (M = 22.44 min) than Structured (control) interviews (M = 14.20 min). Hence, all subsequent analyses of incorrect details included duration as a covariate. Tukey’s (HSD) post hoc tests were performed on all significant interactions (p < .05). The mean numbers of correct, incorrect and confabulated details in the categories of person, action, object, and location recalled in the free recall and question phases of the interviews are presented in Table 1.

Accuracy

Accuracy rates were calculated by dividing the proportion of total correct details recalled in each age group, interview phase, and interview type by the proportion of total details recalled (see Table 1). Two separate 2 (age group) × 2 (interview) ANOVAs on accuracy rates in the two interview phases were performed. Main effects of interview were found in the free recall phase, F(1, 55) = 4.54, MSE = .002, p < .05, ηp² = .076, and in the question phase, F(1, 55) = 4.74, MSE = .006, p < .05, ηp² = .079. Accuracy rates were higher in both phases of Modified Cognitive Interviews (MMMCI FR = .93, MMMCI QP = .86) than in Structured (control) Interviews (MMSI FR = .91, MMSI QP = .82). No age differences were found.

Completeness

The total number of correct details recalled was divided by the total number of possible correct details to give a proportion completeness score for each participant (cf. Holliday, 2003b) (see Table 1). A 2 (age group) × 2 (interview) ANOVA on these scores revealed main effects for age group and for interview, and an Age Group × Interview interaction, F(1, 55) = 8.64, p < .01, ηp² = .136. For young adults, correct recollections in Modified Cognitive Interviews were more complete than in Structured Interviews (MMMCI = .21, MMSI = .14). This effect was not found for the older adults (MMMCI = .16, MMSI = .15).

Recall Across Interview Phases

Three separate 2 (age group) × 2 (interview) ANOVAs examined recall of the numbers of correct, incorrect, and confabulated details collapsed across interview phases (free recall, question). Main effects were found for (1) age group, F(1, 55) = 6.63, p < .05, ηp² = .108; overall, young adults remembered more correct details (M = 114.19) than older adults (M = 99.43), and (2) interview, F(1, 55) = 19.70, p < .001, ηp² = .264, more correct details were reported in Modified Cognitive Interviews (M = 121.54) than in Structured Interviews (M = 94.23). These main effects interacted significantly, Age Group × Interview interaction, F(1, 55) = 8.64, p < .01, ηp² = .136. Young adults remembered more correct details in Modified Cognitive Interviews (M = 136.60) than older adults (M = 104.15), but not in Structured Interviews (Myoung = 93.19, Molder = 95.33). No significant effects were found for incorrect or confabulated details.

Recall in the Free Recall and Question Phases

A series of 2 (age group) × 2 (interview) ANOVAs examined recall of the numbers of correct, incorrect, and confabulated
ANOVAs were performed on these variables. In the free recall phase, more correct details were recalled in Modified Cognitive Interviews than in Structured Interviews ($M = 54.39$), $F(1, 55) = 7.76, p < .01, \eta^2_p = .124$. No effects were found for incorrect or confabulated details.

In the question phase, main effects were found for (1) age group, young adults recalled more correct details ($M = 52.03$) than older adults ($M = 38.64$), $F(1, 55) = 9.01, p < .01, \eta^2_p = .141$, and (2) interview, more correct details were recalled in Modified Cognitive Interviews ($M = 52.14$) than in Structured Interviews ($M = 39.84$), $F(1, 55) = 6.64, p < .05, \eta^2_p = .108$. A main effect of age group was found for recall of incorrect details; young adults recalled more incorrect details ($M = 10.03$) than older adults ($M = 7.29$), $F(1, 54) = 5.42, p < .05, \eta^2_p = .091$. Note that no evidence of age differences in accuracy was found in this phase (see above). No effects were found for confabulated details.

