Retrieval effort improves memory and metamemory in the face of misinformation ☆

John B. Bulevich *, Ayanna K. Thomas

Department of Psychology,The Richard Stockton College of New Jersey, Galloway, NJ 08205, United States
Department of Psychology,Tufts University, Medford, MA, United States

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ABSTRACT

Retrieval demand, as implemented through test format and retrieval instructions, was varied across two misinformation experiments. Our goal was to examine whether increasing retrieval demand would improve the relationship between confidence and memory performance, and thereby reduce misinformation susceptibility. We hypothesized that improving the relationship between confidence and memory performance would improve controlled processes at retrieval. That is, when confidence and memory performance were well calibrated, participants would be able to withhold incorrect responses if given the opportunity. To examine the relationship between memory retention, confidence, and controlled withholding, we compared older and younger adults' performance on a forced memory test, where participants could not withhold responses, and on a free test, where participants were encouraged to withhold responses. Confidence judgments were collected after forced responding. Retrieval demand was manipulated indirectly through type of test (cued recall vs. recognition) and directly through retrieval instructions. The results demonstrated that increasing retrieval demands improved memory retention, metamemorial monitoring and effective withholding. This was particularly pronounced when participants received misleading information. Finally, older adults required explicit direction to effectively monitor memory and institute successful controlled withholding.

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Introduction

Consider the possibility of witnessing a crime. You are most likely motivated to report what you have witnessed correctly. However, when interviewed by detectives, you find that in their attempts to ascertain a complete account of the event, they encourage you to guess and persuade you to answer questions even when you are unsure. While questioning, these detectives may also unwittingly introduce information that may bias or distort your recollection. Even the most earnest witness will find it difficult to

achieve accuracy when faced with pressures to provide details, when encouraged to guess, when presented with post-event information, and when discouraged to say "I don't know". The present study examined changes in younger and older adult eyewitness memory accuracy within the misinformation paradigm under conditions where people were forced to respond to every question and under conditions where people were encouraged to exercise control and withhold answers for which they may not be certain. We examined performance under forced-reporting instructions to ascertain memory retention of a witnessed event after the presentation of misleading post-event information. We examined performance under free-reporting instructions to determine whether the effect of misleading post-event information could be counteracted, thereby improving memory accuracy. Finally, we manipulated retrieval demands in order to improve memory retention and accuracy.

Retention, monitoring, and control

In their classic study, Loftus, Miller, and Burns (1978) demonstrated that exposure to misleading information after witnessing an event reduced accuracy on a later memory test. Variants of this general finding have since been demonstrated in dozens of papers. Further, older adults have been shown to be more susceptible to misinformation than younger adults (Cohen & Faulkner, 1989; Coxon & Valentine, 1997; Holliday et al., 2011; Karpel, Hoyer, & Toglia, 2001; Mitchell, Johnson, & Mather, 2003). A primary goal of the present research is to examine processes that underlie age-related increases in misinformation susceptibility, in order to develop techniques to improve overall memory performance. The Quantity-Accuracy Profile (QAP) methodology, developed by Koriat and Goldsmith (1996), allows us to examine the contributions of memory retention disruption, monitoring and/or control deficits, to misinformation susceptibility. Specifically, this model incorporates metacognitive processes into the assessment of memory performance. Retention is measured by the forced-reporting memory test and is the proportion of forced report answers that are correct. Metacognitive monitoring is also measured during forced-reporting through the collection of confidence judgments for each answer. Memory monitoring effectiveness can be captured by monitoring resolution, which allows for an evaluation of whether participants can distinguish correct from incorrect responses. Control is measured during the free-reporting test, which follows forced-report. During this testing phase participants are re-presented with responses given during the forced report phase. Participants are encouraged to exercise control and withhold answers that may be associated with low confidence. By comparing performance during the forced and free reporting stages we can assess both control sensitivity and response criterion. That is, we can determine whether participants volunteered answers that accompany high confidence and determine the confidence point at which answers were volunteered. The former allows for the examination of the effect of monitoring on control. Koriat and Goldsmith's model makes the assumption that monitoring will affect control (see also, Nelson & Narens, 1990) and that individuals will withhold answers associated with low confidence (Goldsmith & Koriat, 2008).

