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Source: *Child Development*, Jul. - Aug., 1999, Vol. 70, No. 4 (Jul. - Aug., 1999), pp. 887-895

Published by: Wiley on behalf of the Society for Research in Child Development

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Planting False Childhood Memories in Children: The Role of Event Plausibility

Kathy Pezdek and Danelle Hodge

This experiment tested and supported the hypothesis that events will be suggestively planted in children's memory to the degree that the suggested event is plausible and script-relevant knowledge exists in memory. Nineteen 5- to 7-year-old children and 20 9- to 12-year-old children were read descriptions of two true events and two false events, reported to have occurred when they were 4 years old. One false event described the child lost in a mall while shopping (the plausible false event); the other false event described the child receiving a rectal enema (the implausible false event). The majority of the 39 children (54%) did not remember either false event. However, whereas 14 children recalled the plausible but not the implausible false event, only one child recalled the implausible but not the plausible false event; this difference was statistically significant. Three additional children (all in the younger age group) recalled both false events. Although this pattern of results was consistent for both age groups, the differences were significant for the younger children only. A framework is outlined specifying the cognitive processes underlying suggestively planting false events in memory.

INTRODUCTION

Professionals and researchers worldwide are concerned about the reliability of children's memory for witnessed events (for a review, see Bottoms & Goodman, 1996). The central concern here has been the question of whether children's memory is sufficiently accurate, and whether their memory might be too vulnerable to suggestibility to be relied upon in court. There have been numerous studies in recent years on this topic and it is generally found that when preschool children have been compared to older children and adults, significant differences in the degree of suggestibility of memory have been reported. This conclusion follows from a review of 18 studies by Ceci and Bruck (1993), in which 15 of these studies reported that preschoolers were more suggestible. On the basis of this research, there are those who conclude that children should not be relied upon as witnesses in court. This study is based on the premise that just because children's memory can be vulnerable to suggestibility does not mean that it always is. The purpose of this study is to identify the conditions under which children's memory is likely to be resistant to versus vulnerable to suggestibility.

In this study, we attempted to plant false memories in children. In a number of studies, it has been reported that it is possible to plant false events in memory. For example, Loftus and Pickrell (1995) had 24 volunteers suggest to an offspring or younger sibling 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. And 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 aged 3 to 4 years, and 25% of the children aged 5 to 6 years remembered at least one of the false events. On the other hand, Pezdek and Roe (1997) reported that with 4- and 10-year-old children, it was relatively more difficult to suggestively plant a memory for a touch that did not occur than to suggestively change a memory for a touch that did occur.

Although it is clear that some false events can be suggestively planted in memory, it is not clear what factors affect the probability of suggestively planting false memories. This study specifically tests the hypothesis that events will be suggestively planted to the degree that the suggested event is 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, if an event is plausible and one has a well-developed generic script for the event, it should be relatively easier to form a memory construction for a specific episode of that event than to form a memory

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trace for an episode of an implausible event about which one does not have a generic script.

Although the degree of plausibility and the amount of script-relevant knowledge in memory are highly correlated for most real world events, we agree that, in fact, it is possible to have a great deal of knowledge about some implausible events, and perhaps very little knowledge about some plausible events. Thus, although it may be possible to independently vary plausibility and degree of scripted knowledge, for most real world examples, these two factors are highly correlated. In this study, the plausible event was a typical plausible event, that is, an event about which participants had a high degree of knowledge. Similarly, the implausible event in this study was a typical implausible event, that is, an event about which participants had little knowledge. Consequently, in this study it was not possible to separately isolate the effects of degree of plausibility and amount of script-relevant knowledge in memory. This study, however, assesses the suggestibility effect associated with typical plausible and implausible events.