### Recall of Specific Types of Information

The numbers of correct, incorrect, and confabulated details in the free recall and question phases of both interviews were further classified according to the categories of person, action, object, and location details. A series of $2 \times 2$ (age group) ANOVAs were performed on these variables.\(^3\)

In the free recall phase, main effects of interview were found for correct person, $F(1, 55) = 4.97, p < .05, \eta^2_p = .083$, and correct action details, $F(1, 55) = 15.94, MSE = 28.92, p < .001, \eta^2_p = .225$. More correct person ($M = 22.54$) and action ($M = 23.32$) details were recalled in Modified Cognitive Interviews than in Structured Interviews ($M_{person} = 17.10, M_{action} = 17.61$). An Age Group X Interview interaction was found for location details, $F(1, 55) = 15.94, p < .05, \eta^2_p = .074$. For young adults only, more correct location details were recalled in Modified Cognitive Interviews ($M = 15.53$) than in Structured Interviews ($M = 10.50$). No other significant effects were found.

In the question phase, main effects of age group were found for correct person, $F(1, 55) = 4.32, p < .05, \eta^2_p = .073$, object, $F(1, 55) = 5.79, p < .05, \eta^2_p = .095$, and location, $F(1, 55) = 8.51, p < .01, \eta^2_p = .134$. Details. Young adults recalled more correct person ($M = 27.77$), object ($M = 7.58$), and location ($M = 9.97$) details than older adults ($M_{person} = 21.89, M_{object} = 4.96, M_{location} = 6.79$). A main effect of interview for correct person details was found, $F(1, 55) = 5.34, p < .05, \eta^2_p = .088$; more correct person details were reported in Modified Cognitive Interviews ($M = 52.36$) than in Structured Interviews ($M = 49.28$), $F(1, 55) = 3.51, p = .066, \eta^2_p = .06$. No effects were found for incorrect or confabulated details.

### Table 1

**Mean Numbers of Correct, Incorrect, and Confabulated Details Recalled by Interview Condition (SDs Are in Parentheses)**

<table>
<thead>
<tr>
<th></th>
<th>Structured (control) Interview</th>
<th>Modified Cognitive Interview</th>
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<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Old</td>
</tr>
<tr>
<td>Correct free recall phase</td>
<td></td>
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<tr>
<td>Action</td>
<td>16.44 (5.54)</td>
<td>18.87 (4.81)</td>
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<tr>
<td>Person</td>
<td>16.06 (7.57)</td>
<td>18.20 (5.12)</td>
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<tr>
<td>Location</td>
<td>7.50 (3.85)</td>
<td>8.07 (3.54)</td>
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<tr>
<td>Location</td>
<td>10.50 (3.93)</td>
<td>13.30 (4.05)</td>
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<td>Incorrect free recall phase</td>
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<tr>
<td>Action</td>
<td>5.44 (3.61)</td>
<td>4.47 (3.23)</td>
</tr>
<tr>
<td>Person</td>
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<td>20.73 (9.63)</td>
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<tr>
<td>Location</td>
<td>6.44 (4.24)</td>
<td>4.53 (3.96)</td>
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<tr>
<td>Location</td>
<td>8.25 (4.06)</td>
<td>7.07 (3.56)</td>
</tr>
<tr>
<td>Incorrect question phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>2.19 (1.72)</td>
<td>1.67 (0.72)</td>
</tr>
<tr>
<td>Person</td>
<td>1.62 (1.59)</td>
<td>2.47 (1.73)</td>
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<tr>
<td>Location</td>
<td>0.38 (0.62)</td>
<td>0.87 (1.41)</td>
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<tr>
<td>Location</td>
<td>0.50 (0.73)</td>
<td>0.67 (0.98)</td>
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</tr>
<tr>
<td>Action</td>
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<td>0.20 (0.56)</td>
</tr>
<tr>
<td>Person</td>
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<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Location</td>
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<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Confabulated question phase</td>
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<td></td>
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<tr>
<td>Action</td>
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<td>0.07 (0.26)</td>
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<tr>
<td>Person</td>
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<tr>
<td>Object</td>
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<td>0.27 (0.46)</td>
</tr>
<tr>
<td>Location</td>
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<td>0.00 (0.00)</td>
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<tr>
<td>Accuracy</td>
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<td>0.87 (0.04)</td>
</tr>
<tr>
<td>Completeness</td>
<td>0.14 (0.03)</td>
<td>0.15 (0.04)</td>
</tr>
<tr>
<td>Misinformation intrusions</td>
<td>0.38 (0.62)</td>
<td>1.33 (1.72)</td>
</tr>
</tbody>
</table>

