



False memories, but not false beliefs, affect implicit attitudes for food preferences[☆]



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ABSTRACT

Previous studies have found that false memories and false beliefs of childhood experiences can have attitudinal consequences. Previous studies have, however, focused exclusively on explicit attitude measures without exploring whether implicit attitudes are similarly affected. Using a false feedback/imagination inflation paradigm, false memories and beliefs of enjoying a certain food as a child were elicited in participants, and their effects were assessed using both explicit attitude measures (self-report questionnaires) and implicit measures (a Single-Target Implicit Association Test). Positive changes in explicit attitudes were observed both in participants with false memories and participants with false beliefs. In contrast, only participants with false memories exhibited more positive implicit attitudes. The findings are discussed in terms of theories of explicit and implicit attitudes.

1. Introduction

Since the pioneering work of Bartlett (1932), it has been known that human memory involves reconstructive processes that give rise to false memories and false beliefs of events that did not occur. Recently, researchers have begun to focus on the behavioural consequences of false memories and beliefs. For example, Bernstein, Laney, Morris, and Loftus (2005) found that aversions to particular foods can be created by implanting a false memory or false belief that, as a child, one was sick after eating the food. False memories and beliefs have also been found to have *positive* effects on attitudes towards certain foods. For example, Laney, Morris, Bernstein, Wakefield, and Loftus (2008) induced positive attitudes towards asparagus by implanting the false suggestion that participants had enjoyed asparagus the first time they tried it.

These studies and others (see Bernstein, Pernat, & Loftus, 2011, for a review), demonstrate that false memories and beliefs can have significant effects on our attitudes. A recent meta-analysis by Bernstein, Scoboria, and Arnold (2015) of studies eliciting false memories and beliefs of childhood food-related events found that false beliefs (i.e. a belief in the event's occurrence without accompanying recollective experience) and false memories (belief in the event's occurrence *with* accompanying recollective experience) resulted in roughly equivalent changes in attitude measures, leading the researchers to conclude that false autobiographical belief (a common factor in both false memories and false beliefs) is the driving factor behind attitude change. A

limitation of these studies, however, is that they have focussed exclusively on the effects of false memories and beliefs on *explicit* attitudes. Many contemporary models of social cognition acknowledge the importance of both explicit and implicit attitudes in determining behaviour (e.g., Fazio, 1990; Wilson, Lindsey, & Schooler, 2000). Whereas explicit attitudes are considered to be consciously controlled, rational, and deliberative, implicit attitudes are assumed to be activated automatically outside conscious awareness. Implicit attitudes are thought to reflect associations in memory between an item/concept and an attribute, and are typically measured through some form of response-latency based paradigm (see Bar-Anan & Nosek, 2014 for a review of the most commonly used measures). An advantage of this type of measure is that it circumvents the potential for demand characteristics (Fazio & Olson, 2003); an issue which has been a common critique of studies investigating the attitudinal consequences of false memories and beliefs (Laney, Kaasa, et al., 2008). There is also strong evidence that implicit attitude measures predict a significant amount of variance, unique from that which is predicted by explicit attitude measures, in a wide range of behaviours (see Jost et al., 2009 for a review). A meta-analysis by Greenwald, Poehlman, Uhlmann, and Banaji (2009) found that the greater the convergence of explicit and implicit attitude measures, the greater their predictive value of subsequent behaviour. Given the body of evidence from the social psychological literature on the importance of implicit attitudes in social cognition, the aim of the current study was to determine whether false memories and beliefs

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have implicit attitudinal effects.

Since implicit attitudes are thought to represent associations in memory that form over time, the extent to which they can be modified by brief, explicit interventions (as would be the case in a typical laboratory study) could be considered questionable. There is, however, evidence that implicit attitudes can be modified through mental imagery exercises. For example, Blair, Ma, and Lenton (2001) found that participants who engaged in counter-stereotypic mental imagery subsequently exhibited weaker implicit stereotypes. Blair et al. argued that imagery was able to affect implicit attitudes because it increased the accessibility of cognitive representations relevant to the attitude object in memory consistent with the imagined scenario. Markland, Hall, Duncan, and Simatovic (2015) recently revived this idea and found that guided mental imagery of a positive exercise-related experience resulted in more positive implicit attitudes towards exercise. Markland et al. interpreted their results within the framework of Gawronski and Bodenhausen's (2006) Associative and Propositional Evaluation (APE) model. This model suggests that implicit attitude change results from a change in the underlying associative activations triggered upon presentation of the attitude object, which can be dependent on immediately available contextual cues (such as those which might be provided by an imagery exercise).