In two experiments by Pezdek, Finger, and Hodge (1997), it was recently reported that events will be suggestively planted to the degree that the suggested event is plausible and script-relevant knowledge exists in memory. In Experiment 1, 32 Jewish and 29 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. One false event described a Jewish ritual; the other false event described a Catholic ritual. Catholics were significantly more likely to recognize falsely the Catholic event ($n = 7$) than the Jewish event ($n = 1$), and Jews were significantly more likely to recognize falsely the Jewish event ($n = 3$) than the Catholic event ($n = 0$). In Experiment 2, 20 confederate experimenters read descriptions of one true event and two false events to a younger sibling or close relative who was at least 15 years old ($M = 23$ years, 6 months) at the time of the study. One false event described the relative lost in a mall while shopping (the plausible event); the other false event described the relative receiving a rectal enema (the implausible event). More participants recalled the false event involving being lost ($n = 3$) than the false event involving the enema ($n = 0$).

In this study, the methodology used in Experiment 2 by Pezdek et al. (1997) was used to test the vulnerability of children to suggestibility for plausible versus implausible events. Developmental differences in suggestibility for plausible versus implausible events warrant investigation because young children, due to their relatively more limited world experiences, gen-

erally have less script-relevant knowledge in memory than do older children, even for events that are familiar to both age groups (Fivush, Kuebli, & Clubb, 1992; Fivush & Slackman, 1986). Thus, children may not distinguish between suggestively incorporating plausible versus implausible false events into their memory. Further, children have a very limited knowledge base for many domains but nonetheless can acquire new information within those domains. Children, thus, commonly learn about new events that they initially cannot evaluate as true or false. It follows then that if the effect of plausibility on suggestibility is based on the notion that an asserted event must first be evaluated as true before it can be incorporated into autobiographical memory, children may not be as reluctant as adults to incorporate into memory a suggested implausible false event. These issues underlie the rationale for investigating developmental differences in the suggestibility of memory for plausible versus implausible events in this study.

Younger children (5 to 7 years old) and older children (9 to 12 years old) were included in this study based on reports of developmental differences across this age span in a number of suggestibility studies. For example, Cassel and Bjorklund (1995) reported that 6-year-olds (62%) were more likely than 8-year-olds (57%) and adults (20%) to incorrectly verify negative leading questions. Similarly, Ceci, Ross, and Toglia (1987) reported that when children were tested on details of a story about which they had been subsequently suggestively misled, 63% of 3- to 4-year-olds, 42% of 5- to 6-year-olds, 33% of 7- to 9-year-olds, and 16% of 10- to 12-year-olds incorrectly verified the suggested false information.

In this study, a parent (or the experimenter) read descriptions of four events that they reported had happened when the child was 4 years old. The child was asked to recall everything he or she could remember about each event. Two events were true; two events were false. One false event described an incident very similar to that used by Loftus and Pickrell (1995) in which the participant had been lost in a mall while shopping with a parent (*the plausible event*). We contend that this is a familiar event to most children, and as such, 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 themselves, if only for a few frightening minutes.

The other false event described the participant receiving a rectal enema for constipation (*the implausible*

event). Because much of the research on planting false memories is generalized to the evaluation of 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

Participants and design. The participants were children whose parents had volunteered from public schools and day care centers in the suburban San Bernardino, California area. Two age groups were sampled. The 19 younger children ranged from 5 to 7 years old ($M = 6$ years, 5 months, $SD = .79$). The 20 older children ranged from 9 to 12 years old ($M = 10$ years, 8 months, $SD = 1.03$). Ten boys and 9 girls were included in the younger age group; 8 boys and 12 girls were included in the older age group. The group included six African Americans, five Mexican Americans, and 28 European Americans.

The design was a 2 (age) \times 2 (plausibility) mixed-subjects design with plausibility varied within subjects.

