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Literature Review

How to protect eyewitness memory against the misinformation effect: A meta-analysis of post-warning studies

Hartmut Blank[a,*], Céline Launay[b]

[a] University of Portsmouth, United Kingdom
[b] University of Toulouse, France

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ABSTRACT

Four decades of research and hundreds of studies speak to the power of post-event misinformation to bias eyewitness accounts of events (see e.g., Loftus' summary, 2005). A subset of this research has explored if the adverse influence of misinformation on remembering can be undone or at least reduced through a later warning about its presence. We meta-analyzed 25 such post-warning studies (including 155 effect sizes) to determine the effectiveness of different types of warnings and to explore moderator effects. Key findings were that (1) post-warnings are surprisingly effective, reducing the misinformation effect to less than half of its size on average. (2) Some types of post-warning (following a theoretical classification) seem to be more effective than others, particularly studies using an *enlightenment* procedure (Blank, 1998). (3) The post-warning reduction in the misinformation effect reflects a specific increase in misled performance (relative to no warning), at negligible cost for control performance. We conclude with a discussion of theoretical and practical implications.

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* Corresponding author at: Department of Psychology, University of Portsmouth, King Henry Building, King Henry I Street, Portsmouth PO1 2DY, United Kingdom. Tel.: +44 2392846335.
E-mail address: hartmut.blank@port.ac.uk (H. Blank).

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1. Introduction

Pioneering research by Elizabeth Loftus and colleagues has exposed the vulnerability of eyewitness reports to the biasing influence of post-event misinformation (while eyewitness suggestibility more generally has been noted earlier; see Sporer, 1982, for a historical overview). In a prototypical study (e.g., Loftus, Miller, & Burns, 1978), participants are first shown a video or slide sequence of a staged realistic event of some forensic relevance (e.g., a traffic accident or a crime) and are later exposed to misinformation about this event. This can be achieved through 'hiding' misinformation in apparently neutral questions (e.g., "Did another car pass the red Datsun while it was stopped at the stop sign" – the presupposition here is that there was a stop sign at the intersection, rather than the original yield sign in the slide sequence) or through embedding it in an apparently trustworthy narrative account of the event. Finally, the participants undergo a memory test designed to probe their memory for original event details and/or their endorsement of misleading details. Different memory tests focus on one of two major possible manifestations of misinformation influence (cf. Higham, 1998; Pansky, Tenenboim, & Bar, 2011): (1) poorer memory performance for original event details (e.g., yield sign) that have been the target of post-event misinformation (e.g., stop sign), relative to a no-misinformation control condition; this has been demonstrated using forced-choice recognition (e.g., Loftus et al., 1978), yes-no recognition (e.g., Belli, 1989) or cued recall tests (e.g., Geiselman, Fisher, Cohen, Holland, & Surtes, 1986). Alternatively, or sometimes in addition, (2) researchers have demonstrated stronger endorsement or incorporation of suggested misleading details in memory tests, typically in cued recall and in yes-no recognition but also in source monitoring tests, where participants often mistakenly claim to have encountered a suggested detail in the original event (e.g., Higham, 1998; Lindsay, 1990; Zaragoza & Lane, 1994).[1]

The overwhelming majority of literally hundreds of studies of the eyewitness misinformation effect confirm its existence (in one or both of the forms described above; see Belli & Loftus, 1996; Loftus, 2005; Zaragoza, Belli, & Payment, 2006; for overviews). The magnitude of the effect in a given study depends of course on study characteristics and on the nature of the memory test, but even with the most 'conservative' test (McCloskey & Zaragoza's, 1985, modified test procedure) a small but reliable misinformation effect has been found (see Payne, Toglia, & Anastasi's meta-analysis, 1994).

