Current Issues and Advances in Misinformation Research

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Abstract
Eyewitnesses are often called upon to report information about what they have seen. A wealth of research from the past century has demonstrated, however, that eyewitness memory is malleable and vulnerable to distorting influences, including the effects of misinformation. In this article, we review recent developments in research related to the misinformation effect, including individual differences in susceptibility, neuroimaging approaches, and protective interview procedures that may better elicit accurate event details. We conclude with a section on related false memory research.

Keywords
eyewitness, memory, law, misinformation

What Is the Misinformation Effect?
In the wake of more than 30 years of research, an ever-growing literature continues to demonstrate the distorting effects of misleading postevent information on memory for words, faces, and
details of witnessed events (see Loftus, 2005, for a review of the misinformation effect). In a typical misinformation experiment, research subjects are shown materials (e.g., photographs) and are then exposed to deliberately misleading information about what they saw. In a final testing phase, many subjects will inadvertently incorporate elements from the misleading information into their memory for the original source material. For example, Stark, Okado, and Loftus (2010) showed subjects a series of photographs that depicted a man stealing a woman’s wallet and hiding it in his jacket pocket. Later, subjects heard recorded narratives describing the slides. Embedded in the narratives were several pieces of misleading information (e.g., “Then the man hid the wallet in his pants pocket”). Finally, subjects were asked questions about details from the photographs, such as “Where did the thief hide the woman’s wallet?” A substantial number of those subjects not only reported that the thief hid the wallet in his pants pocket but they also reported that they remembered that information from the photographs, not the narratives.

Who Is Vulnerable?
Nobody is immune to the distorting effects of misinformation. Building on the adult literature, misinformation effects have been obtained in myriad subject samples, including infants (Rovee-Collier, Borza, Adler, & Boller, 1993), and even animals (e.g., Schwartz, Meissner, Hoffman, Evans, & Frazier, 2004). Nonetheless, there is evidence that certain types of people are especially vulnerable to misinformation effects. For instance, very young children and the elderly are more susceptible to misinformation than adolescents and adults (see Davis & Loftus, 2005). Also especially vulnerable are subjects who report lapses in memory and attention (Wright & Livingston-Raper, 2002). What do these findings tell us about the underlying mechanisms driving the misinformation effect? One argument is that a poverty of cognitive resources necessitates an increased reliance on external cues to reconstruct memories of events. As Loftus (2005) points out, misinformation effects are easier to obtain when subjects’ attentional resources are limited. Similarly, people who perceive themselves to be forgetful and who experience memory lapses may be less able (or willing) to depend on their own memories as the sole source of information as they mentally reconstruct an event.

Recently, two major studies containing more than 400 subjects have explored cognitive ability and personality factors as predictors of susceptibility to misinformation. In each study, subjects viewed slides of two crimes and later read narratives of the crimes that contained misinformation. Those subjects who had higher intelligence scores, greater perceptual abilities, greater working memory capacities, and greater performance on face recognition tasks tended to resist misinformation and produce fewer false memories (Zhu et al., 2010a). Certain personality characteristics were also shown to be associated with false memory formation, particularly in individuals with lesser cognitive ability. Specifically, individuals low in fear of negative evaluation and harm avoidance, and those high in cooperativeness, reward dependence, and self-directedness were associated with an increased vulnerability to misinformation effects (Zhu et al., 2010b). In other words, it seems that personality variables may be helpful in understanding the processes underlying memory distortion following exposure to misinformation but less so in individuals with superior cognitive ability. These interactions may help explain why individual difference results have not always replicated in false memory research.

Misinformation and Neuroimaging
Relatively new but increasingly popular tools for exploring the effects of postevent information on memory include a set of highly specialized neuroscientific methods which include functional magnetic resonance imaging, or fMRI. In a typical fMRI-based behavioral experiment, subjects undergo traditional experimental procedures in an MRI scanner, during which functional images of oxygenated blood flow in the brain are collected. The resulting images can be analyzed and interpreted as differential brain activation associated with particular tasks. Functional MRI, therefore, is a useful and noninvasive tool for examining the neurobiological correlates of behavior.