Materials and procedure. We intended to have parents interview their children, but many parents preferred to have the experimenter do this. Nineteen children were interviewed by their own mother, three children were interviewed by their father, and 17 children were interviewed by the experimenter. The frequency of using the experimenter versus a parent interviewer did not differ between the young and older children, $\chi^2(1, N = 39) = .03$. The parents who interviewed their own children participated in a 30 min training session before the experiment began. Prior to the experiment, each parent described to the experimenter two true events that happened to his or her child when the child was about 4 years old. The true events typically described getting a new pet or the death of a pet, a trip to the hospital, or a special event such as a birthday party, competition, or family vacation. These descriptions were edited to insure that the level of detail and writing style were comparable to the descriptions of the false events.

All interviews were conducted in the child's home or in the home of a close relative. Each child was read descriptions of two true events and two false events—one plausible and one implausible. The two true events were always presented first. The order of presenting the plausible and the implausible false events was counterbalanced across subjects. Just prior to hearing each of the four events, children were told that they were part of a memory study to investigate

the types of things that are easy for children to remember and the types of things that are difficult for children to remember. All events were purported to have occurred when the child was about 4 years old.

The plausible 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). It was about (x) years ago because you were about (x) years old. I was looking in the store window at something I wanted to buy. When I turned around, you were gone. I don't remember ever being so scared. You must have been really scared too because when I found you, you were standing in a corner crying. I was so relieved that I bought you (favorite childhood treat). This is what I remember about when this happened. What do you remember?

The implausible false event regarding receiving the enema was the following:

I think you were about (x) years old because it was the year that (memorable event from child's life). I remember letting you eat too much (favorite childhood treat). After a couple of days of junk food though, you started to feel really sick and couldn't go to the bathroom. I thought that you should have an enema. An enema is when you have some warm water put into your bottom to help you (term used by child to denote a bowel movement). I remember telling you that the enema wouldn't hurt and that it would make you feel better. You were scared anyway though, because when I took you into the bathroom, I remember that you cried a lot. This is what I remember about when this happened. What do you remember?

Both false events were customized as indicated above to include some familiar contextual material about the time and place. In each description, the word "I" was replaced by "your mother" for children tested by the experimenter. As with the false events, descriptions of true events ended with the statement, "This is what I remember about when this happened. What do you remember?" If a child could not remember anything about an event, the description was read to them again and he or she was encouraged to think hard about it to see what he or she could remember. At the end of the first test day, each child was asked to think hard about the four events to see what else he or she could remember about each. They were told that on the next day, they would be asked if they could remember anything else about each event, but were asked not to talk with anyone about these events.

During the second interview, after reading a brief summary of each event, each child was asked if he or she recalled any additional memories about the event. Nineteen children completed an optional third interview on day 5. At the end of the final session, on day 2 or day 5, clarity ratings were obtained from each child for both false events. Each child was asked "How clearly do you remember this time that you were lost in the mall?" and "How clearly do you remember this time that you received an enema?" Response options were 1 (I do not remember this at all), 2 (I do not remember this too clearly), 3 (I remember this kind of clearly), and 4 (I remember this very clearly). These response options were presented orally and repeated for children who requested it. Finally, children were told, "One of these four memories never really happened. I just pretended that it did. Which of these things do you think never really happened?"

To ensure that all children comprehended what an enema was, after the final session each child was asked to describe what an enema was. All but two children in the younger age group could at least cite the description of an enema offered in the scenario. At this point each child also was asked how many times he or she remembered being lost, and how many times he or she remembered receiving an enema as a child. Each child's parent also was asked how many times he or she remembered this child (1) being lost, and (2) receiving an enema.

Following participation, children were told that really two of the events described in the study were made up: the story about them being lost and the story about them receiving an enema. They were told that this study tested children's memory for what happened to them in their childhood, and that it was thus important to include some events that had not really happened. They also were told that many of the children tested believed these made up events, so they should not be surprised if they actually thought that either of these events had really happened to them. The children as well as their parents were then encouraged to discuss their thoughts and feelings about the debriefing information with the experimenter.

