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# Personalized and not general suggestion produces false autobiographical memories and suggestion-consistent behavior ☆,☆☆

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ABSTRACT

Suggesting false childhood events produces false autobiographical beliefs, memories and suggestion-consistent behavior. The mechanisms by which suggestion affects behavior are not understood, and whether false beliefs and memories are necessary for suggestions to impact behavior remains unexplored. We examined the relative effects of providing a *personalized* suggestion (suggesting that an event occurred to the person in the past), and/or a *general* suggestion (suggesting that an event happened to others in the past). Participants (N = 122) received a personalized suggestion, a general suggestion, both or neither, about childhood illness due to spoiled peach yogurt. The personalized suggestion resulted in false beliefs, false memories, and suggestion-consistent behavioral intentions immediately after the suggestion. One week or one month later participants completed a taste test that involved eating varieties of crackers and yogurts. The personalized suggestion led to reduced consumption of only peach yogurt, and those who reported a false memory showed the most eating suppression. This effect on behavior was equally strong after one week and one month, showing a long lived influence of the personalized suggestion. The general suggestion showed no effects. Suggestions that convey personal information about a past event produce false autobiographical memories, which in turn impact behavior.



## 1. Introduction

Research has shown that when a credible source informs someone that an event occurred during her or his childhood, the individual sometimes develops a false memory. False memories have been proposed to be byproducts of a reconstructive and flexible memory system which is oriented toward goal achievement, planning current behavior, and recombining information to generate simulations of potential future events, rather than the literal recreation of past experience (Addis, Pan, Vu, Laiser, & Schacter, 2009; D'Argembeau & Mandy, 2011; Johnson & Sherman, 1990; Neisser, 1996; Newman & Lindsay, 2009). If this is the case, then believed memories, whether true or false, should sometimes result in behavior that is consistent with the memory. Hence some researchers have argued that to fully address the risks of suggestion for memory, research must go beyond showing that suggestion results in verbal reports of false beliefs and memories, and must also examine whether other changes in behavior follow (Bernstein, Laney, Morris, & Loftus, 2005; Smeets, Merckelbach, Horselenberg, & Jelicic, 2005).

In this paper we describe a study in which we extend work on the relationship between suggestion and behavior. Specifically, we examined factors that were confounded in previous studies that measured behavior post-suggestion. Two factors present in prior studies may have influenced post-suggestion behavior. The first is suggesting to participants that an event actually occurred to them in the past. The second is providing general information about other people experiencing an event in the past. Furthermore, the impact of latency between the delivery of a suggestion and the behavioral measure has yet to be assessed without the influence of a prior behavioral test. As in previous studies, the specific behavior that we examined was eating, following a suggestion that a negative food experience occurred in the past. Before describing the study, we briefly review previous work on the suggestion/behavior relationship.

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### 1.1. Prior studies on suggesting false events and associated behavior

While the literature shows that suggesting events can reliably produce verbal endorsement of false autobiographical beliefs and memories (for a review see Loftus & Davis, 2006), few studies have examined the influence of suggesting past events on aspects of behavior other than verbal memory reports. One series of studies (reviewed in Bernstein, Pernat, & Loftus, 2010) examined the effect of suggesting false childhood food-related events. For example, some participants learned that they liked or disliked a particular food when young. The results across studies show that suggestion resulted in a substantial minority of participants coming to believe the false event, and that participants also showed suggestion-consistent changes in food preferences and anticipated behavior. These studies focused on food-related experiences as a convenient model for demonstrating the consequences of false autobiographical beliefs and memories. Nevertheless, they are important to help understand the mechanisms by which false beliefs and memories affect attitudes and behaviors.

Just two studies have examined the effect of suggesting false childhood events on behavior other than verbal reports about memory. Geraerts, Bernstein, Merckelbach, Linders, Raymaekers and Loftus (2008) told participants they had been sick due to spoiled egg salad as a child. About 40% of participants reported believing the event and expressed an intention to avoid eating the food. When offered an opportunity to eat sandwiches immediately after the suggestion, those who had received the suggestion selected fewer egg salad sandwiches. In another session four months later, only individuals who reported believing the event at the time of the suggestion continued to avoid egg salad. This provides preliminary evidence that suggestion may operate on behavior via autobiographical belief.

Scoboria, Mazzoni, and Jarry (2008) suggested to participants that they had been ill due to spoiled peach yogurt when young, provided a false health report describing a food contamination incident involving spoiled peach yogurt, and had participants imagine the event to facilitate recall. Hence they provided general information about the event occurring to people in the past, and specific information about the event occurring to the person. In an allegedly separate marketing taste test one week later, participants rated types of crackers and types of yogurts (including peach), and had the opportunity to eat as much of the food as they wished. While the two groups did not differ in cracker consumption, those who received the suggestion ate less yogurt of all kinds compared to a control group. Differently from Geraerts et al. (2008), in this study the change in behavior which followed the suggestion was not associated with beliefs, memories, or behavioral intentions.

While both studies show that suggestion modifies behavior, the mechanisms involved remain unclear. Moreover, the studies show inconsistent findings about the role of autobiographical belief in suggestion-modified behavior. Geraerts et al. (2008) interpreted their data as supporting a typical assumption in the false memory literature—that behavior is modified by a specific belief (i.e. getting sick after eating egg salad did in fact occur in the past). However, it remains untested whether the social phenomenon of suggestion can influence memory reports (Garry & Wade, 2005; Mazzoni & Memon, 2003) and behavior (e.g. Bluck, Alea, Habermas, & Rubin, 2005; Pillemer, 2003) via belief modification.

Indeed, beliefs may not be necessary for suggestion to impact behavior. When Scoboria et al. (2008) provided both general information about past events (that other people were sick) and a suggestion that the event occurred to the person, no changes in belief occurred. This points to another potential mechanism: behavior may result from the acquisition of general knowledge about past events. In the case of food illness, general information indicating that a food has been dangerous in the past may affect eating, as it is prudent to avoid foods that make people ill. Even the Geraerts et al. (2008) findings may be due to such a mechanism. The acquisition of information from social models may be sufficient to guide behavior (Bandura, 1986). Therefore, if one considers an event to be plausible (Pezdek, Finger, & Hodge, 1997; Scoboria, Mazzoni, Kirsch, & Relyea, 2004) this belief may influence behavior.