---

\(^3\) Separate analyses were performed for the two interview phases because the information recalled in each phase is not independent. Details recalled in the Free Recall phase are the sources for questions in the Question phase (cf. Holliday, 2003a, 2003b; Holliday & Albin, 2004; Memon, Wark, Holley, Bull, & Kl¨nken, 1997; Wright & Holliday, 2007a, 2007b).
28.64) than in Structured Interviews ($M = 21.68$). An Age Group X Interview interaction was found for incorrect object details, $F(1, 54) = 7.10, p < .05, \eta^2_g = .116$; young adults recalled more incorrect object details in Modified Cognitive Interviews ($M = 2.20$) than older adults ($M = .62$), but not in Structured Interviews ($M_{young} = .56, M_{old} = .87$). A main effect of interview was found for recall of confabulated action details, $F(1, 55) = 4.55, p < .05, \eta^2_g = .076$; more were recalled in Structured Interviews ($M = .19$) than in Modified Cognitive Interviews ($M = .00$), although the absolute numbers were small or nonexistent.

**Misinformation Intrusions: Interviews**

The numbers of misinformation intrusions reported in both interviews were calculated for each participant. Intrusions were defined as details on which misinformation was presented in the postevent narrative. A 2 (age group) $\times$ 2 (interview) ANOVA on these data revealed an Age Group X Interview interaction, $F(1, 55) = 5.20, MSE = 1.31, p < .05, \eta^2_g = .086$. Post hoc tests demonstrated that for the older adults, fewer details were recalled in Modified Cognitive Interviews ($M = .46$) than in Structured Interviews ($M = 1.33$). No significant differences were found for the young adults ($M_{MCI} = .87, M_{SI} = .38$).

**Recognition Test Analyses: The Misinformation Effect**

The proportions correct for control (proportion “old”) and mislaid items (proportion “new”) were calculated for each participant. All analyses were performed after collapsing across postevent narrative version (1 or 2) because preliminary analyses found no reliable effect of narrative version. Table 2 illustrates the mean proportions correct in each experimental condition.

A 2 (age group) $\times$ 2 (interview) $\times$ 2 (item type: control, misled) ANOVA with the item type factor within-participants was performed on the proportions correct. A main effect was found for control versus misled item types, $F(1, 55) = 5.28, p < .05, \eta^2_g = .088$; across interview conditions and age groups, correct recognition of control items ($M = .71$) was higher than for misled items ($M = .63$), which is evidence of a misinformation effect. A main effect of age group was also found, $F(1, 55) = 10.03, p < .01, \eta^2_g = .154$. These main effects were qualified by an interaction with interview, Age Group X Item Type X Interview, $F(1, 55) = 4.45, p < .05, \eta^2_g = .075$. A misinformation effect (i.e., the mean difference between correct recognition of control and misled items (Ceci & Bruck, 1993; Holliday et al., 1999) was found for older adults given a Structured Interview ($M_{diff} = .30$). For older adults given a Modified Cognitive Interview, however, no evidence of a misinformation effect was found ($M_{diff} = .02$). No misinformation effects were found for young adults in either interview condition.

