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Abducted by a UFO: Prevalence Information Affects Young Children's False Memories for an Implausible Event

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SUMMARY

This study examined whether prevalence information promotes children's false memories for an implausible event. Forty-four 7–8 and forty-seven 11–12 year old children heard a true narrative about their first school day and a false narrative about either an implausible event (abducted by a UFO) or a plausible event (almost choking on a candy). Moreover, half of the children in each condition received prevalence information in the form of a false newspaper article while listening to the narratives. Across two interviews, children were asked to report everything they remembered about the events. In both age groups, plausible and implausible events were equally likely to give rise to false memories. Prevalence information increased the number of false memories in 7–8 year olds, but not in 11–12 year olds at Interview 1. Our findings demonstrate that young children can easily develop false memories of a highly implausible event. Copyright © 2008 John Wiley & Sons, Ltd.

Both recent studies (e.g. Pezdek & Hodge, 1999; Strange, Sutherland, & Garry, 2006) and legal cases have demonstrated that children can develop memories of events that never happened, so-called false memories (Loftus, 2004). A well-known legal case is the 'McMartin Preschool' trial in which several teachers were accused of ritually abusing hundreds of children across a 10-year period (Garven, Wood, & Malpass, 2000; Garven, Wood, Malpass, & Shaw, 1998; Schreiber et al., 2006). Some of the children recalled extremely bizarre, implausible events such as flying in helicopters to an isolated farm and watching horses being beaten with baseball bats. The charges against the teachers, however, were eventually dropped; videotapes of the investigative interviews indicated that the children were suggestively interrogated and many experts concluded that the children's memories were almost certainly false. Controversial cases like the McMartin trial have inspired researchers to investigate how children develop false memories of implausible experiences (Pezdek & Hodge, 1999; Strange et al., 2006), yet the precise antecedents of implausible false memories are still ill-understood. The question we ask here is whether prevalence information—that is, details about the frequency of a false event—is a potential determinant of children's implausible false memories.

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What do we know about the role of prevalence information in the development of false memories? Mazzoni, Loftus, and Kirsch (2001) describe a three-step process that explains how false memories are formed. According to this model, three conditions must be satisfied to create false memories. First, an event has to be considered plausible. Second, the event has to be evaluated as something that genuinely happened. Finally, images and thoughts about the event have to be mistaken as memory details. Consider, now, just the first stage of Mazzoni et al.'s model (*event plausibility*) and how prevalence information might affect perceived plausibility. Recent experiments have shown that prevalence information enhances the perceived plausibility of implausible events (Hart & Schooler, 2006; Mazzoni et al., 2001; Pezdek, Blandon-Gitlin, Hart, & Schooler, 2006; Scoboria, Mazzoni, Kirsch, & Jimenez, 2006). Mazzoni et al. (2001) asked undergraduates to read false newspaper articles describing demonic possession. The articles implied, among other things (i.e. a description of what happens in a typical possession experience), that possessions were more common than people previously thought and after reading the articles participants were more likely to believe they had witnessed a demonic possession in the past. Other studies investigating the role of prevalence information in eliciting false beliefs have produced similar striking effects (Hart & Schooler, 2006; Mazzoni et al., 2001; Pezdek et al., 2006; Scoboria et al., 2006).

What we do not know, however, is whether prevalence information influences the development of false memories (*stage 3* of Mazzoni et al.'s model) and not just false beliefs per se. This is an important issue in the false memory literature because several authors have argued that memories and beliefs, although related, are definitely not the same (Scoboria, Mazzoni, Kirsch, & Relyea, 2004; Smeets, Merckelbach, Horselenberg, & Jelicic, 2005). Moreover, the effect of prevalence information has only ever been tested on adults' beliefs. To date, no study has examined whether prevalence information affects the generation of children's false memories.

