PLANTING FALSE CHILDHOOD MEMORIES: The Role of Event Plausibility
Kathy Pezdek, Kimberly Finger, and Danelle Hodge
Claremont Graduate University

Abstract—Two experiments tested and confirmed the hypothesis that events will be suggestively planted in memory to the degree that they are plausible and script-relevant knowledge exists in memory. In Experiment 1, 22 Jewish and 29 Catholic high school students were read descriptions of three true events and two false events reported to have occurred when they were 8 years old. One false event described a Jewish ritual, and one described a Catholic ritual. Results for the false events showed the predicted asymmetry: Whereas 7 Catholics but 0 Jews remembered only the Catholic false event, 3 Jews but only 1 Catholic remembered only the Jewish false event. Two subjects recalled both events. In Experiment 2, 20 confederates read descriptions of one true event and two false events to a younger sibling or close relative. The more plausible false event described the relative being lost in a mall while shopping; the less plausible false event described the relative receiving an enema. Three events were falsely remembered; all were the more plausible event. We conclude by outlining a framework that specifies the cognitive processes underlying suggestively planting false events in memory.

A great deal of attention has recently focused on the suggestibility of memory for childhood experiences. The majority of the research on the suggestibility of memory has used a three-stage procedure (i.e., a presentation phase and a suggestion phase followed by a test phase) and reported that memory for target items seen in the presentation phase is less accurate when misleading information is presented in the suggestion phase than when it is not (Loftus, 1975; Loftus, Miller, & Burns, 1978; Pezdek, 1977). Although there are constraints on the suggestibility effect (Lindsay, 1993; Pezdek & Greene, 1993; Pezdek & Roe, 1995; Zaragoza & Koshnider, 1989; Zaragoza & Mitchell, 1996), numerous studies using this procedure have reported differences of 20% to 30% between performance on misled and control items. Further, when preschool children have been compared with older children and adults, significant developmental differences in the suggestibility of memory have often been reported (Ceci & Bruck, 1993).

On the basis of this research, some scholars have concluded that it is relatively easy to suggestively plant memories for events that did not occur. However, a recent report (Pezdek & Roe, 1997) indicates that although it is relatively easy to suggest to a child a change in an event that was experienced, it is less likely that an event can be planted in or erased from memory. Thus, the large majority of the research on the suggestibility of memory does not directly generalize to the situation involving suggestively planting memories for events that were not experienced. Nonetheless, it is clear that some events can be suggestively planted in memory.

Loftus and Pickrell (1995) had 24 volunteers suggest to offspring or younger siblings that they had been lost in a shopping mall when they were about 5 years old. Six of the 24 subjects reported either full or partial memory for the false event. Similarly, Hyman, Husband, and Billings (1995) asked college students about their memory for numerous true events and two false events. The percentage of subjects who recalled the false events as real was 20% in Experiment 1 and 25% in Experiment 2. Ceci, Huffman, Smith, and Loftus (1996) read preschool children a list of true and false events and asked them to think real hard about each event and try to remember if it really happened. In the initial session, 44% of the children age 3 to 4 years and 25% of the children age 5 to 6 years remembered at least one of the false events.

Although it is clear that some events can be suggestively planted in memory, it is not clear what factors affect the probability of suggestively planting false memories. This study investigated what types of events are more likely to be suggestively planted in memory and specifically tested the hypothesis that events will be suggestively planted to the degree that they are plausible and script-relevant knowledge exists in memory. This hypothesis is derived from the notion that an asserted event must first be evaluated as true before it can be incorporated into autobiographical memory, and if an event is implausible, it is not likely to be evaluated as true. Further, it should be easier to form a memory trace for an event that is plausible and about which one has a well-developed generic script than to form a memory trace for an event that is implausible and about which one does not have a generic script.

In Experiment 1, Jewish and Catholic high school students were read descriptions of three true events and two false events that were reported to have happened when they were 8 years old, and were asked what they recalled about each. The same two false events were read to each subject. One false event described a Jewish ritual, Shabbat; one false event described a Catholic ritual, receiving Communion. Thus, in a mixed factorial design, across the two religious groups, each false event served as both the relatively more plausible and the relatively less plausible event. If the probability of suggestively planting a memory is a function of the plausibility of the event, then Catholics should have been more likely to remember the false Catholic event than the false Jewish event, and Jews should have been more likely to remember the false Jewish event than the false Catholic event.

