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Aging, Misinformation, and Eyewitness Memory: Accuracy and Confidence for Central and Peripheral Items

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Abstract

Eyewitness memory is susceptible to distortion, especially among aging populations. Although we know that memory deteriorates as an individual becomes older, research on the interaction between aging, misinformation, and eyewitness memory remains limited. In this study, 42 young adults (age = 18-30) and 50 older adults (age = 65-78) first watched a short video clip depicting various central and peripheral items and read a narrative text that described the video but included false information about the items. Participants were then tested for their memory accuracy about the items and rated their confidence in memory. While memory appeared to be less accurate in older adults than in younger adults, misinformation and item location (central vs. peripheral) affected memory accuracy similarly for young and older adults. In contrast, confidence judgments differed by age, whereby older adults reported higher overall confidence, with their confidence less sensitive to the central vs. peripheral distinction.

Keywords: aging; eyewitness memory; false memory; confidence

Introduction

Eyewitness memory refers to memory for events that are observed directly, often involving complex scenes that unfold over time and include multiple objects, people, and actions. It is primarily based on episodic memory processes, which are reconstructive in nature and therefore susceptible to forgetting, interference, and post-event distortion (Schacter & Addis, 2007). Inherently fallible, episodic memory is influenced by both internal factors, such as prior knowledge, and external factors, such as misinformation given later (e.g., Loftus, 2005). Such vulnerabilities have important real-world implications, as inaccuracies in eyewitness testimony can influence legal and social decisions. Moreover, episodic memory abilities are known to change across the lifespan (e.g., Hultsch, 1998), raising critical questions about how aging alters susceptibility to eyewitness memory distortion. Given the increasing presence of aging populations in societies worldwide, understanding how aging affects episodic memory within the context of eyewitness memory has become a pressing issue, yet it remains relatively underexplored.

Aging is associated with alterations in attentional control, episodic memory, and source monitoring, all of which are directly engaged when remembering complex events and affect the accuracy of eyewitness reports. Older adults are thought to rely more on gist-based or schematic information and less on specific episodic details (see Greene & Naveh-Benjamin, 2023 for a review), potentially increasing vulnerability to memory distortions. Particularly relevant to the present study is *source memory*, i.e., "memory for where or how one came to know what one now remembers" (American Psychological Association, n.d.). When the ability to remember sources declines, people can easily fail to distinguish an event they have actually seen and another event they have only read or heard about (e.g., Loftus et al., 1978). Investigating how age interacts with features of remembered events can therefore provide valuable insights into both the mechanisms of memory decline and the circumstances under which memory of aging populations remains resilient.

Studies of false memory have shown that exposure to misleading post-event information can systematically alter later memory reports. For example, in their seminal study, Loftus et al. (1978) used a misinformation paradigm to demonstrate that source monitoring is subject to errors. In their task, participants were first presented with a series of still images, and then half of the participants were presented with misleading information about the event depicted in the pictures. Those in the misleading information group performed worse in a later memory test than the other group that did not receive any misinformation, clearly indicating that post-event misinformation can alter memory. The finding has been replicated across many studies, including the one by Takarangi et al. (2006) that introduced a modern version of the paradigm using videos instead of still images. After watching a short video, participants were presented with a narrative that described the storyline in the video but with some accurate (control) and inaccurate (misleading) information.

In these misinformation paradigms, participants tend to incorporate misleading details into their recollection of an original event, even when those details directly contradict what they initially experienced. Several factors affect source monitoring abilities and increase the vulnerability to misinformation, such as the vividness of original memories (Johnson et al., 1993), the nature of the task (recognition memory vs. source monitoring task; e.g., Lindsay & Johnson, 1989; Multhaup et al., 1999), as well as the location of items in the scene (central vs. peripheral; e.g., Dalton & Daneman, 2006; Echterhoff et al., 2007; Sekeres et al., 2016; Wright & Stroud, 1998; Wyler & Oswald, 2016). Such effects have been observed across age groups, but questions remain about

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how characteristics of the original event influence the likelihood of false memories, particularly in older adults.