What do we know about event plausibility in the development of children's false memories? In short, research has produced interesting but varied results. Early studies showed that children were more likely to create false memories of plausible than implausible events (Pezdek & Hodge, 1999; Pezdek, Finger, & Hodge, 1997), and researchers suggested that it may be difficult to implant false memories of an implausible event (i.e. receiving a rectal enema). In contrast, one recent study shows that children will falsely recall both plausible and implausible events to a similar extent (Strange et al., 2006). Three different explanations might account for these mixed findings. First, Strange et al. presented children with a doctored photograph of the false event whereas Pezdek and colleagues used false descriptions. Doctored photographs might be considered an extreme form of evidence -one that is very difficult for children to refute. It is probable, then, that the doctored photographs skewed the children's plausibility judgments which in turn caused them to develop false memories for the plausible and implausible event at a similar rate. Second, Strange et al. compared false events that were either plausible or implausible whereas Pezdek and colleagues (1997, 1999) contrasted false events that differed in terms of script knowledge (i.e. description of what typically occurs in an event). Specifically, they compared a high script knowledge event (i.e. lost in a shopping mall) with a low script knowledge event (i.e. receiving a rectal enema). However, the exact relation between script knowledge and plausibility is not clear (Scoboria et al., 2004). Third, the two false events used in Strange et al.'s and Pezdek et al.'s studies differed with respect to valence. Strange et al.'s events were *positive* (i.e. taking a hot air balloon ride and drinking a cup of tea with Prince Charles), whereas Pezdek and colleagues implanted false *negative* events in

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children's memory (i.e. lost in a shopping mall and receiving a rectal enema). Studies have shown that valence affects the development of children's false memories (Ceci, Loftus, Leichtman, & Bruck, 1994; Howe, 2007). Since plausibility, valence and script knowledge seem to play a role in the development of false memories, the false events used in the current study were matched on these factors.

To examine whether prevalence information can lead children to develop full-blown false memories of plausible and implausible events, and to examine developmental differences in the development of false memories, we adapted the false narrative procedure (e.g. Garry & Wade, 2005; Loftus & Pickrell, 1995; Pezdek & Hodge, 1999; Pezdek et al., 1997), and exposed some 7–8 year old children and some 11–12 year old children to one true description and one false description of past experiences. Previous studies have shown that these age groups differ developmentally with respect to suggestibility and false memory formation (e.g. Ceci, Ross, & Toglia, 1987). The true description described the child's first day at school. The false description was either plausible and described *almost choking on a candy,* or implausible and described being *abducted by a UFO*. Half of the children in each group also received prevalence information in the form of a newspaper article. The article suggested that the target false event was much more common than the children probably thought.

Our predictions were straightforward: based on the prevalence literature with adults, we predicted that children who heard false prevalence information would be more likely to report false memories than children without false prevalence information. With respect to the role of event plausibility, two predictions can be formulated. Based on studies by Pezdek and colleagues (1997, 1999), we would predict that regardless of prevalence information, plausible events would elicit more false memories than implausible events. However, based on a recent study by Strange et al. (2006), we would expect that plausible and implausible events are equally likely to elicit false memories. Finally, because younger children are more suggestible than older children (for an overview see Bruck & Ceci, 1999), we expected that younger children would be more likely to develop false memories than older children.

METHOD

Participants

The study involved 91 primary school children (48 girls) from two different age groups ($n = 44$, 7–8 year olds, $M = 7.68$ years, $SD = 0.52$; $n = 47$, 11–12 year olds, $M = 11.64$ years, $SD = 0.53$). Children participated after parents and teachers had given informed consent. All children received a small gift in return for their participation. The study was approved by the standing ethical committee of the Faculty of Psychology, Maastricht University.

Materials

True narratives

True narratives described children's first day at school. This event was chosen because it was a unique event that had happened to all children at age 4. Children's parents were contacted by telephone to obtain the following personal details about each child's first school day: the family members or friends who escorted the child to school, and the teacher's and school's name. These details were incorporated in the true narratives.

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An example of a true narrative was:

> Your mother told me that when you were 4 years old, you went for the first time to the elementary school. The name of the elementary school was Springer and it was located in Maastricht. The name of your teacher was Tom. Your mother took you to school.

False narratives

False events were selected from a pilot study. In that study, 49 children ($M = 8.02$ years, $SD = 1.20$, range 6–10[1]) rated the plausibility and valence of 29 events on child-friendly 7-point Smiley scales (anchors: ☺ = *implausible/negative*, ☺ = *plausible/positive*) with bigger smiley faces referring to more plausible/more positive events. Specifically, children had to indicate how likely the events were to happen to them (e.g. 'How likely is it that you almost choke on a candy'?; i.e. personal plausibility; Scoboria et al., 2004) and how pleasant the events were for them (e.g., 'How pleasant is it that you almost choke on a candy'?). To ensure that they understood the events, all children rated two practice items. Furthermore, 19 children ($M = 8.74$ years, $SD = 1.05$, range 7–10) were instructed to report everything they knew about each event and the total number of idea units served as our measure of children's script-knowledge about the events (Scoboria et al., 2004). Based on their ratings, we selected two events, *almost choked on a candy* and *abducted by a UFO*. These events were equal in terms of valence ($M_{\text{choking}} = 1.65$, $SD_{\text{choking}} = 1.48$, $M_{\text{UFO}} = 1.94$, $SD_{\text{UFO}} = 1.98$, $t(47) < 1$, n.s.) and script knowledge ($M_{\text{choking}} = 1.11$, $SD_{\text{choking}} = 0.99$, $M_{\text{UFO}} = 0.74$, $SD_{\text{UFO}} = 1.05$, $t(18) = 1.20$, n.s.), but differed in terms of plausibility with mean plausibility ratings being higher for the choking event ($M = 5.86$, $SD = 2.02$) than for the UFO event ($M = 1.63$, $SD = 1.75$, $t(47) = 10.07$, $p < .001$). Age did not correlate with plausibility, valence and script knowledge for the two events ($ps > .05$). Children's parents confirmed that their child had never experienced the false events.