### 1.2. The current study

One aim of this study was to compare how general knowledge versus personal suggestion change behavior. We don't know if providing the general information that a past event occurred in the general population is sufficient to produce behavior change. If general information alone can change behavior, concepts such as false belief and false memory are not necessary to understand the effects of suggestion on non-verbal behavior. Similarly, we don't know if changes in beliefs and memories are necessary to induce behavioral changes. General information alone may not be sufficient to change behavior until one incorporates this information into one's autobiographical past. Several authors propose that episodic memory is used to simulate possible future events and plan behavior accordingly (Atance & O'Neill, 2001; Suddendorf & Busby, 2005). As Scoboria et al. (2008) argued, if one uses available information to plan current and future behavior, and if one comes to believe that false events occurred in the past, then it follows that believing in these false events should result in behavioral change that is consistent with such beliefs. Thus, believing that past events have occurred becomes the critical factor in facilitating the link between suggestions and behavior.

To examine the relative influence of these two types of information, we tested the effects on beliefs, memories and behavior of a general information narrative stating that many people had become frequently sick on a target food. We compared this with a personalized suggestion aimed at inducing the belief that the single individual had become sick on the target food. We provided the personal suggestion and the general information narrative separately in two distinct experimental conditions and together in a third condition. Furthermore, the effects of suggestion on behavior are best demonstrated when there is a delay between suggestion and measurement of the behavior. This delay reduces demands and shows that the effects of suggestion persist over time. None of these elements have been addressed properly in previous studies. Scoboria et al. (2008) provided both personalized and general information together, and measured eating at only one week post-suggestion. The resulting suggestion-consistent behavior may have been the result of either the personalized or the general information or both. Furthermore, while Geraerts et al. (2008) presented only personalized information, they measured eating immediately following the suggestion and then again four months later. This initial opportunity to eat might have influenced eating at the four-month delay. Therefore, their findings of decreased food consumption at delay might have been produced by the suggestion, by the fact that eating occurred previously, or both. A strong test of the effects of suggestion on behavior over time requires separating in time the suggestion and the test of behavior.

To summarize, the current study examined the effects of suggestion on behavior by manipulating the type of suggestion provided (personalized suggestion vs. general suggestion), and the length of delay between the suggestion and measurement of the behavior (one week or one month). Participants completed baseline measures. Several weeks later they received a personalized suggestion telling them they were sick as a child due to contaminated peach yogurt, or a general suggestion that many people became sick due to contaminated peach yogurt in the past, both, or neither. Participants completed a taste test one week or one month later, during which they evaluated and ate crackers (control food) and yogurts (with peach yogurt as the target food). We anticipated either reduced eating of the target food (peach yogurt) relative to the other yogurts or

decreased eating of all yogurts following suggestion, and that eating of control food (crackers) would not vary due to the suggestion.

If suggestions affect behavior via belief, then only the personalized suggestion should influence behavior, whether or not participants received the general suggestion. However, if general suggestion is sufficient, then both personalized and general suggestion should affect eating similarly, and beliefs would not affect behavior. It is also possible that combining the two suggestions will result in greater behavior change than either alone, and such an additive effect would indicate separate influences of each. We also expected, consistent with Geraerts et al. (2008), that eating after one month would be more strongly associated with belief than would be eating after one week, because belief is needed to maintain the influence of the suggestion over time.

## 2. Method

### 2.1. Participants

Of 627 undergraduate students screened over a two-year period, 335 met eligibility criteria and 125 completed all sessions. We dropped two for suspecting the purpose of the study, and one for lactose intolerance, leaving 122 (77% female, ages 17–24, $M = 19.63$, $SD = 2.72$).

Our interest was in typical eating behavior, therefore, we used as exclusion criteria the following variables known to impact eating: any history of eating pathology, current dieting, use of medication impacting eating, current pregnancy, being an athlete, and meeting cutoff for moderate depression. Participants were required to have lived in Ontario as a child, to coincide with the information in the general suggestion (health report). Because we were interested in individuals who were confident at the start of the study that the target event did not happen during their childhood, only those who rated the occurrence for dairy illness and belief for peach yogurt below the scale mid-point, and memory for peach yogurt at the scale floor, were eligible. Groups were statistically equivalent on all baseline variables (all $ps > .10$).

### 2.2. Design

For the suggestion session, the study was a $2 \times 2$ personalized suggestion (personalized, no personalized) by general suggestion (general, no general) factorial design. When taking into account the final taste test, the study was a $2 \times 2 \times 2$ between-subjects design, again with personalized and general suggestion plus time of eating (one week or one month after the suggestion) as between-subjects factors, and we conducted separate analyses conducted for each type of food. See Fig. 1 for a diagram of the procedures.

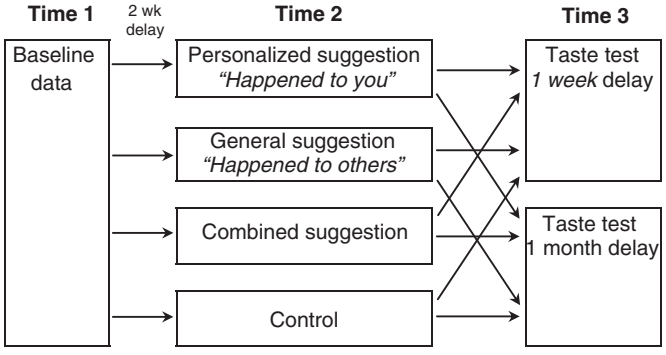


**Fig. 1.** Diagram of the study procedure.

### 2.3. Materials

#### 2.3.1. Autobiographical Belief and Memory Questionnaire (ABMQ (Scoboria et al., 2004)

The ABMQ asks participants to rate general plausibility, personal plausibility, autobiographical belief, and memory for past events. Each of these variables has been shown to play a role in the development of false memories. For example, an event must be considered sufficiently plausible to induce belief (Mazzoni, Loftus, & Kirsch, 2001), and believing in the occurrence of an event is typically necessary for the development of a false memory (see Scoboria et al., 2004). Participants rate each item on a 1–8 point Likert-style scale, anchored 'Not at all plausible' to 'Extremely plausible' for general and personal plausibility; 'Definitely did not happen' to 'Definitely happened' for belief; and 'No memory for event at all' to 'Clear and complete memory for event' for memory. The measure referred to four events (lost while shopping, sick on peach yogurt, sick on pickle, broke a window with a hand) and was administered in the screening and post-suggestion phases, to measure change in ratings.

#### 2.3.2. Memory vs. Belief questionnaire (MvB; Bernstein et al., 2005)

On this measure participants indicate whether they remember an event, believe that the event occurred though they do not remember it, or neither. Participants judged five events, including the target event. We used this measure to classify participants as *remembering (those with memories)*, *believing (believers)*, or *not-believing (non-believers)* the suggested event.