Research suggests that misinformation susceptibility may, in part, be the result of damage or occlusion to the memorial information. For example, the memory impairment hypothesis (Loftus, 1979) states that the memory trace for the original information is permanently altered or destroyed by the misleading post event information. Similarly, the blocking hypothesis (Eakin, Schreiber, & Sergent-Marshall, 2003), suggests that the original information is "blocked" from access by the misleading information. Measures of retention would directly examine these memory-based explanations for misinformation susceptibility, as broadly, they suggest that the original information is not accessible at the time of test.

Alternative to retention explanations, misinformation susceptibility may be a result of erroneous subjective experience that resulted in faulty decisions at retrieval. As one example, in order for participants to effectively withhold answers, they must be able to successfully inspect and monitor both the quality of evidence for a candidate response and the bases for responding when recollection fails. Regarding the first point, when specific details are recollected, individuals often will determine that the episode was actually experienced. However, when conscious recollection fails, individuals may use alternatives to recollection such as plausibility, familiarity, or accessibility (Jacoby & Hollingshead, 1990; Reder, Wible, & Martin, 1986; Thomas, Bulevich, & Chan, 2010). These alternatives, recruited under forced-responding test conditions, may be less valid than detailed recollection and may lead to memory inaccuracies. In the case of the misinformation effect, participants may respond with the misleading post-event information because that information is easily accessed (i.e., Thomas et al., 2010). When given the opportunity to withhold during free-responding, those answers may be omitted. That is, when given the opportunity to use monitoring and control processes, people may assess the effectiveness of retrieval strategies, and if allowed, may withhold items that were accessed with retrieval strategies judged to be less effective or reliable. By using the QAP methodology, and comparing older to younger adults, we examined the specific cognitive mechanisms that underlie increased age-related susceptibility to misinformation (i.e., Mitchell, Johnson, & Mather, 2003). Further, we developed age-appropriate techniques to counteract the negative influence of misleading post-event information.

Age-related monitoring deficits

Across the varied metacognitive monitoring tasks, older adults have sometimes shown age-related impairments and, in other instances, age-equivalent performance. For example, older adults have been shown to be less accurate than younger adults when making episodic FOK predictions (Perrotin, Isingrini, Souchay, Clarys, & Taconnat, 2006; Souchay, Isingrini, & Espagnet, 2000; Thomas, Bulevich, & Dubois, 2011); however age equivalence has been demonstrated on semantic FOK tasks (Allen-Burge & Storandt, 2000; Butterfield, Nelson, & Peck, 1988; Bäckman & Karlsson, 1985; Lachman, Lachman, & Thronesbery, 1979; Marquié & Huet, 2000). Research suggests that the inconsistency of age-related impairment in monitoring tasks might be due to the specific requirements of the task, with episodic FOK judgment accuracy being more dependent on access to contextual episodic information (Souchay, Moulin, Clarys, Taconnat, & Isingrini, 2007; Thomas et al., 2011).

In the present study, we were interested in the monitoring of the validity of candidate memory responses as expressed by the relationship between confidence judgments and correctness (Lovelace & Marsh, 1985; Perfect & Stollery, 1993), within the misinformation paradigm. Previous research has demonstrated that older adults show a pattern of overconfidence when exposed to misleading post-event information (Cohen & Faulkner, 1989; Dodson, Bawa, & Krueger, 2007; Dodson & Krueger, 2006; Jacoby, Bishara, Hessels, & Toth, 2005; Karpel et al., 2001; Mitchell et al., 2003). This pattern of overconfidence may be a result of an accessibility bias. That is, information that is easily accessed, or retrieved more fluently, may result in higher