Central items, which are directly relevant to the main events unfolding, are generally remembered more accurately than peripheral items that appear in the background or are only tangentially related to the event. The eyewitness and source memory literature consistently reports superior recall and recognition for central details relative to peripheral ones (Dalton & Daneman, 2006; Echterhoff et al., 2007; Sekeres et al., 2016; Wright & Stroud, 1998; Wyler & Oswald, 2016). However, despite extensive evidence for the central-peripheral asymmetry, little is known about how false memory of such information may differ across age groups. One notable exception is Daneman et al. (2013), who examined age-related differences in social suggestibility to central and peripheral misinformation using a co-witness discussion paradigm. They found that both young and older adults incorporated misleading suggestions about event details and that older adults were not disproportionately susceptible to misinformation relative to younger adults once baseline memory differences were considered. Regarding the age (young vs. older) × misinformation status (mentioned vs. unmentioned) interaction, no significant effect was found for central misinformation. For peripheral misinformation, the finding suggested that younger adults might have been more susceptible to a co-witness's misleading suggestions than older adults were, but this finding was deemed inconclusive due to potential floor effects. In contrast, a more recent study by Guo et al. (2025) reported greater susceptibility to misinformation among older adults. Although both young and older adults demonstrated better memory for items that were salient in the original pictures than for less salient items, this effect appeared weaker in older adults. These prior studies provide important evidence that both younger and older adults are susceptible to misinformation, yet the literature remains inconclusive regarding age-related differences in susceptibility to misinformation, as well as how the centrality of items influences such effects. Memory distortions can arise through multiple mechanisms, and further examination is needed to truly understand whether aging amplifies, attenuates, or leaves unchanged the relative advantage for central information in eyewitness memory.

In addition to memory accuracy, confidence judgments constitute a crucial component of eyewitness memory and testimony. Confidence is often used as an indicator of memory reliability, despite evidence that confidence and accuracy are not always well aligned (e.g., Chua et al., 2012; Moore et al., 2024). Notably, older adults tend to express higher confidence in their memory reports than younger adults, even when their objective performance is poorer or equivalent. Previous empirical research indeed shows that older adults can be particularly confident in incorrect memory and source attributions (Chua et al., 2009; Dodson et al., 2015; Mitchell et al., 2003; Shing et al., 2009). This overconfidence may be attributed partially to greater reliance on gist-based information during retrieval, which may feel subjectively compelling but lacks diagnostic detail. Yet, how this age-related confidence bias interacts with properties of the remembered material, such as whether information is central or peripheral, remains underexplored.

In sum, the present study addresses the gaps in the literature by examining how aging influences the accuracy of and confidence in eyewitness memory for central and peripheral items in a misinformation paradigm. We adapted the aforementioned modern misinformation paradigm developed by Takarangi et al. (2006) and tested how young and older adults remembered the central and peripheral details. By using stimuli that vary in memorability and diagnostic value (specifically central vs. peripheral items within the event), we aimed to disentangle how objective memory performance and subjective confidence relate to one another across age groups. This approach allows for a more nuanced understanding of age-related differences in eyewitness memory, particularly in contexts where misleading information is present.

Our main hypotheses were, in both age groups (young and older adults), memory accuracy would be lower for peripheral items than for central items (H1) and for misled items than for control items (H2). We also hypothesized that older adults would exhibit higher confidence than younger adults (H3). We also examined potential interactions among item location, misinformation, and age (H4); however, given that the literature on this topic was relatively limited, no specific directional hypothesis was formulated. As discussed earlier, however, the recently published findings of Guo et al. (2025) suggest a three-way interaction whereby younger adults are less susceptible to misinformation for central than peripheral items, while older adults show comparable susceptibility regardless of item location.

Methods

Participants

Forty-two young adults (age = 18-30; 20 females) and 50 older adults (age = 65-78; 26 females) in a large metropolitan area in Japan participated in the study. Informed consent was obtained from all participants. Participants were offered monetary compensation following the local standards. The study has been approved by the ethics committee of Sabancı University (protocol number: 202528).

Procedure

The experiment was conducted in a single-blind design: the researcher collecting and analyzing data was not blind to the study hypotheses, but participants were not informed of the hypotheses or that the misinformation narrative contained misleading information. All participants were first screened for eligibility criteria (e.g., no color blindness and other sight-related conditions). In addition to *the misinformation task*, we administered the *Montreal Cognitive Assessment (MoCA)* and *Corsi Block-Tapping Task (Backward)* to older and young adult participants, respectively, to ensure no participant had noticeable memory and other cognitive issues.