The false narratives were:

> *Almost choked on a candy:* Your mother told me that you were at a birthday party when you were 4 years old. At this party you received a bag of candies. When you were at home again, you were allowed to have one candy. Your mother saw that you turned blue and she panicked. Then she hit you on the back and the candy came out.

> *Abducted by a UFO:* Your mother told me that when you were 4 years old, you were abducted by a UFO. This happened when you were alone outside. You mother was inside the house. Then she suddenly saw through the window that a UFO took you.

False newspaper articles

For the true and false events a newspaper article was fabricated describing that the event took place quite frequently when participants were age 4. These false newspaper articles were similar in appearance to a local newspaper. Moreover, to personalize the newspaper articles, we included the children's hometown in the articles. The newspaper articles were

[1]Because the age range of our pilot sample did not completely overlap with the age groups of our study, we conducted a 2 (pilot group: younger *vs*. older children) × 2 (event: UFO *vs*. choking) ANOVA with the latter factor being a within subject factor to examine the effect of age on plausibility judgments. No significant interaction emerged ($p > .05$) indicating that age did not have an impact on the plausibility ratings of our two events. Therefore, the plausibility ratings of our pilot sample can be extended to the older group of our study.

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identical in terms of lay-out, size and colour and were roughly matched for word count and level of detail. Depending on the event described, the articles contained a photograph of an elementary school, candies or a UFO (Figure 1).

Design and procedure

The design was a 2 (Age: younger children *vs*. older children) × 2 (Event type: plausible *vs*. implausible) × 2 (Prevalence information: yes *vs*. no) between-subjects design. Children

DAGBLAD DE LIMBURGER

UFO seen in Maastricht

November 23rd 1999

Photo of UFO taken in the vicinity of Maastricht

November 23rd 1999
Last Monday, a UFO was again spotted in Maastricht. Lately, it happens quite frequently that UFO's are being seen in the vicinity of Maastricht. Even photographs of the UFO's have been taken (see photo on the left). Moreover, a lot of people claim to have been abducted by the UFO's. The local mayor warns that more persons can become victims of these abductions.

Sentence Olaf H. irreversible
The Hague/Sittard- the sentence against Olaf H. is irreversible. The Supreme Court dismissed an appeal from the lawyers of Olaf H. Olaf H. is sentenced for life for the death of this wife.

Actor Philippe Noiret deceased
Paris- the French actor Philippe passed away yesterday after being ill for a long time. The actor was 76 years old.

More money for peacekeeping force

The Hague- the government decided to give more money to the peacekeeping force in Irak and Afganistan. A spokesman of the government made an announcement

More women in parliament

The Hague- There are more women in the parliament after the last elections. This was first 39 percent, but this has increased to 45 percent. Also, the representation of women and men from ethnic minorities has increased from 7 to 11 percent. Equality, the center of knowledge, notified that yesterday. At the last council elections, there was a decreasing trend, according to Equality.

This trend did not continue at the national elections. The results of the preferential votes have not been processed yet. The electoral council will give the official outcome on November 27th. Perhaps then the differences could come out smaller.

It is certain that the diversity is becoming larger in the parliament. The center of knowledge, Equality, does not know if this trend will continue each year. "It could go either way".