RESULTS

The data were analyzed first to determine if for the participants in this study, being lost was a significantly more plausible experience than receiving a rectal enema. Whereas parents of 23 children reported that their child had been lost at least once, only one parent reported that their child had received an enema. Further, for the children for whom it was reported that they had been lost, the mean number of

occurrences remembered was 2.52, and for the children for whom it was reported that they had received an enema, the mean number of occurrences remembered was 1.0. This validates the manipulations in this study and shows that the false event regarding being lost was more plausible, and the false event regarding receiving an enema was less plausible for the participants in this study. It is important to note, however, that plausibility can arise from a number of sources besides direct personal experience such as exposure to information on television, in books, and in conversations.

The major results are presented in Table 1. An event was operationally defined as having been remembered if a child recalled elaborative details not presented in the description read. Elaborative details for the recalled plausible event typically included information about the location where the child was lost, what was purchased that day, and what the child was doing while they were lost. Elaborative details for the recalled implausible event typically included information about where the child lived at that time, the sick feeling that precipitated the need for the enema, and the relief when it was over. An event was considered not remembered if a participant said that he or she did not remember it, made no verbal response after being asked about the event, provided only information that was redundant with the description read, or provided irrelevant information (e.g., "That sounds like something my brother would have done"). Although 19 children were tested on day 5, no additional information was recalled on day 5 for any of these children. Of the 39 participants, only three differed between day 1 and day 2 in their recall of the two false events. One child recalled only the plausible

Table 1 Number of Children Who Recalled Each Type of Event by Day 2

	Children 5 to 7 Years (<i>n</i> = 19)	Children 9 to 12 Years (<i>n</i> = 20)	All Children (<i>n</i> = 39)
False Events			
Plausible but not implausible false event	7	7	14
Implausible but not plausible false event	0	1	1
Both false events	3	0	3
Neither false event	9	12	21
True Events			
One true event	4	6	10
Both true events	14	11	25
Neither true events	1	3	4

event on day 1 and both events on day 2. Two children recalled the implausible event only on day 1, but then recanted on day 2, indicating that they had decided that the event they remembered the previous day was really a different incident than the one the experimenter had described. As a result, we felt that the data for day 2 was a more accurate assessment of false recall. Consequently, the analyses of the recall data were conducted on the day 2 data.

As can be seen in Table 1, the majority of the children in both age groups recalled both of the true events. Computed differently, 63 of the 78 true events posed to participants (81%) were recalled. On the other hand, the majority of the 39 children (54%) did not remember either of the false events. Three children, all in the younger age group, remembered both false events. The principle finding involves the number of children who remembered the plausible versus the implausible false event. Of the 15 children who remembered one false event on day 2, 14 remembered the plausible false event, and only 1 remembered the implausible false event. A McNemar's test yielded this difference significant, $\chi^2(1, N = 39) = 9.6, p < .01$. To determine if there was a relationship between the probability of recalling true events and false events, a 3×3 (number of true events recalled, 0, 1, or 2) \times 3 (number of false events recalled) χ^2 analysis was conducted. There was not a significant relationship between the probability of recalling true and false events in this study, $\chi^2(4, N = 39) = 1.75$.

Analyses were conducted on each of the two age groups separately to examine potential age differences in performance. Among the 19 younger children, 9 remembered neither false event and 3 remembered both false events. Of the 7 younger children who remembered one false event on day 2, all 7 remembered the plausible event and none remembered the implausible event. A McNemar's test yielded this difference significant, $\chi^2(1, N = 19) = 5.14, p < .05$. A similar pattern emerged for the 20 older children. Twelve remembered neither false event and none remembered both false events. Of the eight older children who remembered one false event by day 2, seven remembered the plausible event and one remembered the implausible event. This difference approached significance, $\chi^2(1, N = 20) = 3.13, .10 > p > .05$.