#### 2.3.3. Food Preferences Inventory (FPI; Bernstein et al., 2005)

The FPI asks participants to rate 62 foods on 1–7 point Likert-style scales (1—strong dislike; 7—strong preference). We used peach yogurt, and several related items (other varieties of yogurts, peaches, and peach nectar) to assess changes in preferences for the target food.

#### 2.3.4. Breakfast questionnaire (BQ)

This measure of behavioral intentions was adapted from the party behavior questionnaire used by Bernstein et al. (2005). Participants imagine attending a breakfast, and report how likely they are to eat 18 different foods. Target items were foods related to the target of the suggestion, i.e. "fruit yogurt" and "peaches".

#### 2.3.5. Food illness questionnaire (FIQ)

We developed this instrument for the current study as an indirect method of assessing the impact of the suggestion at the end of the taste test. Participants rated prior negative reactions to 35 food categories to which people commonly report aversive reactions or allergies, on a 1 (no reaction) to 5 (definite, strong reaction) scale. Participants wrote next to each category the name(s) of any specific foods that caused reactions. The categories of interest were 'Dairy products' and 'Yogurt'. We administered this questionnaire allegedly to help us understand food ratings during the taste test.

#### 2.3.6. Eating and mood

To verify normal eating status, we administered the Eating Attitude Test (EAT, Garner & Garfinkel, 1979), an eating disorder screen; the Revised Restraint Scale (RRS, Polivy, Herman, & Howard, 1988), a measure of concern for dieting and weight fluctuations; and the Beck Depression Inventory, second edition (BDI-II; Beck, Steer, & Brown, 1996) because depression can affect appetite.

#### 2.3.7. Other measures

To enhance the credibility of the screening, we presented other unrelated measures. These included a 24-item Food History Inventory (Bernstein et al., 2005), 24-item Life Events Inventory (Garry, Manning, Loftus, & Sherman, 1996) and a 36-item questionnaire assessing common phobias. We did not analyze these measures.

#### 2.3.8. Food

We used three flavors of commercially available yogurt (peach, strawberry, cherry) and three varieties of crackers (cheese, wheat, vegetable). Each participant received 200 g of each yogurt and 40 g of each cracker, which provided a sufficiently large amount of food to insure variability in participants' consumption and to make the amount eaten inconspicuous. We weighed both foods and counted the crackers before and immediately after eating.

### 2.4. Procedure

#### 2.4.1. Session 1 (screening)

We invited participants who met eligibility criteria to complete the screening on-line. Participants completed the measures in the following order: demographics, food preferences, phobias, life events, ABMQ (plausibility, belief, memory) and food history. We invited participants to complete what we said were unrelated studies: a memory study (Session 2) and a marketing study (Session 3). We told participants that recruitment was occurring together to facilitate the completion of both studies. To enhance the cover story, assistants and locations differed between sessions. Assistants for the suggestion session were unaware of the taste test and were blind to hypotheses. Assistants for the taste test were entirely unaware of the suggestion. Follow-up pre-debriefing interviews indicated that just two participants saw the connection between the study sessions, and we excluded their data.

#### 2.4.2. Session 2 (suggestion)

The suggestion occurred two weeks after the screen. We told participants that they had been invited because their screening responses matched characteristics that interested us.

From this point the procedures varied by condition. In the personalized suggestion plus general suggestion condition, the assistant told participants that the study involved questionnaires to predict the occurrence of childhood events. They learned that their screening questionnaires had been analyzed to generate a profile of events from their childhood. After demonstrating a sample report, the assistant opened a sealed envelope containing the participants' report. The report indicated the likelihood that 10 events occurred during the participant's childhood. Four were depicted as highly likely (above 95% probability of occurrence, including the peach yogurt event) and the remainder as indeterminate (about chance level of occurrence). We told participants they had been invited because the report indicated that one of the events happened to them. We asked them to review their report, and emphasized the elevation of the target event on the profile.

Participants next received the general suggestion. We told them that the researchers were studying events that had happened to many people, but that few people remember (see Scoboria, Lynn, Hessen, & Fisico, 2007, for the effect of normalizing forgetting). We provided a false health report that mimicked an actual health alert. The report was dated when participants were children, indicated that many people had become ill due to contaminated peach yogurt, documented the source of contamination (*E. coli* bacteria on spoiled peaches), and described common symptoms. Participants then reported whether they remembered the target event, or they remembered hearing about it in their family or in the media.

Participants then engaged in guided imagery to attempt to recall the event; the imagery technique was similar to that used in other false memory studies (see Garry & Wade, 2005). Specifically, we asked participants to bring the event to mind, and focus on the details, what they might have been thinking, feeling, what it may have been like to experience the event, what time of year it was, and who was with them at the time. They described their imagery, and reported anything that they recalled. Then they reported whether they remembered getting sick on spoiled pickles as a child (control event) and engaged in the same imagery exercise to try to remember the spoiled-pickles event. All participants then completed the ABMQ, Life events inventory, Food history, Food preferences, and Breakfast behavior. Finally, we asked participants not to discuss the study with others.

Participants in the personal-suggestion-only condition received only the personalized suggestion and imagined the target and control events. General-suggestion-only participants received the health report (general suggestion) and a personal profile that showed that the peach yogurt event was indeterminate; however specific attention was not drawn to any event. Finally participants imagined the target and control events. Control participants went directly from the introduction to imagining the control pickle event.

#### 2.4.3. Session 3 (taste test)

The taste test was the same as that described in Scoboria et al. (2008) and was based on standard experimental taste-test methodology (see Aubie & Jarry, 2009; Copeland, Woods, & Hursey, 1995; McFarlane, Polivy, & Herman, 1998). The assistant described the study as a marketing study examining food preferences. Participants rated their hunger, fullness, thirst, and nausea on 100-mm visual analogue scales. The assistant then entered with three heaping full bowls of crackers, water, and rating sheets (to rate the appearance, odor, taste, texture, how much they would like to eat the food, how much they liked each food). Participants sipped the water and rated the first cracker (foods appeared in random order). Once satisfied with their ratings, they sipped the water, rated the second cracker, and repeated the procedure with the third cracker. The assistant left to avoid social influence on eating, returned 10 min later with three bowls of yogurt, and moved the crackers off the table. The same procedure occurred for the yogurts. After 10 min, the assistant returned with questionnaires (EAT, RRS, BDI-II, and FIQ). The experimenter encouraged eating by casually telling participants that s/he would be discarding the remaining food, so they should feel free to help themselves to as much as they would like while completing the questionnaires. The experimenter then placed the crackers on the table beside the yogurt. The assistant left for 10 min, and then removed and weighed the foods in a separate room. Participants then completed the FIQ. Finally, another researcher interviewed participants to determine their awareness of the study's purpose, and debriefed them.