EXPERIMENT 1

Method

Subjects
Twenty-nine Catholic students (mean age = 16.6 years) from a women's Catholic high school participated, as did 22 Jewish students (mean age = 15.85). Nine of the Jewish subjects were students at a Jewish high school, and 13 were students in weekly religious education classes at Temple Beth Israel. To match the available Catholic
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sample, only females were included in the Jewish sample. All three sites were in the Los Angeles metropolitan area.

Materials and procedure
Mothers of students at each of the three sites were mailed questionnaires requesting descriptions of three events that happened to their daughters at about age 8. Descriptions of true events were edited by the experimenter so that the level of detail and writing style were comparable for the true and false events. The age of 8 was chosen because the selected Catholic false event, receiving Communion, typically begins at the age of 8. In addition, each Jewish mother was asked how frequently her family conducted Shabbat prayers, and each Catholic mother was asked how frequently her child received Communion. A child was excluded if her mother indicated that she participated in the religious ritual "never" either (a) when the child was 8 years old or (b) currently.

Both false events described religious rituals that could have occurred on a weekly basis. The Jewish ritual was Shabbat, the saying of prayers before sunset on Friday evening. The Catholic ritual was receiving Communion, the sacrament that can be received at Mass. The two false events were described in paragraphs of about the same length, avoiding specific words that would identify their religious origins (i.e., "host," "Mass," "challah," etc.). The paragraph describing the false Catholic event was the following:

Your mother told me about the time you went to weekly service with your family. You were about 8 years old. It was toward the end when you all went up to the front in line and, as usual, the man gave you something for you to put on your tongue. After he handed one to you, you looked down and followed the adult in front of you back to the seat. But when you knelt down you realized that you were in a row with a family that you did not know. You stood up right away and looked around. You saw your mother nearby and returned to the seat beside her. This is what your mother remembered about this event. Now what do you remember about it?

The paragraph describing the false Jewish event was the following:

Your mother told me about the time your family was at home conducting the usual Friday night prayers before sunset. You were about 8 years old. Your mother started the prayers and lit the candles. She then passed around the bread prepared for this occasion so that you could each break off a piece. As she handed it to you, you dropped the whole loaf of bread on the floor by accident. Although there was no real harm, your mother was embarrassed anyway. Your mother picked up the bread and then finished the prayers. This is what your mother remembered about this event. Now what do you remember about it?

Subjects were told that they were studying what types of things they remembered from their childhood. The two false events were always included in the third and fifth positions in the sequence, with the order of assigning the Jewish and Catholic stories to these two positions counterbalanced across subjects. After the test session, subjects were asked to rate on a scale from 1 (low) to 10 (high) the clarity of their memory for each event and how confident they were that they could remember more information about each event if given more time. They were then asked to think about each of the five events over the next week to see if they could remember any additional details. One week later, the experimenters returned to test if each subject had any additional memories.

Results
An event was operationally defined as remembered if the subject recalled specific details of the event that were not included in the description read. The three true events were generally well remembered, with no significant difference between the number remembered by Catholics (M = 2.83) versus Jews (M = 2.95). All remembered true events were remembered in the first session. The most important result involves the number of Catholics versus Jews who remembered the false Catholic versus false Jewish event. These data are presented in Table 1. The table shows clearly that Catholic subjects were far more likely to remember the false Catholic event than the false Jewish event, and whereas some Jewish subjects remembered the false Jewish event, none remembered the false Catholic event.

The majority of the Catholics (65.5%) and the Jews (86.4%) did not remember either of the two false events. Of the 11 subjects who remembered one false event, 10 recalled the more plausible event, and only 1 recalled the less plausible event. This difference was significant in a McNemar's test, $\chi^2(1) = 5.82, p < .05$. All 10 Catholics and all 3 Jews who remembered a false event did so on the first day of testing. One week later, additional details of the false events were recalled by only 2 of the 10 Catholics and 1 of the 3 Jews.