**Discussion**

The first important finding was that participants who were given the Modified Cognitive Interview recalled more correct information and their reports were more accurate overall than participants given the Structured (control) Interview. Significantly, the Modified Cognitive Interview increased older adults’ reporting of correct details in both the free recall and question phases. With regard to the types of information recalled, the Modified Cognitive Interview increased adults’ memories of person and action details, as has been reported previously with adults (Wright & Holliday, 2007a) and children (Holliday, 2003b; Milne & Bull, 2003), without a concomitant increase in incorrect or confabulated details (Wright & Holliday, 2007a). Indeed, both young and older adults recalled twice as many correct person and action than object details during the free recall phase (Holliday, 2003a, 2003b; Holliday & Albon, 2004; Memon et al., 1997; Milne et al., 1995), and 25% more correct person details in the question phase (Holliday, 2003b). Practically, interviews with law professionals in real-life settings necessarily demand that witnesses provide an accurate description of an alleged offender and his or her actions.

Several other results were found to be age-related. First, the older adults recalled fewer correct details and were less complete in their recollections than the young adults, as reported by others (e.g., Aizpura et al., 2009; Brimacombe et al., 1997; Coxon & Valentine, 1997; Craik et al., 1987; List, 1986; Wright & Holliday, 2007a; Yarmey & Kent, 1980). Second, the type of interview influenced correct recollections. Modified Cognitive Interviews increased correct remembering in both age groups but this increase was three times larger for the young adults than the older adults (31 and 10%, respectively). The type of interview also influenced the kind of information reported. For young adults only, 33% more correct location information was reported in Modified Cognitive Interviews. Completeness of recollections was 5% higher in Modified Cognitive Interviews, but only in the young adults. Third, the type of information recollected differed by age. The older adults recalled fewer correct location details during free recall, and fewer correct person, object, and location details during questioning than the young adults. Yet, memory for action details was stable across young and older participants. Taken together, these results suggest that memory for person, object, and location information may decline earlier in old age than memory for details about actions. These findings accord with earlier work by Wright and Holliday (2007a) and are important because there is little evidence about how memory for different types of details changes with advancing age. Surprisingly, young adults recollected more incorrect object details in the question phase of Modified Cognitive Interviews than older adults, although the absolute numbers were small (2 and 0.6 details, respectively). We can find no other studies that report such a finding. Importantly, however, there was no evidence that accuracy was comprised in the young adults.

How might the Modified Cognitive Interview used here improve memories for a simulated crime? Remember that an important feature of this interview is the context reinstatement instruction, whereby the witness is asked to close his or her eyes and to

Table 2

<table>
<thead>
<tr>
<th>Item type</th>
<th>Structured (control) Interview</th>
<th>Modified Cognitive Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Old</td>
</tr>
<tr>
<td>Control</td>
<td>.73 (.19)</td>
<td>.70 (.18)</td>
</tr>
<tr>
<td>Misled</td>
<td>.74 (.25)</td>
<td>.40 (.24)</td>
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</tbody>
</table>
mentally reinstate the physical and personal contexts in which the to-be-remembered event was experienced. There is considerable evidence that memory is enhanced if the context in which the event was witnessed/experienced overlaps with the context in which the event is recalled, a phenomenon known as “encoding specificity” (Tulving & Thomson, 1973). There is also evidence that if memory retrieval is performed with eyes closed, as in the present study, this often results in significantly more detailed (correct) information being recalled (Holliday, 2003b; Holliday & Albon, 2004; Perfect, Wagstaff, Moore, Andrews, Cleveland, Newcombe, Brisbane, & Brown, 2008; Wright & Holliday, 2007a). Can older adults use contextual cues to improve their recollections?

The effect of context on memory in old age is predicted by environmental support theory (Craik, 1986, 1994). Specifically, deficits in available processing resources mean that older adults are less efficient and less likely than younger adults to use contextual cues (e.g., Burke & Light, 1981) spontaneously at encoding (e.g., elaboration) and retrieval (e.g., retrieval searches) to aid their remembering. Yet, we know that if older adults are instructed to use contextual cues at encoding; for example, in the form of a question as to whether a presented word matched a presented face, that accuracy and completeness of recall are increased (Skinner & Fernandes, 2009). Free recall tests are especially difficult for older adults because they provide few retrieval cues (Craik, 1994; Luo & Craik, 2008). In our study, environmental support was given at retrieval in the form of the context reinstatement instruction in the free recall phase and the form a mental image instruction in the question phase, both of which serve to focus the interviewee’s mind on the details of the original film. To this end, it is likely that the recall improvements seen in the older adults when interviewed with a Modified Cognitive Interview were affected in part by the availability of contextual cues facilitated by the context reinstatement instruction.

