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Timing does matter: Examining imagery's impact on the temporal origins of false beliefs

Rebecca B. Bays [a,*], Mary Ann Foley [a], Karen M. Zabrucky [b]

[a] Skidmore College, USA
[b] Georgia State University, USA

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ABSTRACT

In the current study imagination inflation effects were revisited, giving special attention to decreases in confidence ratings following imagery. Reexamining false beliefs, 151 participants were instructed to rate their confidence that they experienced specific childhood events before and after imagery. No significant imagery effects emerged when examining differences in confidence ratings. However, imagery differentially enhanced (26.27%) and diminished (15.45%) belief ratings for specific events. Content analysis of participants' imagery descriptions revealed that only diminished false beliefs were distinguishable from genuine belief accounts, containing less affective and contextual detail as well as fewer words, but remaining comparable in the presence of cognitive operations. These findings suggest that deflation effects provide a route to studying the potentially positive impact of imagery on false beliefs. Because diminished false beliefs cannot be mistaken as veridical memories reconstructed during imagery, they are less subject to criticisms of traditional false belief studies using self-report measures.

1. Introduction

Imagination allows us to relive our childhood, mentally traveling backward in time to resurface contextual and affective details surrounding past events. Mental imagery and remembering are intertwined with evidence suggesting explicit and implicit imagery effects on memory (Addis, Pan, Vu, Laiser, & Schacter, 2009; Stocker, 2012). Although numerous studies have documented the ways in which imagination can alter beliefs about memories, leading people to think that plausible childhood events may actually have happened to them (Garry, Manning, Loftus, & Sherman, 1996; Pezdek, Blandon-Gitlin, & Gabbay, 2006), the mechanisms responsible for the effects of these thought processes on memory beliefs have not been fully specified. Moreover, the transformation processes by which memory beliefs begin to feel like actual memories are also not clear. The same processes that seem to promote and sustain memory beliefs about false events can sometimes lead to diminished beliefs as well (Bays, Zabrucky, & Gagne, 2012; Kunzendorf, Deignan, Galva, Latorre, & Masotta, 2005–2006). The purpose of this study is to consider the content of imagery experiences cued while remembering childhood events as a possible factor for predicting imagery's effects on beliefs.

Researchers investigating false memories have emphasized the role of imagery in the construction of false memories (Garry et al., 1996; Mazzoni & Memon, 2003; Pezdek et al., 2006). Asking participants to generate images of events never experienced (such as breaking a window as a child) leads to increases in their beliefs that the events might have happened (as measured by an increase in confidence ratings). Such increases in confidence, referred to as imagination inflation effects (Garry & Polascheck, 2000), are taken as evidence of the presence of a false belief in an event's occurrence. Although the memorial status of these false beliefs continues to be controversial, as we later discuss, false beliefs and false memories are not distinguished in the current paper. Rather increases in the confidence of an event's occurrence are taken as evidence of a failure to accurately monitor the source of an event representation so that contents of an imagination are mistaken for a memory.

Imagination inflation effects are robust, reported under a wide range of imagery circumstances, with additional consideration for variables impacting the richness and content of the images, such as event valence (Barnier, Sharman, McKay, & Sporer, 2005; Sharman & Barnier, 2008); age of the memory (Sharman & Barnier, 2008; Sporer & Sharman, 2006); individual differences (Heaps & Nash, 2001; Sharman & Calacouris, 2010); sensory elaboration (Thomas, Bulevich, & Loftus, 2003); personalized imagery content (Scoboria, Mazzoni, Larry, & Bernstein, 2012); perspective taken during imagery (Sharman, Garry, & Hunt, 2005); and repeated imaginings (Goff & Roediger, 1998; Sharman, Garry, & Beuke, 2004; Thomas & Loftus,

* Corresponding author at: Department of Psychology, Skidmore College, 815 North Broadway, Saratoga Springs, NY 12866, USA. Tel.: +1 518 580 5315; fax: +1 518 580 5319.
E-mail address: rbays@skidmore.edu (R.B. Bays).

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2002). In these imagination studies, a common theme, as with most false memory researches, is a focus on the negative impact of visual imagery on memory. In the current paper, we consider the possibility that imagery may not always be detrimental in its effects on false beliefs, perhaps eliciting more accurate source monitoring.

In the current study we revisited imagination inflation effects, investigating confidence ratings as evidence for a potentially positive impact of imagery on memory. In the process we reconsidered the ways that researchers have come to define and measure false beliefs in imagination inflation studies. As a second aim we analyzed the content of participants' imagery descriptions to further investigate false beliefs, exploring various types of detail inclusion, including evidence of cognitive processes evoked during imagery.

In typical imagination inflation studies, participants rate confidence in events experienced at study onset, then provide a second confidence rating following imagination of those events. Researchers look for increases in confidence as evidence of false beliefs due to constructed images. In early studies of imagination inflation researchers analyzed only events given low pretest confidence ratings, generally a 1–4 on a scale of 8 (Garry et al., 1996; Paddock et al., 1998). The practice of only analyzing a subset of the data continues in more recent studies of false beliefs (Sharman & Scoboria, 2009). However, as noted by some researchers (Bays et al., 2012; Kunzendorf et al., 2005–2006; Pezdek & Eddy, 2001; Polage, 2004), the nature of the Likert scale data also permits *decreases* in confidence. The direction of change in confidence ratings warrants attention as a means to better inform our understanding of how imagery contributes to the construction of false memories. A more complete analysis of confidence ratings also leads to the intriguing possibility that imagery may protect against false memory construction for some false beliefs.