A χ^2 analysis was conducted to assess whether there were differences in recall between the children interviewed by their parent versus those interviewed by the experimenter. First, among those children interviewed by the experimenter, eight recalled at least one false event and nine did not. Among those children interviewed by a parent, 10 recalled at least one false event and 12 did not. These frequencies did

not differ from what would be expected by chance, $\chi^2(1, N = 39) = .01$. Although the absence of a difference in results between children tested by a parent versus the experimenter seems surprising, it is important to note that in this study, when the experimenter tested a child, the parent also was present in the same room.

There is a concern in this and every suggestibility study, that when children recall an event that is "false," they may be recalling a similar event that actually did happen to them. To address this concern, we compared the frequency of recalling the plausible false event in this study for the 15 children whose parents reported that they had never previously been lost and the 23 children whose parents reported that they had previously been lost at least once. A 2×2 (actually lost or not) \times 2 (recalled the false plausible event or not) χ^2 analysis indicated no significant relationship between recall of the plausible false event and past experience with being lost in this sample, $\chi^2(1, N = 38) = .74$. This analysis was not possible for the implausible false event as only four children recalled this event and for none of these children did the parent report that the child had ever actually received an enema. The one child in the study whose parent reported that they had received an enema, however, did not verify the implausible false event in this study. It is interesting to note here that there was not a significant difference between the older and younger children in the number whose parents reported that they had previously been lost. Fourteen younger children (out of 19) and nine older children (out of 19; the relevant data was missing for one older child) were reported to have been lost, $\chi^2(1, N = 38) = 2.74$.

A second approach was taken to assess the possibility that when children recalled an event that is "false" in the study, they may be recalling a similar event that actually did happen to them. First, we compared the mean number of idea units recalled for the plausible event by children who were reported by their parents to have been previously lost ($M = 5$) with the comparable mean for children who were reported by their parents not to have been previously lost ($M = 2.63$). This difference was not significant, $t(15) = 1.33$. Second, we computed the correlation between the number of times that each child was reported to have been lost and the number of idea units that he or she recalled for the plausible false event in this study. This analysis included the 17 children who falsely recalled the plausible false event. This correlation was not significant, $r(16) = .21, p < .05$. This analysis was not possible for the implausible false event due to the small number of children who recalled this event. Thus, the children who had been lost

more frequently did not include statistically more idea units in their descriptions of the plausible false event than did the children who had been lost less frequently. These results suggest that the children were recalling details of the suggested false event in this study rather than details of their actual experience of being lost.

In the above analyses, an event was operationally defined as having been remembered if a child recalled elaborative details not presented in the description read. Thus, if a child simply echoed back a description of a false event without providing any details, the event was not considered to have been recalled. It could be argued, however, that echoing a description might be considered a consent, rather than a denial that the event had in fact occurred. It is thus important to examine the number of children who did not recall each false event using the above operational definition, and within this group compare the number of children who simply echoed the description provided as compared to the number who either denied the event outright or provided some other response that implied dissent. Of the 22 children who did not recall additional details of the plausible false event, only 6 echoed details provided, and 16 denied that the event had occurred. Similarly, of the 35 children who did not recall additional details of the implausible false event, only 5 echoed details provided, and 30 denied that the event had occurred. The low rate of echoing and the similar pattern for echoing versus denying for the plausible event and the implausible event suggests that echoing responses per se did not affect the overall pattern of recall results.

Several analyses were conducted on the number and quality of the idea units recalled for true versus false events. An idea unit was defined as an isolatable elaborative detail that was recalled but had not been presented in the scenario described. For each child, the number of *unique* idea units recalled across days 1 and 2 were used in this analysis. Thus, if a child simply repeated on day 2 what had been recalled on day 1, no additional idea units were added beyond the day 1 recall. The interrater reliability calculated on 20% of the 156 events presented was reasonably high, Cohen's kappa = .87. One-tailed significance tests were conducted on these data; the results are presented in Table 2.