Following this logic, Markland et al. (2015) suggested that detailed imagery exercises can affect implicit attitudes by creating associations between the attitude object and positively-valenced details generated during imagination (e.g. positive sensory or affective details). In recent years, a line of research has emerged which has emphasised the similarities between episodic memory of past events and imagination of hypothetical future events, both of which can be episodic in nature, containing rich details specific to time and place (Addis, Wong, & Schacter, 2007). There is strong evidence that re-experiencing past events via episodic memory and pre-experiencing hypothetical events via imagination have strong phenomenological similarities (D'Argembeau & Van der Linden, 2004, 2006; Szpunar & McDermott, 2008), as well as shared neural substrates (see Schacter et al., 2012, for a review). Given these similarities, it seems plausible that a false episodic memory may be sufficient to affect implicit attitudes via the same mechanisms as guided imagination exercises. However, it seems unlikely that a false belief of a positive experience involving an attitude object without accompanying recollective experience would generate the detail necessary to affect underlying associative activations generated upon presentation of the attitude object (and therefore be insufficient to elicit implicit attitude change).

In sum, the current study is the first to address the issue of whether false memories and beliefs can affect implicit attitudes towards an object as well as explicit attitudes. A false-feedback paradigm similar to that used in Laney, Morris, et al. (2008) was utilised, with some procedural modifications designed to maximize usable data and the number of reported false memories and beliefs within the experimental group (see *Method section*). The false suggestion given to the experimental group was that they had enjoyed a certain food the first time they tried it as a child. It was hypothesised that those who formed a false memory or belief of enjoying the food the first time they tried it would report more preferential explicit attitudes towards the attitude object post-suggestion than pre-suggestion. With regards to implicit attitudes, it was hypothesised that participants with a false memory (but not necessarily those with a false belief only) would exhibit significantly more positive implicit attitudes towards the relevant attitude object.

2. Method

2.1. Participants

The overall sample consisted of 120 undergraduate students (101 female, 19 male) at the University of Hull, U.K., who participated in

return for course credit or payment. Overall sample size was comparable to that of other experiments using a similar paradigm (Clifasefi, Bernstein, Mantonakis, & Loftus, 2013; Laney, Morris, et al., 2008). The subdivision of the Suggestion group (the experimental group who received the false suggestion of loving a certain food the first time they tried it) in the analyses means that a far higher number of Suggestion group participants are needed relative to control participants. Therefore, allocation of participants to groups was only partially random. The majority of participants ($n = 96$) were randomly assigned to either the Suggestion or control group at a ratio of two Suggestion group participants to one control participant. Once a sufficient number of control participants had been recruited for analyses ($n = 32$), all subsequent participants ($n = 24$) were allocated to the Suggestion group. The final number of participants in the false suggestion group was 88, with 32 in the control condition. Because the study was exclusively interested in false memories and beliefs, participants were only included in analyses if they indicated low baseline confidence in the occurrence of a potential false suggestion event (see *Materials* and *Procedure* sections for further details). After applying this exclusion criterion, there were 75 suggestion group participants and 31 control participants, giving a functional overall size for this study of $n = 106$. This sample was made up of 88 females and 18 males, with a mean age of 21.88 years ($SD = 6.33$). Up to five participants were tested simultaneously in each experimental session.

2.2. Design

A mixed design was employed in which session (Session 1/pre-suggestion vs Session 2/post-suggestion) served as a within-subjects factor, with group serving as a between-subjects factor. For initial analyses of false memory/belief formation, the between-subjects group factor refers to the false Suggestion group vs the control group. In later stages of analyses, the Suggestion group is subdivided into "Believers" and "Non-Believers", with the Believers subgroup then being further subdivided in order to compare data for those who formed a false memory and those who formed a false belief only.

The dependent variables differed slightly from previous studies. In past studies, the false suggestion given to the experimental group was identical for each participant; subsequently, the DV has always been attitude measures relating to the attitude object in the false suggestion (e.g., the false suggestion 'You loved asparagus as a child' and the subsequent DV of attitudes towards asparagus in Laney, Morris, et al., 2008). However, a problem with this approach is that all participants who indicate high baseline confidence in the false suggestion item need to be excluded from analyses (since the studies are interested exclusively in false memories). In an attempt to maximize the amount of usable data, the current study measured participants' baseline confidence that they had loved a series of different foods the first time they tried them, including four potential critical items which could later be incorporated into the false suggestions given to the experimental group (see *Procedure* section for more details on item allocation and how they were incorporated into false suggestions). Subsequently, the DVs for each participant are the explicit and implicit attitude measures pertaining to their specific critical item.

2.3. Materials

This study utilised pen-and-paper questionnaires similar to those used by Laney, Morris, et al. (2008), but with several changes designed to improve the efficiency of the experimental design in terms of data utilisation as well as increasing the likelihood of Suggestion group participants forming false memories. The first session contained eight brief questionnaires. One of these was the "Food History Inventory" (FHI) which lists a series of 24 food related events (e.g. "ate ice cream at the seaside", "helped your parents prepare a meal") and asks the participant to rate on a 1–8 scale how confident they are that the event

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