Scientists have begun to investigate brain activity associated with the misinformation effect. In a recent study (Stark et al., 2010), subjects were shown a series of photographs and later listened to an auditory narrative describing them, which included misleading information. Soon afterward, they were placed into an MRI scanner and given a test of their memory for the photographs. Functional neuroimaging data revealed similar patterns of brain activity for true and false memories, but the true memories (formed by visual information) showed somewhat more activation in the visual cortex while the false memories (derived from the auditory narrative) showed somewhat more activation in the auditory cortex. As the researchers noted, these results are congruent with the sensory reactivation hypothesis (Slotnick & Schacter, 2004, 2006), which in part proposes that the same sensory regions activated in the brain during encoding will be reactivated during retrieval. These results suggest that there may be differing brain activation patterns for true and false memories when they are encoded in different sensory modalities.

Research that involves neuroimaging and other neuroscientific measurement techniques are promising for discoveries about the effects of misinformation on memory: They can provide glimpses into how different neurological processes underlie true and false memories. At the present time, however, it would be wise to err on the side of caution in the application of these findings. Although some differences were found, the patterns of brain activation associated with true and false memories in Stark et al.’s (2010) study were not reliably distinct, and other small differences in brain activation (unrelated to the sensory reactivation hypothesis) were not fully accounted for. Furthermore, data from fMRI studies are often averaged both within and across participants, which makes interpretation at the individual level of analysis difficult. Although functional
Pickrell’s Lost in the Mall study (1995), a series of studies have investigated autobiographical memory. Beginning with Loftus and colleagues (1974), it became evident that even the subtlest suggestions can produce astonishing false witness reports. For instance, a handful of studies have emerged in recent years that have contributed to more than three decades’ worth of research on the misinformation effect. One study found that 40% of a British sample was willing to report having seen nonexistent footage of a bus exploding in the 2005 London terrorist attacks (Ost, Granhag, Udell, & Hjelmsäter, 2008). Of the subjects who claimed they saw the footage, 35% described memories of details that they could not have seen. Another study (Sjödén, Granhag, Ost, & Hjelmsäter, 2009) found that 64% of a Swedish sample claimed to have seen nonexistent video footage of an attack on the Swedish foreign minister, and 19% went on to describe details in the form of written narratives. The ease with which these studies elicited blatantly false memory reports is striking.

Research has also shown that suggestion can also shape autobiographical memory. Beginning with Loftus and Pickrell’s Lost in the Mall study (1995), a series of studies have successfully used personalized suggestion (or other suggestive techniques) to plant false memories of traumatic childhood events (Porter, Yuille, & Lehman, 1999), receiving a painful enema (Hart & Schooler, 2006), and even impossible events such as meeting Bugs Bunny—a Warner Brothers character—at Disneyland (Braun, Ellis, & Loftus, 2002). These lines of research represent a broad area in their own right, with controversies and applications that are beyond the scope of this paper. However, they show that misleading postevent information has implications beyond merely mistaking a green traffic light for a red one or misremembering where a pickpocket hid a woman’s wallet. If suggestion can cause us to remember experiences that never occurred, what does this say about the reliability of eyewitness evidence in general? If merely asking people if they have seen events they could not possibly have witnessed represents a strong enough suggestion to cause such staggering errors, what are the implications for witnesses who were present at a crime scene but never saw a perpetrator’s face, only to hear it described later? Researchers continue to investigate what conditions lead to memory distortion, which types of people are most susceptible, and how best to prevent the distorting effects of postevent information. Unfortunately, in spite of recent scientific advances, many eyewitness errors continue to go undetected and can have devastating consequences.

**Declaration of Conflicting Interests**
The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

**Recommended Reading**

Loftus, E.F. (2005). (See References). Summarizes some of the key studies that have contributed to more than three decades’ worth of research on the misinformation effect.

**References**