The following analyses are based on the mean scores for the true and false events that were actually recalled. Of the 18 children who remembered at least one false event, significantly more idea units were recalled for true events ($M = 4.86$) than for false events ($M = 3.06$), $t(17) = 2.36$, $p < .05$. Of the 17 children who recalled the plausible false event, significantly

Table 2 Comparisons of the Mean Number of Idea Units Recalled for the Various Event Types for Both Age Groups Combined^a

Recalled Event Type	Mean Number of Idea Units Recalled
True events	4.86* (3.07)
False events ($n = 18$)	3.06* (1.95)
True events	5.06* (3.04)
Plausible false event ($n = 17$)	3.24* (1.95)
True events	3.00 (1.08)
Implausible false event ($n = 4$)	1.75 (.50)
Plausible false event	3.00 (0)
Implausible false event ($n = 3$)	1.67 (.58)

Note: Standard deviations are in parentheses.

^aBecause all children did not recall events of each type, different numbers of children are included in each set of contrasts.

*Significant at $p < .05$, two-tailed.

more idea units were recalled for the true events ($M = 5.06$) than for the plausible false event ($M = 3.24$), $t(16) = 2.26$, $p < .05$. The pattern of results was consistent for the next two comparisons as well; however, due to the small numbers of subjects in each condition, there was insufficient power to conduct statistical analyses. Of the four children who recalled the implausible false event, more idea units were recalled for true events ($M = 3.0$) than for the implausible false event ($M = 1.75$), and of the three children who recalled both false events, more idea units were recalled for the plausible false event ($M = 3.0$) than for the implausible false event ($M = 1.67$). Together these results suggest that the true events could be distinguished from the false events, even the plausible false event, by the number of details recalled. Even when children recalled a false event, they recalled significantly fewer idea units about that event than they recalled about the true events.

At the end of their last day of participation, each child was asked, "How clearly do you remember this time that you were lost in the mall?" and "How clearly do you remember this time that you received an enema?" Clarity ratings were not obtained for true events. Response options ranged from 1 (do not remember this at all) to 4 (very clearly remember). For the 38 children who answered this question, clarity ratings were significantly higher for the plausible false event ($M = 2.13$) than the implausible false event ($M = 1.32$), $t(37) = 3.77$, $p < .001$.

As the last step in the procedure, participants were told, "One of these four memories never really happened. I just pretended that it did. Which of these

things do you think never really happened?" Of the 28 children who identified one of the four events, 23 identified the implausible false event, 3 identified the plausible false event, and 2 identified a true event. This distribution of responses differed significantly from chance, $\chi^2(2, N = 28) = 10.02, <.01$. Thus, when forced to identify the least likely event to have actually occurred, children in both age groups were far more likely to select the implausible false event.

Several analyses were conducted to examine qualitative difference in the recall of the two age groups. First, the number of idea units recalled for the plausible false event were compared for the 10 younger children ($M = 3.90$ idea units) and the 7 older children ($M = 2.29$) who recalled the plausible false event. This difference was not significant, $t(15) = 1.79$. Second, the number of idea units recalled for the implausible false event was compared for the three younger children ($M = 1.67$) and the one older child ($M = 2.0$) who recalled the implausible false event. Given the small sample size in this comparison, a significance test was not possible. Next, clarity ratings for the plausible false event were compared for the 18 younger children ($M = 2.5$) and the 20 older children ($M = 1.8$) who completed this part of the procedure. This difference was not significant, $t(36) = 1.65$. Finally, clarity ratings for the implausible false event were compared for the 18 younger children ($M = 1.56$) and the 20 older children ($M = 1.1$) who completed this part of the procedure. This difference was not significant, $t(36) = 1.87$. Thus, although the younger children tended to recall more idea units than the older children and provide higher clarity ratings for recalled items, none of these differences was statistically significant.

DISCUSSION

This study tested the hypothesis that events will be suggestively planted in children's memory to the degree that the suggested event is plausible and script-relevant knowledge exists in memory. This hypothesis was confirmed with the finding that across all 39 children, the more plausible event was more likely to be planted in memory than the less plausible event. Further, when forced to identify the least likely of the four events to have actually occurred, children in both age groups were far more likely to select the implausible than the plausible false event. These findings extend the results of Pezdek et al. (1997) to children aged 5 to 7 and 9 to 12.