Measures

Misinformation Task The current study adapted the stimuli and paradigm developed by Takarangi et al. (2006). The task consists of three main phases: *event encoding*, *misinformation*, and *recognition test* (Figure 1). In the event encoding phase, the participant watched a 7-minute silent video clip of a man appearing to be an electrical repair person, walking into a house, getting food and beverages from the kitchen, and stealing several items. In the video, we selected 24 target items, evenly split between *central items* with which the protagonist directly interacts, and *peripheral items* that appear only in the background. The video was presented on a 13-inch tablet device. Participants were informed that this study concerns their memory and that they should pay close attention to the content of the video. After watching the video, the participant performed a distractor filler task of basic arithmetic questions (e.g., 18 + 57 =) for 5 minutes.

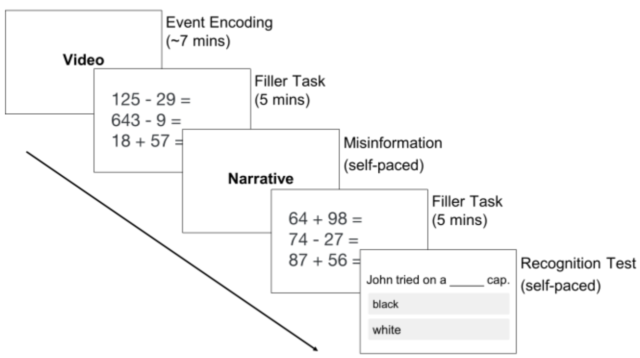

Figure 1: Overview of the experimental procedure.

In the misinformation phase, the participant read a narrative description of the video describing different subevents (e.g., "John rummaged through a pile of papers next to a yellow mug…"). In the misinformation narrative, half of the central and peripheral items were described congruently with the video, i.e., *control items*, while the other half were described inaccurately, i.e., *misled items*. For example, for the target item *cap*, the participant watched the protagonist trying on a black cap in the video, but the misleading narrative stated "a white cap." Participants were instructed to read the narrative at their own pace. The control and misleading items were counterbalanced between two versions of the misinformation narrative, and participants were randomly assigned to one of the two. After reading the narrative, the participant completed another filler task and the recognition test.

In the recognition test phase, for each target item, the participant was presented with a fill-in-the-blank question (e.g., John tried on a _______ cap) and two alternative choices (e.g., black and white), and were asked to answer the questions based on the video. We also asked the participant to rate their confidence in their choice on a scale of 1-5 (1 = not at all confident; 5 = very confident). The task took 20-30 minutes to complete.

The materials were based on the design of Takarangi et al. (2006), but the narratives and questions were created for the current study and were all in Japanese.

Montreal Cognitive Assessment (MoCA) MoCA is a globally used assessment of general cognitive abilities, measuring a range of skills including attention, memory, and language, and can be administered in about 10 minutes (Nasreddine et al., 2005). MoCA was administered to older adults to ensure none of them had severe cognitive impairment. The total scores ranged from 23-31 (M = 27.44, SD = 2.00) with a normal distribution, indicating the absence of severe cognitive impairment.[1]

Corsi Block-Tapping Task As MoCA is not designed to assess the cognitive abilities of neurotypical young adults, we measured the visuospatial working memory (executive function) of young adult participants using the backward Corsi Block-Tapping task (Corsi, 1972). We administered a computerized version of the task in *PsyToolkit* (Stoet, 2010, 2017). In each trial, 9 squares were presented on a computer screen in a random arrangement, and some squares changed their color one by one in a sequence. Participants were asked to select the same square in a reverse order, and the sequence length increased as they correctly answered the trial. The total scores ranged from 4–8 (M = 6.02, SD = 1.05), showing no sign of cognitive issues.

Results

All analyses were conducted in *R 4.4.2* (R Core Team, 2024) and *RStudio 2026.01.0* (Posit team, 2026). Accuracy was analyzed using generalized linear mixed-effects models (GLMMs) with a binomial error distribution and logit link function, whereas confidence ratings were analyzed using linear mixed-effects models (LMMs). Mixed-effects models were fit using the *lme4* package, with inferential statistics for fixed effects in LMMs obtained via the *lmerTest* package. Models included fixed effects of Item Location (central vs. peripheral), Item Type (control vs. misled), and Age Group (young vs. older), with random intercepts for both participants and items to account for repeated measurements and item-level variability. GLMMs were fit using maximum likelihood estimation with the *bobyqa* optimizer to ensure stable convergence. Model comparisons were conducted using AIC to evaluate the contribution of interaction items.