Figure 1. Example of a false newspaper article about UFO abduction (English translation)

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were randomly assigned to the plausible or implausible event and to the prevalence or no prevalence information condition. Each child was interviewed individually twice over seven days. All interviews were audio taped and transcribed. During the interviews, one true narrative and one false narrative were read aloud, with the latter always being presented in the second position. The procedure of the interviews was similar to that used by Wade, Garry, Read, and Lindsay (2002). At the start of Interview 1, children were told that we were interested in their memories for events that had happened when they were 4 years old. Children were instructed to report everything they remembered about the events. In the prevalence information condition, they were told that to help them remember the events they would be provided with a newspaper article. Subsequently, the interviewer read out the article to the child. Children who did not describe details of the target event were told that 'many people can't recall certain events because they haven't thought about them for such a long time. Please concentrate and try again'. If they still did not recall any details, the interviewer made use of context reinstatement and guided imagery. The purpose of these retrieval techniques was to take the children mentally back to the scene of the event. Specifically, children were told to close their eyes and they were asked to think about their feelings, who was with them, and about the time of the year. After this, children were asked again to recall any details about the event. If they still did not come up with details, the next narrative was presented or the interview was stopped. At the end of Interview 1, children were asked to think about the events every day until the next interview and they were instructed not to talk with others about the events. Parents were asked not to discuss these events with their children. Interview 2 was similar to Interview 1. At the end of Interview 2, they were debriefed using ethical guidelines for false memory research with children (Goodman, Quas, & Redlich, 1998).

RESULTS AND DISCUSSION

An extensive number of children were extremely surprised during the debriefing when they were told that the false event did not happen to them. For example, one 8-year old child responded 'It really did happen' where another one said 'I really can remember seeing the UFO'. After the debriefing, 39% ($n = 13$) of the children remained absolutely confident that they experienced the false events. We debriefed these children until they understood the events were false. Together, these findings suggest that the false memories in this study were not the result of children falsely assenting or trying to please the interviewer.

True events

True memories were categorized as either *remembered* or *not remembered*. To be categorized as remembered, children had to report at least two of the three personal details correctly. Children's true recall was near ceiling. They remembered 88 (97%) events at Interview 1 and 89 (98%) events during Interview 2, $\chi^2(1) = .07$, n.s.

False events

For the false events, two independent judges classified each memory report as no false memory, images but not memories or false memory according to criteria used by Lindsay, Hagen, Read, Wade, and Garry (2004). If a child attempted to recall the false event, but did

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not have any memory of the event or did not report any details that were beyond the false description, the report was categorized as no false memory. A report was judged as an image when children speculated about details and described images related to the false events. For example, one child reported: 'I think I almost choked on a candy on the birthday of Mauk. I am not sure. It was not a pleasant feeling'. To be classified as a false memory, children had to indicate that they remembered the event and provide details beyond those mentioned in the narrative, but related to the narrative. To give an example of a detail, one child stated that he remembered being taken to the UFO through a blue beam of light. If children stated that they thought the event and/or certain details could have happened, then this was not scored as a false memory. Furthermore, to minimize the effect of demand characteristics, direct responses to interviewer prompts were not classified as a false memory. The following dialogue from Interview 2 illustrates a child's false memory of the UFO abduction.

Child: 'I saw cameras and flashes and some people in the UFO'.
Interviewer: 'How many people did you see'?
Child: 'Approximately nine or ten'.
Interviewer: 'What kind of people'?
Child: 'People like me, children'.
Interviewer: 'What else did you see'?
Child: 'I saw some people and also some blue/green puppets were passing'.

Inter-rater agreement for classification of the memory reports was high; $\kappa = 0.92$ for Interview 1 and $\kappa = 0.94$ for Interview 2.

Collapsing across the conditions, at Interview 1, 33% ($n = 30$) of the children developed a false memory. Thirty per cent ($n = 9$) of these children assented to the false events immediately, that is prior to guided imagery and context reinstatement. Thirty-six per cent of the children ($n = 33$), with 67% ($n = 20$) immediately assenting, 'remembered' the false events at Interview 2, $\chi^2(1) = 26.61$, $p < .001$, *Cramer's* $V = 0.54$. Some of the children who rejected the false events at Interview 2 indicated, despite the explicit instruction at Interview 1, that they had discussed the false events with their parents. The increase in false memories over time is in line with previous studies with adults and children (e.g. Lindsay et al., 2004; Strange et al., 2006; Wade et al., 2002). Furthermore, 10% ($n = 9$) of the children were classified as having an image of the false events at Interview 1. At Interview 2, this percentage decreased to 7% ($n = 6$), $\chi^2(1) = 58.53$, $p < .001$, *Cramer's* $V = 0.80$.