To investigate potential differences between memories for true versus false events, we compared various characteristics of the memories for the 13 subjects who recalled at least one false event. Two-tailed significance tests were conducted on these data, and the results are presented in Table 2. Compared with recall of false events, recall of true events employed significantly more words, $t(12) = 4.54, p < .001$, and more idea units, $t(12) = 3.43, p < .01$. Thus, the recall output for true versus false events could be differentiated in terms of the number of new details provided for each; there were almost twice as many details provided for true as false events. Compared with recalled false events, recalled true events were also associated with significantly higher ratings of clarity, $t(12) = 3.99, p < .01$, and confidence, $t(12) = 2.73, p < .02$. Further, for the 11 subjects who recalled only one false event, the clarity ratings were higher for the false event recalled $(M = 3.91)$ than for the false event not recalled $(M = 1.05)$. $t(10) = 5.22, p < .001$, and confidence ratings were higher for the false event only $(M = 4.91)$ than for the false event not recalled $(M = 1.95)$. $t(10) = 4.77, p < .001$.

| Table 1. Number of Catholic and Jewish participants who recalled neither, one, or both false events |
|---|---|---|---|
| Participants | Neither event | Catholic event only | Jewish event only | Both events |
| Catholic | 19 | 7 | 1 | 2 |
| Jewish | 19 | 0 | 3 | 0 |
Table 2. Means (and standard deviations) for measures comparing recall of true and false events in Experiment 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of words recalled***</td>
<td>27.79 (8.81)</td>
<td>15.42 (7.69)</td>
</tr>
<tr>
<td>Number of idea units recalled**</td>
<td>6.33 (2.53)</td>
<td>3.23 (1.55)</td>
</tr>
<tr>
<td>Clarity rating***</td>
<td>6.90 (0.17)</td>
<td>4.00 (0.18)</td>
</tr>
<tr>
<td>Confidence rating*</td>
<td>6.88 (0.21)</td>
<td>5.00 (0.21)</td>
</tr>
</tbody>
</table>

*p < .02, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

EXPERIMENT 2

Experiment 2 provided an additional test of the hypothesis that events will be suggestively planted in memory to the degree that they are plausible and script-relevant knowledge exists in memory, and specifically tested the generalizability of the results of Loftus and Pickrell (1995). The false event suggested by Loftus and Pickrell was being lost in a shopping mall at about the age of 5. We contend that this event is familiar to most people, and therefore should be relatively easy to plant in memory. Children are often warned about the dangers of getting lost, have fears about getting lost, read classic tales about children who get lost (e.g., Hansel and Gretel, Snow White and the Seven Dwarfs, Pinocchio, Goldilocks and the Three Bears), and often do get lost, if only for a few frightening minutes.

In Experiment 2, each confederate tested the memory of a younger sibling or close relative (the subject). Confederates read descriptions of three events that they reported had happened when the subjects were 5 to 6 years old. Subjects were asked to recall everything they could remember about each event. One event was true; two events were false. One false event, an incident very similar to that used by Loftus and Pickrell (1995), described the subject being lost in a mall while shopping with a parent (the relatively plausible event). The other false event described the subject receiving a rectal enema for constipation (the relatively implausible event). Because much of the research on planting false memories is used to evaluate the probability of planting false memories for childhood sexual abuse, we selected a false event that approached this experience. This particular false event was suggested because, like sexual abuse, being given a rectal enema is shameful and embarrassing and involves discomfort in a private part of the body.

Method

Subjects

Confederate experimenters were recruited from among graduate students at Claremont Graduate University and senior honors stu-

1. In a pilot study, 98 subjects completed a questionnaire to assess how frequently they remembered experiencing the two target events used in Ex-

dents at California State University, San Bernardino. Each subject (a) was no more than 2 years older than the confederate, (b) was at least 15 years old at the time of the study, and (c) was a close relative or sibling of the confederate and at age 5 to 6 had been in close contact with him or her. Confederates participated in a 1-hr training session in which they were instructed how to interview their subject, and they observed the first author and a graduate student role-play the interview process. The confederates were not explicitly informed of the hypotheses under investigation. Twenty confederates participated. The mean age of the subjects at the time of this study was 28.5 years (median age = 23.5 years). Thirteen subjects were females. Nine participants were sisters or step-sisters of a confederate, 4 were brothers, 4 were daughters or step-daughters, 2 were sons, and 1 was a nephew.

Materials and procedure

The cover story for this task was that the confederates were taking a class for which they had been generating memories from their childhood in a daily diary. For this assignment, three diary entries had been selected, and the confederate was asked to contact a close relative who could possibly provide independent validation for these three events. The confederate then read descriptions of the three events, with the true event presented first and the order of the two false events counterbalanced across subjects. Each confederate drafted a short paragraph describing a specific true event that had occurred when the subject was 5 to 6 years old and at which the confederate was present. The true paragraphs were edited to ensure that the level of detail and writing style were comparable to the detail and style of the paragraphs describing the false events.