Two additional pieces of evidence that favor a contextual account of our findings are to do with the individual Cognitive Interview instructions. We noted that the absolute numbers of correct information recollected under the Change order instruction in the free recall phase was very small (less than 2%). This means that the locus of the positive effects of Modified Cognitive Interviews on correct recollections in the free recall phase was with the report all and context reinstatement instructions. Note that these instructions are given together in that order in the protocol of Fisher and Geiselman (1992) and that used here. In the question phase of a Modified Cognitive Interview, an instruction to create a mental image of the item (e.g., of the woman standing at a cash machine) was given immediately before questions about this item. Note that the only difference between the two interviews in this phase is the form an image instruction in the Modified Cognitive Interview. Hence, we can see precisely how this instruction facilitated correct recollections. Indeed, more correct information (i.e., not produced during free recall) was recollected in the Modified Cognitive Interview than the Structured (control) Interview.

Misinformation Effects

A major aim of this study was to test whether misinformation effects could be minimized if participants, particularly the older adults, were interviewed using a Modified Cognitive Interview. As has been reported in studies that compared young and older adults, older adults’ memories were disproportionately affected by postevent misinformation (Cohen & Faulkner, 1989; Gabbert et al., 2004; Karpel et al., 2001; Marche et al., 2002; Mitchell et al., 2003; Mueller-Johnson & Ceci, 2004; Roediger & Geraci, 2007). Specifically, acceptance of misinformation on a recognition test was dependent upon the type of prior interview as well as age; only older adults given the Structured (control) Interview demonstrated a misinformation effect on this test, and this effect was substantial (30%). Older adults were also more likely to incorporate postevent misinformation (misinformation intrusions) in their free recall during an interview when they were given the Structured Interview. Importantly, however, misinformation effects were eliminated if older adults were given the Modified Cognitive Interview. To the best of our knowledge this is the first study to show that instructions at the point of retrieval can reduce misinformation effects in older adults. No misinformation effects were found for young adults in either interview condition. Why? It could be that the retention interval between viewing the film and exposure to postevent misinformation was not sufficiently long enough (1 day) to allow for forgetting of the film details for the young adults. If so, the fact that the older adults were suggestible after the same delay suggests they may have greater difficulties with memory storage and/or memory retrieval difficulties in comparison to young adults. Yet, if this explanation is correct, one would expect that older and young adults would also differ in correct recognition of control items for which no misinformation was given, but this was not the case, both age groups were equally proficient.

We propose that two theoretical accounts of misinformation effects in old age best explain our findings. One is concerned with memory for source—the source-monitoring framework (Johnson et al., 1993), and the other is concerned with memory processes/memory trace strength—the hypothesis (Brainerd & Reyna, 2005; Koustaal & Schacter, 1997).4 It is well-known that older adults make more source-monitoring errors than young adults because they misattribute the source of their memories to the postevent misinformation instead of to the original event (Hashtroudi, Johnson, & Chrosniak, 1989; Henkel, Johnson, & De Leonards, 1998; McIntyre & Craik, 1987; Mitchell et al., 2003; Multhaup, De Leonards, & Johnson, 1999; Roediger & Geraci, 2007; Schacter, Kasznia, Kihlstrom, & Valdiserri, 1991; Searcy et al., 1999; Wegesin et al., 2000). Moreover, older adults have difficulties in identifying and using specific details about the sources of their memories such as the day, time, and place (Dodson & Krueger, 2006; Ferguson, Hashtroudi, & Johnson, 1992). Some studies have reported that misinformation effects can be minimized by having participants take source-monitoring tests that encourage close examination of the source of the memories for the original and the postevent misinformation (e.g., Lindsay & Johnson, 1989; Multhaup et al. 1999).5 As discussed earlier, we pro-

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4 The two accounts propose similar mechanisms but are theoretically distinct.