Pezdek and Eddy (2001) addressed the direction of confidence rating changes, revealing a substantial portion of their sample whose confidence decreased after imagery. Using the standard imagination inflation procedure from Garry et al. (1996), Pezdek and Eddy report that in 11% of imagined events initially rated as 1–4, posttest belief ratings decreased (compared to 50% remaining unchanged and 39% increasing). Significantly more participants increased confidence in event occurrence following imagination if their confidence was low at study onset. Interestingly, an analysis of events rated as 5–8 during pretest demonstrated that 54% of the events decreased after imagination (compared to 32% remaining unchanged and 14% increasing).

More recently, Bays et al. (2012) reported a complete analysis of confidence change score magnitude. Forty percent of event ratings remained unchanged following imagery. When confidence changes did occur, they were almost equally likely to increase (31%) or decrease (29%). Interestingly, in Bays et al. (2012), confidence increases (traditional false beliefs) in suggested event occurrence were not significant, regardless of initial confidence judgments or repeated imaginings, inconsistent with previous studies using similar false memory induction procedures (Mazzoni & Memon, 2003; Pezdek et al., 2006). However, it is possible that the decreases in confidence ratings may have masked traditional inflation effects, explaining the failure to find an imagination inflation effect.

In the current study, using an imagination procedure similar to Bays et al. (2012), we examined this possibility more fully by analyzing decreases in confidence ratings resulting from imagery experiences. These diminished beliefs reflect false beliefs, but differ in two key aspects from false beliefs traditionally examined in false memory studies. First, participants' doubts about the possible reality status of some events are evident at the outset of an experimental session with confidence ratings for diminished beliefs suggesting a lack of certainty. Thus, their temporal origin differs from traditional false beliefs. Secondly, doubts about the reality status of some events may benefit from generating images about those events. Participants may be less likely (or less able) to generate particular kinds of details (e.g., fewer perceptual features) than those generated for traditional false beliefs. The absence of these kinds of details, or the subjective experience accompanying imaginations about doubts could later convince participants that the events did not occur, leading to decreases in confidence following imagination trials. Thus, imagery may sometimes lead to diminishing beliefs, a possibility not considered in the false memory literature.

Our examination of the directional aspects of false beliefs was informed by the *Source Monitoring Framework* (SMF). The SMF accounts for memory errors induced by imagery generation through lapses in source monitoring. Memory representations contain qualitative and quantitative characteristics that are diagnostic of source, and mental events are considered internally (imagined) or externally (experienced) generated based on these characteristics (Lindsay, 2008). For example, attributing a memory of receiving your first car on your 16th birthday to experience is likely an automatic process due to the richness of detail and emotion available for that event, eliciting easy retrieval. Memory representations generated internally with no experiential basis include fewer perceptual, emotional, and contextual details than memory representations of experienced events. Internal representations also contain more evidence of cognitive processes elicited while imagining, such as the plausibility of a suggested event or beliefs about how memory works (Henkel, 2004; Johnson, Hashtroudi, & Lindsay, 1993; Lampinen, Faries, Neuschatz, & Toglia, 2000).

The SMF accounts for imagination inflation effects (traditional false beliefs, hereafter referred to as enhanced false beliefs) by emphasizing retrieval monitoring. The imagery process may elicit the inclusion of qualitative details within imagined event accounts that typically accompany experienced events and corresponding accounts. These qualitative details (e.g., perceptual cues and vividness) can drive source errors through familiarity and ease of retrieval. The imagery process itself may resemble the automatic processing typical of actual events, leading to minimal cues related to the acts of generating images.

However, imagery's potential role in diminished false beliefs is also consistent with the SMF perspective. If the act of generating images leads participants to notice their own thought processes, these processes might manifest themselves in description details. If so, such details might serve as cues to later help participants determine imagery source. In the present context, the act of generating images for events experienced as doubtful during imagery could result in subjectively different kinds of imagery experiences than those related to false beliefs experienced with confidence during imagery. Similarly, the nature of the imagined details could differ for false beliefs strengthened or diminished by imagination. To assess these predictions, a more complete analysis of confidence ratings is required. In addition, content analysis of visualizations related to these different kinds of beliefs is essential.

To date few researchers have examined the content of enhanced false belief descriptions relative to genuine belief descriptions (Blandón-Gitlin, Pezdek, Lindsay, & Hagan, 2009; Short & Bodner, 2011), and researchers have not considered the content of diminished false belief descriptions. As such, in the current study, we provide the first test of differential predictions regarding imagery's effects on false beliefs. Will description content vary for events written by participants' holding enhanced false beliefs versus diminished false beliefs? And how might these imagery descriptions compare to those of genuine experiences, or to experiences written *as if* an event occurred, a no belief condition? In the current study we addressed these questions to provide a more complete analysis of false beliefs.

In line with previous imagination inflation researches, we included an imagery repetition manipulation in the current study (Goff & Roediger, 1998; Sharman et al., 2004; Thomas & Loftus, 2002). Participants provided confidence ratings before generating images and writing descriptions of their images and, again, at a later session. In addition to examining changes in confidence ratings, we examined