## 3. Results

We report our results in two sections. In the first section we present the main findings related to the effects of suggestion on eating related attitudes and behavior. In the second section we examine the formation of false beliefs and memories, and link these to eating. We found no effect of gender, therefore all analyses collapsed across gender.

### 3.1. Eating attitudes and eating behavior

#### 3.1.1. Food preferences and behavioral intentions

We first examined the impact of the two types of suggestion on attitudes toward the target food. Descriptive statistics are reported in Table 1. All analyses were $2 \times 2$ ANCOVAs on change scores (personalized vs. general suggestion, controlling for baseline scores), unless otherwise noted. The personalized suggestion led to decreased preference for the target food, peach yogurt, but only when the general suggestion was not provided. The interaction was significant, $F$ (1, 116) = 5.22, $p = .024$, and post-hoc t-tests revealed that the group receiving only the personalized suggestion reported a larger decrease in preference for the target food than did the control group, $d = .56$. We found no differences for preference in the other foods assessed.

**Table 1**
Pre- and post-suggestion ratings by personalized suggestion and general suggestion.

| | | | No personalized suggestion | | | | Personalized suggestion | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | No general suggestion | | General suggestion | | No general suggestion | | General suggestion | |
| | | | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Food preference | Blueberry yogurt | Time 1 | 4.58 | 1.73 | 4.19 | 1.62 | 4.40 | 2.04 | 5.14 | 1.48 |
| | | Time 2 | 4.52 | 1.66 | 4.35 | 1.82 | 4.00 | 1.88 | 5.18 | 1.44 |
| | Peach yogurt | Time 1 | 4.09 | 1.61 | 4.16 | 1.42 | 4.03 | 1.73 | 4.64 | 1.73 |
| | | Time 2 | 4.24 | 1.70 | 3.77 | 1.82 | 3.27 | 1.76 | 4.39 | 1.91 |
| | Peaches | Time 1 | 5.67 | 1.19 | 4.94 | 1.59 | 5.37 | 1.69 | 5.64 | 1.64 |
| | | Time 2 | 4.24 | 1.70 | 3.77 | 1.82 | 3.27 | 1.76 | 4.39 | 1.91 |
| | Strawberry yogurt | Time 1 | 5.64 | 1.25 | 5.26 | 1.61 | 5.07 | 1.98 | 5.82 | 1.12 |
| | | Time 2 | 5.33 | 1.34 | 5.39 | 1.65 | 4.73 | 1.89 | 5.43 | 1.60 |
| | Vanilla yogurt | Time 1 | 5.24 | 1.82 | 5.23 | 1.86 | 4.70 | 2.15 | 5.14 | 1.21 |
| | | Time 2 | 4.79 | 1.92 | 5.42 | 1.77 | 4.33 | 1.99 | 5.00 | 1.70 |
| | Peach nectar | Time 1 | 4.15 | 1.68 | 3.32 | 1.78 | 3.50 | 1.81 | 4.07 | 1.72 |
| | | Time 2 | 3.76 | 1.82 | 3.71 | 2.10 | 2.90 | 1.58 | 3.86 | 1.78 |
| Breakfast behavior | Sliced peach | Time 2 | 6.45 | 1.62 | 5.42 | 2.36 | 6.07 | 2.56 | 6.18 | 2.52 |
| | Fruit yogurt | Time 2 | 5.39 | 2.15 | 5.58 | 2.11 | 4.53 | 2.52 | 5.00 | 2.57 |
| ABMQ peach yogurt | General plausibility | Time 1 | 6.18 | 1.84 | 6.13 | 2.13 | 6.07 | 1.74 | 6.71 | 1.27 |
| | | Time 2 | 6.97 | 1.33 | 6.35 | 1.87 | 6.30 | 1.73 | 6.75 | 1.62 |
| | Personal plausibility | Time 1 | 3.42 | 2.24 | 3.65 | 2.33 | 3.53 | 2.32 | 3.50 | 2.36 |
| | | Time 2 | 4.61 | 2.22 | 4.48 | 2.74 | 4.80 | 2.16 | 5.25 | 2.49 |
| | Belief | Time 1 | 1.88 | 0.96 | 1.48 | 0.63 | 1.80 | 0.89 | 1.93 | 1.05 |
| | | Time 2 | 2.91 | 1.81 | 2.42 | 1.77 | 4.10 | 2.72 | 3.89 | 2.41 |
| | Memory | Time 1 | 1.09 | 0.29 | 1.10 | 0.30 | 1.00 | 0.00 | 1.29 | 0.53 |
| | | Time 2 | 1.30 | 1.07 | 1.23 | 0.62 | 2.70 | 2.51 | 2.89 | 2.66 |

Note: Time 1—screening; Time 2—post-suggestion; ABMQ—Autobiographical Belief and Memory Questionnaire.

We next examined intentions to eat the target food on the breakfast behavior questionnaire. The personalized suggestion also led to a decrease in anticipated eating of the target food. An ANCOVA on the fruit yogurt item, controlling for baseline preferences for fruit yogurts, revealed a significant main effect of personalized suggestion on anticipated eating of fruit yogurt, $F$ (1,115) = 5.54, $p$ = .020, $d$ = .60, whereby participants receiving the personalized suggestion anticipated eating less fruit yogurt than did those who did not receive the personalized suggestion, regardless of whether they received the generalized suggestion or not. No differences were found for anticipated eating of peaches.

These findings show that a personalized suggestion changed attitudes toward the food immediately after the suggestion. The personalized suggestion led to lower intention to eat and lower preference for the target food (but only when the general suggestion was not provided).

### 3.1.2. Eating behavior (taste test)

Having established that the personalized suggestion affected food preferences and behavioral intentions immediately after the suggestion, we examined whether the suggestions affected eating behavior either one week ($M$ = 8.48 days, $SD$ = 2.54) or one month ($M$ = 29.61 days, $SD$ = 4.64) after the suggestion. Our main prediction was that peach yogurt consumption would be lower relative to the other yogurts following the personalized suggestion, but that participants would not differ in their consumption of a non-targeted food, in this case crackers.

Peach yogurt consumption was examined using a between-subjects ANCOVA, with personal suggestion, general suggestion, and time of eating as factors, controlling for total yogurt eaten. We found a main effect of personalized suggestion, $F$ (1,113) = 8.69, $p$ = .004, $d$ = .53. Those who received the personal suggestion ate less peach yogurt than did those who did not receive this suggestion (see Fig. 2). We found no other significant effects in this analysis; because this is the main finding for the study, we report all associated effects in Table 2.