Accuracy

Accuracy (see Figure 2) was analyzed using GLMMs with a binomial distribution and logit link. Fixed effects included Item Location (central vs. peripheral), Item Type (control vs. misled), and Age Group (young vs. older). Random

[1] MoCA score is calculated out of 30, but some participants exceeded the maximum score as we used the Japanese version of MoCA (MoCA-J) which adds an extra point for receiving ≤ 12 years of education.

intercepts were included for both Participant and Item to account for repeated observations and item-level variability.

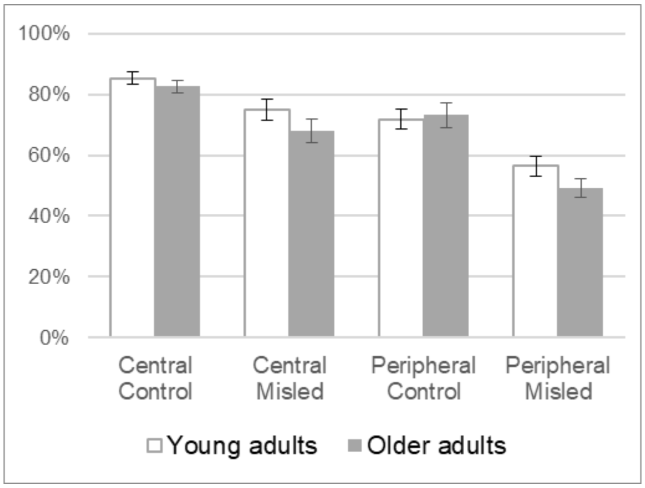

Figure 2: Memory accuracy of young and older adults. Error bars indicate standard errors.

In the main-effects model (Model A1), confirming H1 and H2, accuracy was significantly lower for peripheral items than for central items (b = -1.04, SE = 0.33, z = -3.11, p = .002), and for misled items compared to control items (b = -0.91, SE = 0.10, z = -8.78, p < .001). The effect of age group was marginal, with young participants showing slightly higher accuracy than older participants (b = 0.22, SE = 0.11, z = 1.93, p = .054).

A model including all two-way and three-way interactions among Item Location, Item Type, and Age Group (Model A2) did not improve model fit (AIC = 2434.11) relative to the main-effects model (AIC = 2429.17). None of the interaction terms were statistically significant (all ps > .31), indicating that the effects of Item Location and Item Type on accuracy did not reliably differ as a function of age group.

Confidence

Confidence ratings were analyzed using LMMs with random intercepts for Participant and Item. Fixed effects included Item Location, Item Type, and Age Group. In the main-effects model (Model C1), confidence was significantly lower for peripheral items than for central items (b = -1.38, SE = 0.17, t(22.00) = -8.05, p < .001), and lower for young participants compared to older participants, supporting H3 (b = -0.35, SE = 0.11, t(89.97) = -3.10, p = .003). The effect of item type was not significant (b = -0.06, SE = 0.05, t(2091) = -1.27, p = .20; see Figure 3).

Adding interaction terms (Model C2) did not substantially improve model fit (AIC = 6798.90) over the main-effects model (AIC = 6800.68; ΔAIC < 2). No two-way or three-way interactions involving Item Type were significant (all ps > .16), but the interaction between Item Location and Age Group reached significance (b = -0.27, SE = 0.13, t(2087) = -2.12, p = .035).

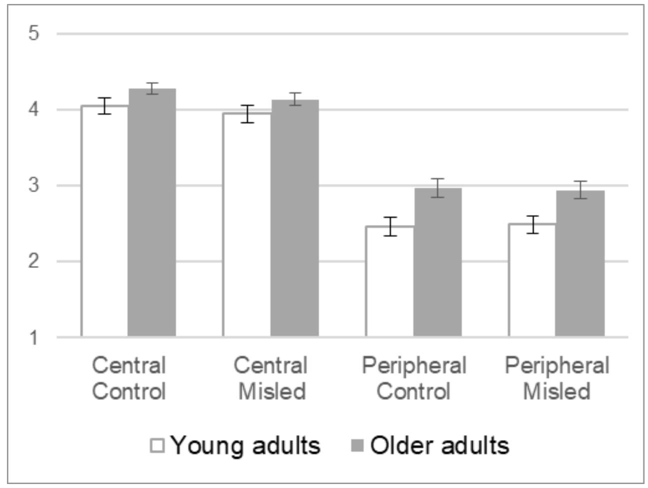

Figure 3: Confidence levels of young and older adults. Error bars indicate standard errors.

