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A word of warning: Instructions and feedback cannot prevent the revelation effect ☆

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ABSTRACT

In recognition tests, participants claim that stimuli appear more familiar after an intervening task (e.g., solving an anagram) than without an intervening task—the revelation effect. In Experiment 1, we warned half of the participants about the revelation effect and asked them to prevent any judgment bias. However, compared to a control group without warning instructions, the revelation effect remained unaltered. In Experiment 2, participants who received warning instructions additionally received accuracy feedback for their recognition judgments. We assumed that feedback would aid participants in detecting any judgment bias. Again, warning instructions and feedback failed to reduce the revelation effect. In Experiment 3, participants demonstrated that they understood the warning instructions and generally believed that they were successful in suppressing the revelation effect. Yet, again, a revelation effect occurred. The experiments suggest that the revelation effect is a robust judgment bias that lies outside of the participants' control.

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1. Introduction

The revelation effect is the increased probability to call a stimulus familiar, a choice preferable, or a statement true immediately following an intervening task compared to a condition without an intervening task (Bernstein, Rudd, Erdfelder, Godfrey, & Loftus, 2009; Bernstein, Whittlesea, & Loftus, 2002; Kronlund & Bernstein, 2006; Watkins & Peynircioglu, 1990). In recognition experiments, for example, participants are more likely to call a word (e.g., *railroad*) "old" after solving an anagram of that word (e.g., *dirnopar* – *railroad*) compared to a condition without anagrams. Other common intervening tasks include identifying a word that appears letter by letter or upside down (Watkins & Peynircioglu, 1990). Similarly, participants rate pictures of objects appearing first fragmented then intact as more familiar than consistently intact pictures (Guttentag & Dunn, 2003). The revelation effect even occurs when the stimulus in the intervening task (e.g., *railroad*) is unrelated to the recognition probe (e.g., *symphony*; Westerman & Greene, 1996, 1998).

The revelation effect is a judgment bias, that is, a tendency to provide lopsided judgments irrespective of the objectively correct judgment. Whether the revelation effect leads to erroneous judgments in high-stakes scenarios like the courtroom has been woefully ignored by past research. For example, evidence such as CCTV footage that appears noisy at first, then clear, might lead to an illusion of familiarity or truth. It is also conceivable that engaging jurors in a cognitively effortful task

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may sway them to accept a directly following statement as true (Bernstein et al., 2002). To prevent judgment biases in such cases and to inform the development of cognitive theories, research needs to address ways to prevent the revelation effect (see Lilienfeld, Ammirati, & Landfield, 2009). A typical procedure includes informing participants about a specific judgment bias along with instructions to prevent the bias. In the past, warning participants about a judgment bias has been effective in decreasing the bias, however, not in all cases. In the repetition priming paradigm, participants are more likely to call a word familiar if the word was briefly flashed (e.g., 100 ms) on the screen before participants provide their recognition judgment. This priming effect even persists if participants are aware of the prime (Huber, Clark, Curran, & Winkielman, 2008). Similarly, awareness of the hindsight bias does not prevent it. The hindsight bias is the failure to discount outcome knowledge for an event or the correct answer to a numerical judgment (Fischhoff, 1975; Fischhoff & Beyth, 1975). Critically, warning participants about the hindsight bias does not prevent it (Fischhoff, 1977; Harley, Carlsen, & Loftus, 2004; Pohl & Hell, 1996). In another example, receiving misleading post-event information is difficult to ignore (e.g., Loftus, 1979). However, warning participants about this misinformation effect prior to receiving the misinformation or by portraying the source of the misinformation as untrustworthy reduces the effect (Echterhoff, Hirst, & Hussy, 2005; Greene, Flynn, & Loftus, 1982). In yet another example, the false-memory effect (Deese, 1959; Roediger & McDermott, 1995), participants are likely to falsely recognize critical lures (e.g., sleep) associated with study list items (e.g., bed, pillow, night, etc.). In this paradigm, warning instructions tend to reduce the false-memory effect (Starns, Lane, Alonzo, & Roussel, 2007). Others found that the ability to suppress the false-memory effect depends on interindividual differences in working-memory capacity with higher capacity increasing the likelihood of successful warning instructions (Watson, Bunting, Poole, & Conway, 2005).