Still, this does not mean that the misinformation effect must be accepted as some sort of curse thrust upon memory. Soon after its initial demonstration, researchers have started to look for conditions under which the misinformation is weakened or does not materialize at all. One of the earliest demonstrations along these lines was a study by Dodd and Bradshaw (1980) in which the effect basically disappeared when the misinformation was presented as coming from a biased source (the lawyer representing the driver in a car accident). Following a similar rationale, other researchers employed different forms of *warnings* in order to discourage participants from relying too much on the post-event information and the misleading details contained in it. To our knowledge, Greene, Flynn, and Loftus (1982) were the first to explore the moderating impact of a (mild) warning on the misinformation effect. In their study, some participants were told that "the police cadet who wrote the report [i.e., the post-event narrative containing misinformation; our addition] was inexperienced"; this happened either before or after the presentation of this report. Greene et al. report that only the pre-warning but not the post-warning reduced the misinformation effect (but even so it did not fully eliminate it).

Other researchers explored different types of warnings, partly as required by the specific purposes of their studies. For example, Wright (1993) used an extreme form of warning in which the misleading detail was explicitly *named* and it was made clear that it did *not* appear in the witnessed event. Thereafter, participants were asked to remember the original detail; this led to an almost complete elimination of the misinformation effect. Echterhoff, Hirst, and Hussy (2005) took another approach in trying to socially discredit the misinformation (similar to Dodd and Bradshaw's procedure mentioned above but using a post-warning instead of a pre-warning) and also found a substantial reduction of the misinformation effect.

Generally, a considerable variety of warning procedures have been used, and perhaps not surprisingly, the results have been mixed in terms of reductions of the misinformation effect. This is precisely why we thought a more systematic approach is needed in order to find out if and to what degree warnings can safeguard against the misinformation effect. More specifically, and anticipating that the answer might not be as straightforward as implied in the last sentence, we tried to find out exactly *how effective different types of warnings are under which circumstances*. A powerful tool to answer such questions is meta-analysis.

1.1. Scope of the meta-analysis and a theoretical analysis of warnings

For both practical and theoretical reasons, we restricted our meta-analysis to *post-warning* studies. In real life – unlike in laboratory settings where researchers are aware of misleading details from a specific source of information because they have set up these conditions themselves – it is rarely possible to effectively *pre-warn* witnesses against misinformation they may *potentially* encounter at *some* point from *some* source. By contrast, we agree with other researchers (e.g., Echterhoff et al., 2005) that it would be very useful to be able to *post-warn* witnesses against misinformation, if there are good reasons to believe that they may have encountered such misinformation (e.g., from other witnesses or through the media). Even more specifically, we were interested only in post-warnings given immediately before the memory assessment, as this would be the most practically feasible timing of a warning in real eyewitness interrogations. This was the procedure in the vast majority of post-warning studies anyway; in only a handful of cases were post-warnings issued at other times (e.g., in Chambers & Zaragoza, 2001; and in some conditions in Christiaansen & Ochalek, 1983; or Eakin, Schreiber, & Sergent-Marshall, 2003). Focusing on post-warnings immediately before testing also resolves the difficulty of having to deal with double warnings (e.g., after the presentation of post-event information and then again before the test) and then deciding about the respective impacts of different elements of such multiple warnings.

Findings related to post-warnings before testing are also theoretically more interesting and unambiguous than findings obtained with pre-warnings or with post-warnings at earlier points in time, because the latter two are less diagnostic with respect to the processes involved. If a pre-warning resulted in a reduced misinformation effect, this could be due to enhanced attention (e.g., better scrutiny of the post-event information), enhanced remembering, or both. Similarly, post-warnings immediately after presentation of misinformation could still affect its encoding and certainly its rehearsal. By contrast, effects of post-warnings immediately before testing can only be due to an influence at the remembering (i.e., retrieval or reporting) stage. This means also that any obtained insights about the effectiveness of post-warnings have implications

[1] This distinction between the two main types of misinformation effect is purely descriptive; it reflects the two main types of *dependent variable* in misinformation studies (i.e., what the memory assessment focuses on). It neither suggests nor forecloses any theoretical interpretations of those effects; the descriptive and the theoretical level are entirely separate. We will return to theoretical interpretations later, in Section 4.