The crackers served as a control food. A separate analysis of grams of crackers eaten revealed only a main effect of variety, $F$ (1,114) = 5.59, $p$ = .020; participants ate fewer grams of wheat crackers than they did of the other varieties, and consumption did not vary due to either suggestion. This indicates that the suggestion only impacted peach yogurt consumption, and not eating overall. We also note that additional analyses controlling for hunger, fullness, thirst, and nausea ratings taken prior to eating produced the same pattern of results.

To summarize the effect on eating, telling people that they personally had been sick on peach yogurt when young resulted in suppressed eating of peach yogurt up to one month following the suggestion. The effect of the personalized suggestion was equivalent at one week and one month. Providing information that others had become sick due to spoiled yogurt in the past (general suggestion) did not affect eating behavior.

### 3.1.3. Taste test food ratings

We analyzed participants' food ratings during the taste test (appearance, odor, taste, texture, amount that participants desired to eat, liking) for yogurts and crackers separately. The analyses consisted of a series of mixed Analyses of Variance (ANOVA). For yogurts, we found significant yogurt type by personalized suggestion

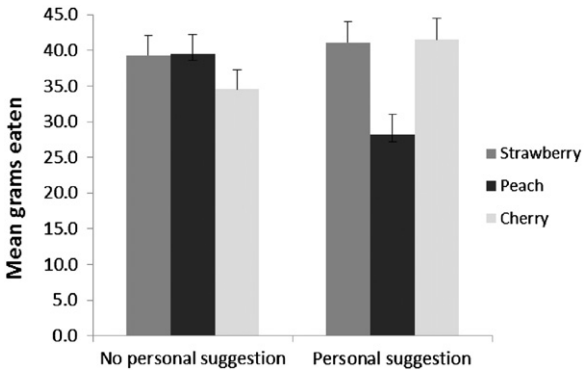


**Fig. 2.** Number of grams of yogurt eaten by personalized suggestion group. Bars show standard errors.

**Table 2**
Main effects and interactions for analysis of eating of peach yogurt.

| Source of variance | *DF* | *MS* | *F* | *Sig.* |
|---|---|---|---|---|
| Total yogurt eaten (Covariate) | 1 | 83,393.06 | 188.58 | .000 |
| Personalized suggestion (PS) | 1 | 3843.62 | 8.69 | .004 |
| Generalized suggestion (GS) | 1 | 3.30 | .01 | .931 |
| Delay to taste test (TST) | 1 | 118.54 | .27 | .606 |
| PS × GS | 1 | 518.31 | 1.17 | .281 |
| PS × TST | 1 | 425.44 | .96 | .329 |
| GS × TST | 1 | 217.62 | .49 | .484 |
| PS × GS × TST | 1 | 849.35 | 1.92 | .169 |
| Error | 113 | 442.21 | | |

interactions for texture and liking ratings, $F(1,109) = 9.59$, $p = .002$; $F(1,109) = 3.80$, $p = .049$. Post-hoc t-tests showed that individuals receiving the personalized suggestion gave lower texture, $t(55) = 2.08$, $p = .041$, $d = .20$, and liking ratings, $t(55) = 3.13$, $p = .003$, $d = .48$, for peach yogurt than for the other yogurts. Those not receiving the personalized suggestion gave higher texture ratings to strawberry yogurt than to the other yogurts, $t(64) = 5.74$, $p < .001$, $d = .41$. There were no group differences on the other items (all $p_s > .10$).

For crackers, the only effect was a cracker type by general suggestion interaction, $F(1,107) = 4.69$, $p = .033$. Across all six items, general suggestion participants rated cheese crackers lower than the other crackers, whereas non-generalized suggestion participants rated garden crackers higher than the other crackers.

These analyses show that only the personalized suggestion affected enjoyment of the target food during the taste test. As was the case for the amount eaten, the personalized suggestion influenced the taste-test ratings to the same degree at one week and one month.

### 3.2. Development of false beliefs and false memories

To this point we have established that telling people that they were personally were sick on peach yogurt when young affects food attitudes at the time of the suggestion, and eating at up to a month's delay. In our next analyses, we examined the formation of false beliefs and memories following the suggestion, and their relationship to eating.

#### 3.2.1. Effects of suggestion on plausibility, belief and memory

We examined whether suggestions resulted in change in ratings about event plausibility, belief and memory (ABMQ). We used a 2 × 2 (personalized vs. general suggestion) between-subjects analysis of covariance (ANCOVAs) to examine change on these variables, controlling for baseline scores.

We found a main effect of personalized suggestion for changes in memory, $F(1,116) = 16.16$, $p < .001$, $d = .74$, and in belief, $F(1,116) = 9.32$, $p = .003$, $d = .56$. Participants told that they had been sick due to spoiled peach yogurt increased their belief and memory ratings for this event. We did not find any main or interaction effect of general suggestion, meaning that telling participants that others had become sick on peach yogurt affected neither memory nor belief. We found no effects of the manipulations on plausibility ratings.

Given the effect of the personalized suggestion on belief and memory, we examined the proportion of individuals who endorsed with certainty remembering or believing the target event (MvB questionnaire). A logistic regression (modeling personalized suggestion, general suggestion, and their interaction) indicated that participants who received the personalized suggestion were more likely to indicate remembering the event (19%) than did those who did not receive this suggestion (2%), $B = 2.58$, $SE = 1.07$, $Wald = 5.812$, $df = 1$, $p = .016$, $Exp(B) = .08$. Furthermore, a second logistic regression indicated that those receiving the personalized suggestion were more likely to endorse belief than were those who did not receive this suggestion; 25% v. 5%, $B = 2.05$, $SE = .68$, $Wald = 9.18$, $df = 1$, $p = .002$, $Exp(B) = .13$. We found no effect of general suggestion, nor any interactions for either analysis (all $p > .10$).

#### 3.2.2. Contrasting those with memories, beliefs, non-believers and controls

We identified individuals in the personalized suggestion group who reported remembering the target event, or believing that the event occurred without remembering the event. Adopting the convention from Bernstein et al. (2005), we defined *remembering* as endorsing a memory on the MvB measure and an increase on the memory scale; and *believing* as reporting a belief on the MvB measure and showing an increase on the belief scale. The remaining personalized suggestion participants comprised a group of non-believers. We compared changes in plausibility, belief, memory, food preferences and eating behavior, in personalized suggestion participants who were grouped as having memories ($N = 11$), beliefs ($N = 14$), not believing ($N = 34$), or no-manipulation controls ($N = 32$). We sought to establish whether individuals who developed memories or beliefs were more susceptible to the personalized suggestion, and whether this susceptibility extended to eating behavior and attitudes.