The false event regarding being lost was the following:

I remember that once you and I were at the (name of local store or shopping center) with Mom. You must have been about five or six because I was about ( ). I was looking in the store window and standing next to Mom. When we turned around, you were gone. Mom yelled out your name, and lots of people turned around to see what was going on. I don’t remember ever being so scared. You must have been really scared too, because when we found you, you were standing in a corner crying. Mom was so relieved that she went and bought us both (favorite childhood treat).

The false event regarding receiving the enema was the following:

It was summertime and we were out of school. I think it was about 19( ) because (some memorable anchoring event). It was really fun because we got to stay up late and eat whatever we wanted. I remember you ate lots of (favorite childhood treat). After a couple of days of junk food, though, you started to feel really sick and were nauseous and uncomfortable. Mom thought that you should have an enema. I remember her telling you that the enema wouldn’t hurt and that it would make you feel better. You were scared anyway, though, because when she took you into the bathroom, I remember that you cried a lot.

Both false events were customized as indicated to include some familiar contextual material about the time and place.

After each event, the subject was told, “This is what I remember...”

Experiment 2 and the extent of their knowledge about these two events. Whereas 68 subjects remembered being lost as a child at least once (M = 1.26 times), only 11 subjects remembered receiving a rectal enema (M = 0.20 times); these means were significantly different, t(97) = 6.30, p < .001. In addition, the mean number of idea units generated regarding what it would be like to be lost (M = 6.26, SD = 3.46) was significantly greater than the comparable figure for receiving an enema (M = 3.19, SD = 3.24), t(97) = 8.61, p < .001.
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about this event. Now, what do you remember about it?” One day and again about 1 week later, each confederate returned to test if the subject had any additional memories for the events. At the end of the last session, each subject was asked how many times he or she remembered being lost as a child and being given a rectal enema as a child. Eighteen subjects answered these questions. Five reported never having been lost, 3 said they had been lost once, and 10 responded that they had been lost two times or more. Fourteen subjects said they had never received an enema as a child, and 4 responded that they had received an enema “at least once.” These findings confirm the results of the pilot study, being lost was a significantly more plausible experience than receiving a rectal enema.

Results

The most important result involves the number of subjects who remembered the relatively more plausible versus the relatively less plausible false event. Three subjects remembered the false event about being lost and recalled additional details of this event. This figure compares fairly well with Loftus and Pickrell’s (1995) report of 25% false recall for the same false event. However, none of the subjects remembered the false event about receiving a rectal enema. The binomial probability that all three of the remembered false events would be in the more plausible condition by chance is .125. Nonetheless, given that false memory for either event did not occur very often (only 3 times out of 40 attempts), the finding that all cases of false memory were in the relatively more plausible condition is notable. Of the 3 subjects who remembered the scenario regarding being lost, 2 did so on the first day of the study; the 3rd did not recall the event initially but did remember it and elaborated details of the event in the subsequent interview.

There were no obvious individual characteristics differentiating the 3 subjects who falsely remembered being lost and the other 17 subjects. The 3 who remembered were 17, 18, and 26 years old; 2 were females, 1 was a stepsister, 1 a sister, and 1 a son of the confederate. Although using a family member rather than an unrelated experimenter to attempt to implant the false memories would generally be expected to create a more convincing context for planting the memories (i.e., the family member was there so he or she should know), it is possible that the low overall rate of false reports in this study and the absence of a statistically significant difference in recall between the two false events in this study may have occurred because of insufficient training of the confederates. Thus, the fact that none of the subjects in this experiment falsely remembered the episode regarding receiving the enema does not suggest that it is impossible to plant memories for shameful, embarrassing, and uncomfortable events in memory.

GENERAL DISCUSSION

This study tested the hypothesis that events will be suggestively planted in memory to the degree that they are plausible and script-relevant knowledge exists in memory. This hypothesis was confirmed with the finding, in both experiments, that the more plausible event was more likely to be planted in memory than the less plausible event. In Experiment 1, this result occurred in the mixed factorial design in which each false event served as both a relatively plausible and implausible event. Catholics were significantly more likely to recall the false Catholic event than the false Jewish event, and Jews were significantly more likely to recall the false Jewish event than the false Catholic event. In Experiment 2, three events were falsely recalled; all three were the relatively plausible event.