Discussion

The present study examined how aging affects the accuracy of and confidence about eyewitness memory, focusing on the location of items to be remembered. Regarding accuracy, robust main effects emerged for item location (central vs. peripheral) and item type (control vs. misled). Older participants also showed a tendency toward lower accuracy than younger participants, though this effect did not reach conventional levels of statistical significance, indicating largely comparable accuracy across age groups in the present task. Importantly, the effects of item location and item type were consistent across age groups, suggesting that location and misleading post-event information exert independent and similar influences on memory performance in young and older adults, differing from Guo et al. (2025). One potential explanation for this discrepancy lies in the nature of the stimuli used. Guo et al. (2025) presented static images, whereas the current study used a dynamic video clip. The higher ecological validity of video stimuli may have allowed older adults to allocate attention more naturally than in the relatively artificial task of memorizing static images, thereby attenuating age-related differences in memory performance.

In terms of memory confidence, participants reported lower confidence for peripheral items than for central items, mirroring the accuracy results and indicating sensitivity to spatial factors at both objective and subjective levels. In contrast to accuracy, however, confidence did not differ reliably between misled and control items, suggesting that misleading information reduced performance without a corresponding reduction in subjective certainty. Further, young participants reported lower confidence overall than older participants, despite comparable levels of accuracy. This pattern is consistent with prior work showing age-related differences in metacognitive calibration, whereby older adults exhibit relatively preserved or even elevated confidence despite declines in objective performance (e.g., Chua et al., 2009). The observed overconfidence in older adults may partially be due to their confidence level in peripheral items, as we found an interaction between item location and age group, indicating that young participants show a larger confidence decrease when items are peripheral than older participants. In other words, compared to young adults, confidence in older adults appears less sensitive to whether an item is central or peripheral.

The current study contributes to a growing body of research emphasizing the importance of testing participants from non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) populations (Henrich et al., 2010) by testing participants in Japan. Yet, one limitation is that all participants were recruited in the same city with (relatively) homogenous backgrounds. We recognize the importance of testing participants from different cultural and socio-economic backgrounds (Henrich et al., 2010; see also Alam, 2008; Khan et al., 2022), and this is especially crucial for the current study because cultural psychology studies comparing different populations (e.g., East vs. West) identified systematic differences in how individuals attend to and encode information (Boduroglu et al., 2009; Gutchess et al., 2006; Masuda & Nisbett, 2001, 2001, 2006; Nisbett et al., 2001; Nisbett & Masuda, 2003; Wong et al., 2018). For example, East Asian and Western participants differed in their visual attention allocation, with East Asians showing a more strategic preference toward the changes in the periphery than in the center of the screen (Boduroglu et al., 2009). These findings suggest that cultural orientation influences how information is encoded and retrieved. It is intriguing to explore how such cultural differences interact with the effects of aging.

Conclusion

The present study investigated how aging influences the accuracy of and confidence in eyewitness memory when misinformation is present. Across age groups, memory was reliably shaped by properties of the original event: peripheral items and misleading information resulted in lower accuracy than central and control items, respectively. These effects were mostly comparable in young and older adults, suggesting that the mechanisms through which spatial relevance and post-event misinformation distort memory operate similarly across the adult lifespan. In terms of confidence judgments, however, older adults reported higher overall confidence, and their confidence appeared less sensitive to item location than that of younger adults. This dissociation between confidence and accuracy highlights potential age-related differences in metacognitive monitoring and underscores that subjective certainty may not reliably reflect memory fidelity. Overall, our findings suggest that, although aging does not necessarily increase susceptibility to misinformation in eyewitness memory, it may influence how individuals evaluate the reliability of their own memories. Understanding the details of the objective performance and subjective confidence has important implications for the interpretation of eyewitness testimony in real-world settings.

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