The ANCOVAs (to control for baseline scores in the same variable) showed significant group differences for personal plausibility, $F(3,86) = 6.59$, $p < .001$; belief, $F(3,86) = 49.72$, $p < .001$; and memory, $F(3,86) = 77.53$, $p < .001$. For each analysis we contrasted the four groups using Bonferroni corrections to control for alpha inflation. We found that individuals who reported memories showed greater increases in belief and memory on the ABMQ scale compared to all other groups. Believers also showed greater increases on belief and memory on the ABMQ scale than did non-believers and controls. Finally, those reporting memories or beliefs increased their personal plausibility scores more than did the remaining groups. Group means are presented in Table 3.

We analyzed the amount of peach yogurt eaten, controlling for total yogurt eaten and found that those reporting memories ate less peach yogurt than did controls, $F(1,40) = 9.26$, $p = .004$, $d = 1.07$, $M = 21.72$, $SD = 15.17$ vs. $M = 38.17$, $SD = 15.36$. Believers and non-believers did not differ from controls ($p > .10$). The groups did not differ significantly in cracker consumption, change in food preferences, behavioral intentions, or food ratings (all $p > .10$).

#### 3.2.3. Endorsement of the suggested event following the taste test

We also examined whether the suggested event was recalled during the taste test. We measured this indirectly using the Food Illness Questionnaire, which gave individuals the opportunity to report any past food experiences that came to mind. Eleven participants unambiguously stated that they had been ill due to spoiled yogurt. Of these, three were from the combined suggestion group, six were from the personalized suggestion group, and two were from the general suggestion group. A logistic regression indicated

**Table 3**
Pre- and post-suggestion plausibility, belief, and memory ratings for the critical peach yogurt event by memory status.

| | | Controls | | Non-believers | | Believers | | Memories | |
|---|---|---|---|---|---|---|---|---|---|
| | | (n = 32) | | (n = 34) | | (n = 14) | | (n = 11) | |
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| General plausibility | Time 1 | 6.19 | 1.87 | 6.24 | 1.60 | 6.57 | 1.50 | 6.55 | 1.51 |
| | Time 2 | 6.94 | 1.34 | 6.71 | 1.27 | 6.43 | 2.10 | 6.18 | 2.22 |
| Personal plausibility | Time 1 | 3.50 | 2.23 | 3.41 | 2.23 | 4.07 | 2.46 | 2.91 | 2.47 |
| | Time 2 | 4.59 | 2.26 | 4.09 | 2.35 | 5.86 | 1.29 | 6.82 | 1.60 |
| Belief | Time 1 | 1.91 | .96 | 1.85 | .99 | 2.14 | 1.10 | 1.45 | .52 |
| | Time 2 | 2.31 | 1.84 | 2.24 | 1.30 | 5.43 | 1.65 | 7.55 | .93 |
| Memory | Time 1 | 1.09 | .30 | 1.06 | .24 | 1.43 | .65 | 1.00 | .03 |
| | Time 2 | 1.31 | 1.09 | 1.24 | .78 | 3.29 | 2.33 | 6.82 | 1.47 |

that personalized suggestion participants were more likely to mention the target event than were non-personalized suggestion participants, ($B = -1.74$, $SE = .80$, $Wald = 4.67$, $p = .031$, $Exp(B) = .176$).

## 4. Discussion

This study provides clear evidence that suggesting false events can lead to suggestion-consistent behavior. When people receive information from a presumably credible source that events occurred in their past, not only are beliefs about the past changed, attitudes and behavior related to the suggestion also are altered. Furthermore, the influence of such information can be long lived, up to one month after the suggestion, in the current study.

The current results show that suggestions operate in part via the transmission of information about the personal occurrence of events. Why is being told that an event occurred in the past so persuasive? One reason is that people often use information from social sources to make decisions about the occurrence of events. Autobiographical memory serves social functions such as group cohesion (Alea & Bluck, 2003), and feedback from the social environment about the past can influence subsequent behavior (Bluck et al., 2005; Pillemer, 2003). A variety of research findings show that social feedback plays an important role in the regulation of the perceived accuracy of autobiographical memory. For example, discussion of unremembered events by siblings can reduce the likelihood of false memories (French, Sutherland, & Garry, 2006); discussion of witnessed events by co-witnesses or romantic partners can amplify memory distortion (French, Garry, & Mori, 2008; Gabbert, Memon, & Wright, 2006); and discussion between twins can lead to disagreements about which twin experienced an event (Sheen, Kemp, & Rubin, 2001). When people cannot recall past events, the first source that they seek for information are other people (Wade & Garry, 2005). People also revise their memories based on social feedback. For example, people sometimes describe "non-believed memories", which are memories that were once believed to have occurred, but following social feedback to the contrary are no longer believed (Mazzoni, Scoboria, & Harvey, 2010).

These findings show that people do not rely only on internally stored information when attempting to recall past events. As proposed by Mazzoni and Kirsch (2002), in the absence of memory, people use other credible information to make decisions about the occurrence of events. Information provided by others can be highly persuasive. One theoretical argument is that when people consider a proposition (e.g. "Did this event happen to you?"), they initially believe it to be true in order to evaluate the truth of the statement. A body of research suggests that people do tend to believe the propositions that they are asked to evaluate, and may then not re-evaluate the initial truthfulness of the proposition (Gilbert, Tafarodi, & Malone, 1993), particularly when the source of the information is trusted (Schul, Mayo, & Burnstein, 2004). In memory implantation studies, people are provided with strong social cues that encourage belief in the occurrence of the event. They may not adequately re-evaluate this belief in light of the evidence. This initial belief results in efforts to find supporting knowledge and related episodic details. This in turn reinforces belief, resulting in an iterative process of information search and belief enhancement, which may result in the creation of false memories.

The provision of general information that an event happened to others was not associated with attitude or behavior change. Telling people that a false event happened to others in the past is apparently not sufficient to influence behavior. This is consistent with the argument that general information may impact plausibility judgments, but not judgments of occurrence to the self (see Scoboria, Lynn, Hessen & Fisico, 2007). This shows that the assumption that suggestions impact behavior via autobiographical mechanisms, including the development of false beliefs and false memories, is likely correct. Learning only that something happened to others, and by extension that it may have affected the self, is not sufficiently compelling to produce a change in behavior under the conditions currently studied. We note that providing generalized information using different manipulations may reveal an effect. For example, we cannot say whether the minimal presentation of the profile and target food in the generalized suggestion group influenced the outcomes. We can state with greater certainty that the generalized suggestion did not augment or combine with the effect of the personalized suggestion, which indicates that any effects of general suggestion, if present, are likely weak.