The mixed success of warning instructions in other paradigms leaves no clear prediction for the effectiveness of warning instructions in the revelation-effect paradigm. However, a study by Frigo, Reas, and LeCompte (1999) suggests that warning instructions might reduce the revelation effect. Frigo et al. instructed their participants to listen for words carefully hidden in radio static. Afterwards, participants received a recognition test for the masked words. Following the typical revelation-effect pattern, participants rated words as more familiar after solving an anagram compared to words without anagram. Interestingly, however, the participants did not know that the radio static was devoid of words. In contrast, when Frigo et al. merely asked their participants to imagine they had received a study list, there was no revelation effect. This implies that a task-induced feeling of familiarity is not automatically transferred into more "old" responses and supports the idea that instructions like warning participants about the revelation effect might be successful.

The revelation effect might even reverse when participants receive warning instructions, that is, words might receive lower familiarity judgments after an intervening task than without. Several authors argued that the revelation effect is the byproduct of a judgment heuristic based on processing fluency (Aßfalg & Bernstein, 2012; Bernstein et al., 2002, 2009; Whittlesea & Williams, 2001). Fluency is the ease and speed of information processing and informs judgments of familiarity, truth, and attractiveness, among others (Alter & Oppenheimer, 2009). In a typical revelation-effect experiment, participants encounter a distorted word, like an anagram (e.g., *dorarial*). Compared to the distorted word, participants arguably process the intact recognition probe (e.g., *railroad*) more fluently. According to the fluency-misattribution hypothesis this unexpectedly high fluency of the recognition probe triggers an attribution process. Because the study phase of an experiment is a salient source of fluency for recognition probes, participants misattribute the unexpectedly high fluency of the recognition probe to familiarity (e.g., Jacoby & Dallas, 1981; Whittlesea & Williams, 1998). It is important to note that the misattribution of fluency from one source (i.e., the intervening task) to another, quite distinct, source (e.g., familiarity) also explains why the revelation effect occurs when the stimuli in the intervening task and the recognition probes are unrelated. For example, compared to an anagram (e.g., *dorarial*), participants will process the anagram solution (*railroad*) but also an unrelated recognition probe (e.g., *symphony*) more fluently, thus, triggering the misattribution of fluency to familiarity.

Importantly, however, there is evidence that participants becoming aware of fluency sources that might distort their judgment try to discount these sources. Critically, lacking perfect calibration, participants are likely to over-discount. As a result, stimuli may appear as less familiar after an intervening task than without an intervening task (Jacoby & Whitehouse, 1989; Oppenheimer, 2004, 2006; Oppenheimer & Monin, 2009). For example, Oppenheimer (2004) asked his participants for either their initials or their birthdate as part of a cover story. Later, participants estimated the frequency of letters in an average text. Participants in the control group, who had provided their birthdate before, *overestimated* the frequency of the letter representing their last initial. Arguably, participants overestimated letter frequency because they misattributed the fluency of their own initial resulting from frequent exposure in the past. Conversely, participants, who had provided their initials before, *underestimated* the frequency of the letter representing their last initial. According to Oppenheimer, the seemingly unrelated question about their initials made participants aware of their initials as a possible source of fluency, leading to over-discounting of that fluency and, consequently, to a response bias opposite to that of participants in the control group. In another study, participants rated the (fictitious) author of a text using fairly common words as more intelligent than the (fictitious) author of the same text using very rare synonyms of the common words. Oppenheimer (2006) argued that participants misattributed high processing fluency for common words to the author's intelligence. Conversely, when participants had an obvious source for low fluency—a low-toner document which was hard to read and a normal-print document which was easy to read—participants over-discounted fluency and rated the author of the harder-to-read document as more intelligent (Oppenheimer, 2006).

If fluency misattribution causes the revelation effect and if fluency can be over-discounted, there should also be instances of a reversed revelation effect. Indeed, in two-alternative-forced-choice tests, participants received pairs of recognition probes, one as anagram, another intact. When asked to solve the anagram and select the probe that was more likely studied

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