The finding that relatively plausible events are more likely to be planted in memory than relatively implausible events has implications for the cognitive processes underlying suggestibility. The literature on script processing is useful for understanding these cognitive processes. According to Graesser’s schema-copy-plus-tag model (Graesser, 1981; Graesser & Nakamura, 1982), every time a scripted activity is experienced, a specific memory trace is formed by the comprehender. This memory trace contains a pointer to an instantiated script that has been copied from a permanent generic script. The instantiated script for the specific episode includes all script-relevant actions that were explicitly triggered by the experienced event as well as script-relevant actions that were triggered by default as a result of script-based inferences that occurred during comprehension. This model suggests that if a person is presented with a description of a specific instance of an activity and asked to verify whether this event happened to him or her, the person would compare the instance as described with his or her memory for related instances of that activity to determine if there is a match. The more overlap there is between the information in the description and the information in memory, the more likely it is that a match will be indicated and the described event will be reported as true. Thus, the described activity is less likely to be verified as true if it is an implausible activity, about which the individual is not likely to have either specific episodic memory or generic script-relevant knowledge, than if it is a plausible activity. Accordingly, a description of a false event that is an episode of a plausible activity is more likely to be reported as true than a description of a false event that is an episode of an implausible activity.

Gentner and Collins (1981) reported a similar effect that they referred to as the “lack of knowledge inference.” In this inference, a person who is trying to verify an assertion as true or false uses metaknowledge to reason that he or she would certainly have more general knowledge of the asserted event if it were true. Therefore, if an event is implausible, and the person does not find any information in memory relevant to the assertion, the person may conclude that the assertion must be false. In Experiment 2, for example, if subjects did not know what an enema is or how one is administered, they would have been less likely to make the lack-of-knowledge inference that the event must not have ever happened or simply they would know something about it.

According to this interpretation of how false events can be suggestively planted in memory, once a false event is judged to be true, then details of the generic script for the event as well as details from related episodes of the event can be “transported” to the memory for the suggested false event. Thus, memory for the false event becomes developed by this related information in memory. However, the results of this study suggest that there are significant differences between memories for true versus false events. On the average, recall for false events contained less information than recall for true events, and subjects were less confident with false events than with true events that they could recall more information if given more time. In addition, memories for recalled false events were rated as less clear on the average than were memories for recalled true events. However, one should be cautious drawing conclusions about the veracity of any particular memory from the length or degree of detail of its descrip-
tion or the clarity or confidence with which it is recalled, given that there is an overlap between the distribution of responses for the true and false events on each of these measures.

This study takes the field one step closer to understanding the conditions under which memories are likely to be suggestively planted and the conditions under which memories are not likely to be suggestively planted. This study indicates that false memories are more likely to be planted if they involve events that are relatively plausible. As demonstrated in Experiment 2, although it may be relatively less effortful to plant a false memory that an adult had been lost in a mall when he or she was a child, it is more difficult to plant a false memory in an adult that he or she had received a rectal enema as a child. Because the findings of Loftus and Pickrell (1995) are frequently applied to cases involving adults’ memory for childhood sexual abuse (Loftus, 1993), it is especially important to evaluate the appropriateness of this generalization.

The results of this study suggest that the relative ease of suggestively planting false childhood memories for sexual abuse versus being lost in a mall while shopping should be related to the relative plausibility of these two events to the particular individual. It should be easier to plant false memories of sexual abuse during childhood with people for whom sexual contact with an adult during their childhood is more plausible than with people for whom sexual contact with an adult during their childhood is less plausible. In this context, it is important to note the possibility that many sources may influence the plausibility of an event. One influence is the consistency of the event with one’s autobiographical memory—the focus of this study. But it is possible that plausibility can also be affected by other sources. In the case of a false memory of being sexually abused during one’s childhood, influences on plausibility might include claims of widespread sexual abuse of children disseminated by the popular press and other media, suggestions by therapists and other people that one fits some profile of a victim of sexual abuse, and self-identification as an abuse victim. Similarly, script knowledge can arise from a number of sources besides direct personal experience. Of course, the relative strength of these and other possible suggestible sources has yet to be determined empirically.

All memories are not equally likely to be suggestively planted in memory, and individuals with differing prior experience and prior knowledge are not equally vulnerable to suggestion. This study offers a framework for evaluating the probability of suggestively planting memory for an event; key considerations are the extent to which the event is plausible and script-relevant knowledge exists in memory.

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