We also found equally robust effects of personalized suggestion on behavior one week or one month following the suggestion. This is the first study to measure post-suggestion behavior with a longer delay without the potential contamination of a prior behavioral test. The findings show that the effects of suggestion are long lived. This increases confidence that the findings are not due to demand characteristics. Exactly how long the influence lasts remains an empirical question. Presumably, people will make decisions about behavior based on the suggested information until some other information brings the validity of said information into question, or the suggested information is forgotten over time. If the suggestion is remembered and remains uncontested, then it may continue to affect behavior for long periods of time, perhaps years.

These findings are consistent with those of preceding studies showing that suggestion impacts eating behavior. Similarly to the results of the present study, those of Geraerts et al. (2008) and Scoboria et al. (2008) show that when a credible source indicates that an aversive experience with a specific food occurred, suggestion-consistent changes in behavior result (i.e. the consumption of that food is reduced). However, differences in the findings of these three studies deserve attention. In Scoboria et al. (2008), the suggestion influenced behavior without associated changes in belief or memories, whereas here we observed robust belief and memory increases following the personalized suggestion. The difference is likely due to statistical power. The number of suggestion participants in the 2008 study was relatively small ($N = 11$), whereas the current study had sufficient power ($N = 61$) to observe effects on variables other than eating.

Furthermore, in the 2008 study the suggestion produced lower preference ratings specifically for peach yogurt, but also led to lower eating of the other two yogurt flavors during the taste test. Here, eating was suppressed only for the target yogurt. Differences in the suggestion may account for this (as well as their lack of belief findings). In the 2008 study, the suggestion was presented as an error in the experiment. Therefore, participants may have recalled getting sick on yogurt in general when eating, rather than recalling being ill specifically from peach yogurt. In addition, in the current study, individuals spent more time thinking about and trying to remember the exact suggested event. This may have promoted focus on the single target food rather than on the general class of foods.

We found the greatest suppression of eating for those who developed memories following the suggestion. In contrast, Geraerts et al. (2008) found relatively few false memories (2.6% vs. 20% in the present study). We suspect that our memory rate is greater because participants took part in individual rather than group suggestion sessions, and because our participants received a more comprehensive guided visualization. Also, in this study it was those who reported memories who showed suggestion-consistent behavior, while those reporting only belief did not show behavioral avoidance.

Finally, in the Geraerts et al. study, those who believed the event avoided the target food up to four months later. Perhaps an effect of belief on behavior in the current study would have become apparent if eating occurred after four months; our longest delay was one month. It is also possible that developing a belief followed by immediate engagement in the behavior, as in the Geraerts study, serves to anchor the belief so that it continues to influence behavior over time.

As an example, people come to believe a food made them sick, they are offered the food to eat, they avoid eating it, and later they have a memory of avoiding the food. By not engaging in the specific behavior until later in the present study, belief alone may no longer have held sufficient salience to affect eating. The timing of the behavioral measure may influence the degree to which beliefs or memories affect how people subsequently behave.

It would be important to extend the generalizability of these findings to other populations, and take also into account individual differences variables that might correlate with susceptibility to this form of suggestion. Future research might examine the role of factors such as compliance and susceptibility to persuasion in the suggestion/behavior relationship.

We also note that suggestion may affect eating behavior by mechanisms other than the conscious formation of autobiographical beliefs and memories. Individuals may forget the suggestion, yet remain predisposed towards disliking the food due to implicit influences. Research has shown that food preferences are not entirely consciously mediated and that changes in preferences can occur outside of awareness (Maison, Greenwald, & Bruin, 2004; Richetin, Perugini, Prestwich, & O'Gorman, 2007). Suggestions may activate automatic processes related to food preferences. One possible mechanism is the activation of disgust. Disgust is posited to be a basic defensive cognitive-affective reaction to potential environmental contaminants (Ekman, 1992). Rozin and Zellner (1985) argue that the social transmission of information about foods is a primary mechanism in producing food preferences. Evidence indicates that individuals have implicit attentional biases for disgust inducing information (Charash, McKay, & DiPaolo, 2006). The activation of disgust via socially transmitted information is a plausible mechanism for explaining the influence of suggesting negative food events on behavior. Future research is needed to differentiate explicit from implicit effects of suggestion on behavioral outcomes.

The results of this study contribute to the growing body of experimental work showing that suggesting false autobiographical events impacts non-verbal behavior, via the development of false autobiographical beliefs and memories. The findings are consistent with views that one adaptive function of making information about the past available is to inform subsequent planning and behavior. Autobiography is influenced by socially transmitted information, which subsequently influences behavior. Behavior is in part predicated on credible and relevant historical information, whether or not this information is true.

## References


Addis, D. R., Pan, L., Vu, M. A., Laiser, N., & Schacter, D. L. (2009). Constructive episodic simulation of the future and the past: Distinct subsystems of a core brain network mediate imagining and remembering. *Neuropsychologia*, *47*, 2222–2238.

Alea, N., & Bluck, S. (2003). Why are you telling me that? A conceptual model of the social function of autobiographical memory. *Memory*, *11*, 165–178.

Atance, C. M., & O'Neill, D. K. (2001). Episodic future thinking. *Trends in Cognitive Science*, *5*, 533–539.

Aubie, C. D., & Jarry, J. L. (2009). Weight related teasing increases eating in sub-clinical binge eaters. *Journal of Social and Clinical Psychology*, *28*, 909–936.

Bandura, A. (1986). *Social foundations of thought and action.* Englewood Cliffs, NJ: Prentice-Hall.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory* (2nd ed.). San Antonio, TX: The Psychological Corporation.

Bernstein, D. M., Laney, C., Morris, E. K., & Loftus, E. F. (2005). False memories about food can lead to food avoidance. *Social Cognition*, *23*, 11–34.

Bernstein, D. M., Pernat, N., & Loftus, E. F. (2010). The false memory diet: False memories alter food preference. In V. R. Preedy, R. R. Watson, & C. R. Martin (Eds.), *Handbook of behavior, food, and nutrition* (pp. 1645–1663). New York: Springer.

Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A TALE of three functions: The self-reported uses of autobiographical memory. *Social Cognition*, *23*, 91–117.