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.

Based on the interpretation of suggestibility offered by Pezdek et al. (1997), if a person is presented with a description of a specific instance of an event and asked to verify whether this happened to them, they would compare the instance as described with their memory for related instances of that event 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, if the described event is an implausible one, about which an individual is not likely to have either specific episodic memory nor generic script-relevant knowledge, then it is less likely to be verified as true than if the event is plausible. Accordingly, a description of a false event that is an episode of an implausible activity is less likely to be reported as true than a description of a false event that is an episode of a plausible 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 about another person's experience as true or false, uses their metaknowledge to reason that the other person would certainly have remembered the event if it was true; "if *that* had happened, they certainly would have remembered it!" Therefore, if an asserted event is implausible, and the other person cannot remember it, this allows the conclusion that the assertion must be false. In this study for example, if a child did not know what an enema is nor how one is administered, she is likely to make the lack of knowledge inference that it thus must not have ever happened to her or surely she would know something about it. The finding in this study that young children are differentially vulnerable to suggestively planted plausible versus implausible events, as are older children and adults (in the study by Pezdek et al., 1997), suggests that the "lack of knowledge inference" operates for young children as well as adults. This is especially interesting in light of the fact that

young children generally have less script-relevant knowledge in memory than do older children (Fivush et al., 1992).

According to the Pezdek et al. (1997) 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. The results of this study, however, suggest that there are significant differences between children's memories for true versus false events; recalled false events contained less information than recalled true events. This result is consistent with the results of Pezdek et al. who reported that recall for false events contained less information than recall for true events, and participants 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 average than were memories for recalled true events. On the other hand, Hyman and Pentland (1996) reported that ratings of image clarity were similar for false and true memories in their study. Thus, it appears that under some conditions it may be more difficult to differentiate between true and false memories.

The results of this study suggest developmental differences in the general vulnerability to suggestibility. First, whereas 3 out of the 19 younger children (16%) reported that they remembered both false events, none of the older children did so. Also, developmental comparisons can be made based on the probability of remembering the "lost in the mall" plausible false event scenario that has now been used in at least three different studies. Whereas 43.6% of the children in this study remembered the false event about being lost, 15% of the adults in the Pezdek et al. (1997) study and 25% of the adults in the Loftus and Pickrell (1995) study did so.

Nonetheless, the fact that children as well as adults are more likely to falsely remember plausible false events than implausible false events suggests that similar cognitive processes underlie suggestibility for children and adults. These results suggest that the locus of developmental differences in the suggestibility of memory does not reside at the level of memory processes or memory representations. Consequently, we propose that developmental differences in the suggestibility of memory are more likely based in children's heavier reliance on extramemorial social cues to verify suggested events. Consistent with the approach of Nelson (1993), because children's autobiographical

memory is essentially a social-interactive process, the social verification of a suggested event by a parent, for example, is proposed to play a more critical part in deciding whether a suggested event is true or false for children than for adults.

This study reports that false memories are not likely to be planted if they involve events that are relatively implausible. Because the findings of Loftus and Pickrell (1995) are frequently applied to cases involving children's 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 for a given child, the relative ease of suggestively planting false memories for childhood sexual abuse versus being lost in a mall while shopping should be related to the relative plausibility of these two events for the child. It should be easier to plant false memories of childhood sexual abuse with children for whom childhood sexual contact with an adult is more plausible than with children for whom childhood sexual contact with an adult is less plausible. In conclusion, one should be cautious to recognize that although it is possible to plant false memories in children, and it appears that false memories are more likely to be planted in children than in adults, all memories are not equally likely to be suggestively planted in memory. Children with various degrees of prior experience and prior knowledge will differ in their vulnerability to suggestibility for specific events.

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