5 Although the present research was not specifically intended as a test of the source-monitoring account of the misinformation effect it did incorporate conditions that encouraged a high level of discrimination between sources; a different experimenter provided the misinformation, and adults were presented with a postevent summary 1 day after viewing the film clip.
pose that the context reinstatement instruction in the free recall phase and the form an image instruction in the question phase of the Modified Cognitive Interview improved older adults’ correct recollections by encouraging them to use memory retrieval strategies (e.g., retrieval searches) that they do not, for the most part, implement spontaneously. A likely by-product of this is that they are better able to discriminate the sources of their memories as the original film rather than the postevent misinformation summary.

The second theoretical account proposes that remembering in older age is based predominantly on the familiarity or gist or general meaning of the event to-be-remembered (e.g., Gardner & Java, 1991; Koustala & Schacter, 1997) rather than on the exact surface information (verbatim). This reliance on gist processing is called “the gist-preference” hypothesis (Brainerd & Reyna, 2005), a tendency to use gist in remembering. If this hypothesis is correct, and the specific details were encoded in the first place, it should be possible to reverse the reliance on gist processing by using a verbatim-focused manipulation (Brainerd & Reyna, 2005). A Cognitive Interview is one such manipulation. As discussed earlier, the purpose of the context reinstatement instruction in the free recall phase and the form an image instruction in the question phase in the Modified Cognitive Interview used here was to facilitate retrieval of the exact details (verbatim) of the filmed crime. There are two ways in which our findings fit this theoretical account. First, misinformation effects were eliminated in older adults when they were interviewed with a Modified Cognitive Interview protocol that focused their retrieval on the surface details of the event rather than on the general meaning of the event. Second, the fact that the young adults showed no evidence of a misinformation effect indicates that their memories were likely to be verbatim-based. A line of research that should be pursued in future studies with older adults concerns identifying the memory processes underlying acceptance of misinformation effects as has been evaluated with children. Holliday and Hayes (2000) adapted Jacoby’s process dissociation model of recognition memory to quantify these processes and established that both conscious recollection and unconscious familiarity were implicated in children’s reporting of misinformation. Whether these processes are involved in older adults’ reporting of misinformation is yet to be determined, but would have important implications for theoretical accounts of misinformation effects in old age.

To conclude, the Modified Cognitive Interview facilitated remembering of witnessed information by focusing retrieval on the surface details of the filmed crime and on the sources of those details (whether the film or postevent summary). This result demonstrates that a Cognitive Interview adapted for older adults can be an important tool for interviewing them about forensically relevant information. Furthermore, a Modified Cognitive Interview offered some protection against the negative effects of misinformation when administered after the postevent misinformation. The fact that older adults could reject postevent misinformation demonstrates that both the original and postevent memory traces were intact, which rules out a strong version of the trace-alteration hypothesis of the misinformation effect (e.g., Loftus et al., 1978), but lends support to the co-existence of original and postevent memory traces (e.g., Christianson & Ochalek, 1993).

For practitioners, shortened modified interview protocols that facilitate accurate testimony are important given the potential problems surrounding interviewing these witnesses (limited attention span, forget faster) and pressures on police and other professionals to obtain maximum information following a crime (Wright & Holliday, 2005, 2007a). It is acknowledged that these results were obtained under laboratory conditions but we believe that, it is important that factors are first tested under controlled experimental conditions before evaluation in the field (Brainerd & Ornstein, 1991; Holliday, 2003b; Holliday et al., 2009). Testing of an adapted version of the Modified Cognitive Interview protocol for young children (Holliday, 2003b) using a live (staged) event has demonstrated that misinformation effects can minimized in real life contexts (Holliday, 2010) in the older adult population.

References


REDDING MISINFORMATION IN OLDER ADULTS


Wegesin, D. J., Jacobs, D. M., Zabin, N. R., Ventura, P. R., & Stern, Y.