Charash, M., McKay, D., & DiPaolo, N. (2006). Implicit attention bias for disgust. *Anxiety, Stress and Coping*, *19*, 353–364.

Copeland, C. D., Woods, D. J., & Hursey, K. G. (1995). Social interaction effects on restrained eating. *International Journal of Eating Disorders*, *17*, 97–100.

D'Argembeau, A., & Mathy, A. (2011). Tracking the construction of episodic future thoughts. *Journal of Experimental Psychology: General, 140*, 258–271.

Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, *6*, 169–200.

French, L., Garry, M., & Mori, K. (2008). You say tomato? Collaborative remembering leads to more false memories for intimate couples than for strangers. *Memory*, *16*, 262–273.

French, L., Sutherland, R., & Garry, M. (2006). Discussion affects memory for true and false childhood events. *Applied Cognitive Psychology*, *20*, 671–680.

Gabbert, F., Memon, A., & Wright, D. B. (2006). Memory conformity: Disentangling the steps toward influence during a discussion. *Psychonomic Bulletin and Review*, *13*, 480–485.

Garner, D. M., & Garfinkel, P. E. (1979). The eating attitudes test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, *9*, 273–279.

Garry, M., Manning, C., Loftus, E. F., & Sherman, S. J. (1996). Imagination inflation. *Psychonomic Bulletin and Review*, *3*, 208–214.

Garry, M., & Wade, K. (2005). Actually, a picture is worth less than 45 words: Narratives produce more false memories than photographs do. *Psychonomic Bulletin & Review*, *12*, 359–366.

Geraerts, E., Bernstein, D., Merckelbach, H., Linders, C., Raymaekers, L., & Loftus, E. F. (2008). Lasting false beliefs and their behavioral consequences. *Psychological Science*, *19*, 749–753.

Gilbert, D. T., Tafarodi, R. W., & Malone, P. S. (1993). You can't not believe everything you read. *Journal of Personality and Social Psychology*, *65*, 221–233.

Johnson, M. K., & Sherman, S. J. (1990). In E. T. Higgins, & R. M. Sorrentino (Eds.), *Constructing and reconstructing the past and the future in the present. Handbook of Motivation and Cognition: Foundations of Social Behavior, Vol 2*. (pp. 482–526) New York: The Guilford Press.

Loftus, E. F., & Davis, D. (2006). Recovered memories. *Annual Review of Clinical Psychology*, *2*, 469–498.

Maison, D., Greenwald, A. G., & Bruin, R. H. (2004). Predictive validity of the Implicit Association Test in studies of brands, consumer attitudes, and behaviour. *Journal of Consumer Psychology*, *14*, 405–415.

Mazzoni, G. A. L., & Kirsch, I. (2002). Autobiographical memories and beliefs: A preliminary metacognitive model. In T. J. Perfect, & B. L. Schwartz (Eds.), *Applied metacognition* (pp. 121–145). New York: Cambridge University Press.

Mazzoni, G., Loftus, E. F., & Kirsch, I. (2001). Changing beliefs about implausible autobiographical events: A little plausibility goes a long way. *Journal of Experimental Psychology. Applied*, *7*, 51–59.

Mazzoni, G., & Memon, A. (2003). Imagination can create false autobiographical memories. *Psychological Science*, *14*, 186–188.

Mazzoni, G., Scoboria, A., & Harvey, L. (2010). Non-believed memories. *Psychological Science*, *21*, 1334–1340.

McFarlane, T., Polivy, J., & Herman, C. P. (1998). Effects of false weight feedback on mood, self-evaluation, and food intake in restrained and unrestrained eaters. *Journal of Abnormal Psychology*, *107*, 312–318.

Neisser, U. (1996). Remembering as doing. *Brain and Behaviour Sciences*, *19*, 203–204.

Newman, E., & Lindsay, D. S. (2009). False memories: What the hell are they for? *Applied Cognitive Psychology*, *23*, 1105–1121.

Pezdek, K., Finger, K., & Hodge, D. (1997). Planting false childhood memories: The role of event plausibility. *Psychological Science*, *8*, 437–441.

Pillemer, D. (2003). Directive functions of autobiographical memory: The guiding power of the specific episode. *Memory*, *11*, 193–202.

Polivy, J., Herman, C. P., & Howard, K. I. (1988). The restraint scale: Assessment of dieting. In M. Herson, & A. S. Bellack (Eds.), *Dictionary of behavioral assessment techniques* (pp. 377–380). New York: Pergamon.

Richetin, J., Perugini, M., Prestwich, A., & O'Gorman, R. (2007). The IAT as a predictor of food choice: The case of fruits versus snacks. *International Journal of Psychology*, *42*, 166–173.

Rozin, P., & Zellner, D. (1985). The role of Pavlovian conditioning in the acquisition of food likes and dislikes. In N. S. Braveman, & P. Bronstein (Eds.), *Experimental assessments and clinical applications of conditioned food aversions* (pp. 189–202). New York: The New York Academy of Sciences.

Schul, Y., Mayo, R., & Burnstein, E. (2004). Encoding under trust and distrust: The spontaneous activation of incongruent cognitions. *Journal of Personality and Social Psychology*, *86*, 668–679, doi:10.1037/0022-3514.86.5.668.

Scoboria, A., Lynn, S. J., Hessen, J., & Fisico, S. (2007). So *that* is why I don't remember: Normalizing forgetting of childhood events influences false autobiographical beliefs but not memories. *Memory*, *15*(8), 801–813.

Scoboria, A., Mazzoni, G., & Jarry, J. (2008). Suggesting childhood food illness results in reduced eating behavior. *Acta Psychologica*, *128*, 304–309.

Scoboria, A., Mazzoni, G. A., Kirsch, I., & Relyea, M. (2004). Plausibility and belief in autobiographical memory. *Applied Cognitive Psychology*, *18*, 791–807.

Sheen, M., Kemp, S., & Rubin, D. (2001). Twins dispute memory ownership: A new false memory phenomenon. *Memory & Cognition*, *29*, 779–788.

Smeets, T., Merckelbach, H., Horselenberg, R., & Jelicic, M. (2005). Trying to recollect past events: Confidence, beliefs and memories. *Clinical Psychology Review*, *25*, 917–934.

Suddendorf, T., & Busby, J. (2005). Making decisions with the future in mind: Developmental and comparative identification of mental time travel. *Learning and Motivation*, *36*, 110–125.

Wade, K., & Garry, M. (2005). Strategies for verifying false autobiographical memories. *The American Journal of Psychology*, *118*, 587–602.