**Appendix**

**Interview Protocols**

Modified Cognitive Interview Structured Interview
1. Rapport building phase
   - Rules of interview rules of interview
2. Free recall phase
   - Report everything
   - Context reinstatement
   - Recall request recall request
   - Change order
   - Recall request remember more?
3. Questioning phase
   - Information provided in FR
   - Information provided in FR used as the basis of open-ended used as the basis of open-ended and specific questions
   - Specific questions
   - Form image, probe image
4. Closure
   - Yes/no Recognition memory test question for each postevent narrative
     Postevent narrative Version 1
     There are two people at the cash machine. The woman is wearing a jacket with a hood. The man is shorter than the woman. A third man waits in line carrying something. There is a red sign above the cash machine with 50% off on it. There are four bins nearby. The grey-haired woman opens her brown handbag and puts the money in her purse. Another woman is wearing a jacket. The grey-haired woman bumped into a trolley. There are cars parked on each side of the trolley park. A silver Mini passes in front of the grey-haired woman. There is snow on the ground. The grey-haired woman crosses a busy road. As she walks beside a fence she meets a man. The man is tall and is wearing a woolly hat. After the man takes her bag, the grey-haired woman drops something. She rang her friend for help.
   - Yes/no recognition memory test questions for this narrative version
     1. Did the grey-haired woman wear a purple jacket? (Control 1)
     2. Was the man at the cash machine shorter than the grey-haired woman? (Misled 1)
     3. Was there a third man waiting in line holding plastic carrier bags? (Control 2)
     4. Did the red sign above the cash machine say 50% off? (Misled 2)?
     5. Did the grey-haired woman have a brown handbag? (Misled 3)
     6. Was there another woman shopper wearing a blue jacket? (Control 3)
     7. Did the grey-haired woman bump into a trolley? (Misled 4)
     8. Were there three cars parked on either side of the trolley park? (Control 4)
     9. Did a silver Mini pass in front of the grey-haired woman? (Misled 5)
    10. Did the grey-haired woman walk beside a brown fence? (Control 5)
    11. Did the robber wear a woolly hat? (Misled 6)
    12. Did the grey-haired woman drop her glove? (Control 6)

(Appendix continues)
Appendix (continued)

Postevent narrative Version 2

There were two people at the cash machine. The woman was wearing a pink jacket with a hood. There was a man at the other cash machine. A third man waited in line carrying a backpack. There was a red sign above the cash machine. There were four bins nearby. The grey-haired woman opened her handbag and put the money in her purse. Another woman was wearing a red jacket. The grey-haired woman walked on. There were four cars parked on each side of the trolley park. A silver car passed in front of the grey-haired woman. There was snow on the ground. The grey-haired woman crossed a busy road. As she walked beside a green fence she met a man. The man was wearing warm clothes. After the man took her bag, the grey-haired woman dropped her keys. She rang her friend for help.

Yes/no recognition memory test questions for this narrative version

1. Did the grey-haired woman wear a pink jacket? (Misled 1)
2. Was the man at the cash machine taller than the grey-haired woman? (Control 1)
3. Was there a third man waiting in line carrying a backpack? (Misled 2)
4. Did the red sign above the cash machine say “half price”? (Control 2)?
5. Did the grey-haired woman have a black handbag? (Control 3)
6. Was there another woman shopper wearing a red jacket? (Misled 3)
7. Did the grey-haired woman walk past a trolley? (Control 4)
8. Were there 4 cars parked on either side of the trolley park? (Misled 4)
9. Did a silver estate car pass in front of the grey-haired woman? (Control 5)
10. Did the grey-haired woman walk beside a green fence? (Misled 5)
11. Was the robber man tall? (Control 6)
12. Did the grey-haired woman drop her keys? (Misled 6)

Control questions are those for which no misinformation was given and reflect the information that was present in the original film. In the postevent narrative, only generic information was presented for these details. Misled questions are those for which misinformation that contradicts information presented in the original film and was presented in the postevent narrative.