Recall that the primary question in this study was whether prevalence information boosts the likelihood of plausible and implausible false memories. Table 1 shows the percentage and number of children who reported false memories as a function of interview and condition. To examine the role of age, event type, and prevalence information in the development of false memories, we conducted a logistic regression analysis with the dependent variable being false memory (0 = no false memory/images, 1 = false memory). In this analysis, we only focused on 'genuine' false memories and did not collapse across false memories and images. Although non-parametric methods, such as logistic regression, often lack the statistical power to detect interactions (Sawilowsky, 1990), there are four important points to note about these data. First, the only significant interaction found was an Age × Prevalence information interaction at Interview 1. Prevalence information enhanced the development of 7–8 year old children's false memories but not 11–12 year old children's false memories, and this effect occurred at Interview 1 ($B = 2.16$, $SE = 0.96$,

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Table 1. Percentage and number (between parentheses) of children who developed false memories at Interview 1 and 2

		Interview 1		Interview 2	
		UFO	Almost choked	UFO	Almost choked
7–8 year olds	Prevalence	78 (9)	45 (5)	67 (6)	46 (4)
	No prevalence	21 (3)	40 (4)	36 (5)	60 (6)
11–12 year olds	Prevalence	8 (1)	23 (7)	8 (1)	46 (6)
	No prevalence	18 (2)	45 (3)	9 (1)	36 (4)

Wald = 5.05, Exp(*B*) = 8.68, $p < .05$), but not at Interview 2 ($B = -2.05$, $SE = 0.93$, *Wald* = 0.05, Exp(*B*) = 0.82, n.s.). Indeed, 7–8 year old children who received prevalence information were approximately two times more likely to report false memories at Interview 1 than their 7–8 year old counterparts who did not receive prevalence information ($B = 1.29$, $SE = 0.64$, *Wald* = 4.08, Exp(*B*) = 3.64, $p < .05$; see Figure 2). These findings fit with previous research showing that prevalence information increases the plausibility of events (Hart & Schooler, 2006; Mazzoni et al., 2001; Pezdek et al., 2006; Scoboria et al., 2006). But they also extend these findings by showing that prevalence information can increase the likelihood of young children's false memories. However, the older children who received prevalence information were equally likely to report false memories as their control counterparts at Interview 1 ($B = -0.90$, $SE = 0.71$, *Wald* = 4.08, Exp(*B*) = 0.41, n.s.).

A counterexplanation for the effect of prevalence information in the younger age group is that, although children's responses to the debriefing suggest that they developed full-blown false memories, they might have complied with the researcher. Since younger children are more compliant than older children (Gudjonsson, 1989, 1992; Richardson & Kelly, 2004), the younger group could have been more willing to please the interviewer when confronted with prevalence information. Moreover, in our study, children received prevalence information combined with the suggestion that their mother/father told us that the false event had happened. Future studies should examine the effect of prevalence information *alone* upon false memory formation.

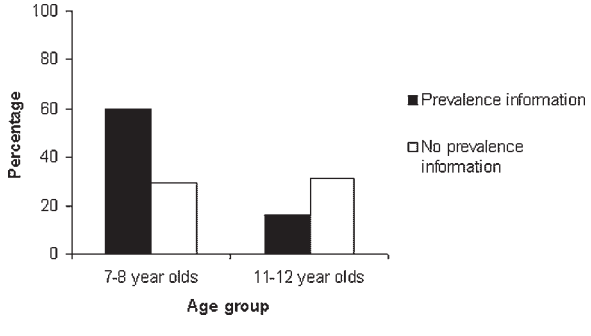

Figure 2. Percentage of false memories in the prevalence information condition and in the no prevalence information condition at Interview 1

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Second, prevalence information did not have an effect on younger children's false memories at Interview 2. The decrease of false memories of the younger children who received prevalence information might account for this finding. Eight children (27%) who reported a false memory at Interview 1 rejected these events at Interview 2. Moreover, two of these children were in the 7–8-year old prevalence information condition. Furthermore, the percentage of false memories of the younger children who did not receive prevalence information increased at Interview 2. This increase is in accordance with previous research (e.g. Lindsay et al., 2004; Strange et al., 2004; Wade et al., 2002).

Third, the plausibility of the false event did not affect the development of false memories. That is, both younger and older children were equally likely to report false memories of choking on a candy and being abducted by a UFO (Interview 1: $B = 0.43$, $SE = 0.48$, $Wald = 0.81$, $\text{Exp}(B) = 1.54$, n.s.; Interview 2: $B = 0.78$, $SE = 0.46$, $Wald = 2.82$, $\text{Exp}(B) = 2.17$, n.s.). These findings fit with recent research that shows that children will falsely remember pseudo-events regardless of whether they are everyday events or bizarre events (Strange et al., 2006).

Fourth, the younger children were more likely to report false memories than the older children at Interview 2 ($B = 1.05$, $SE = 0.46$, $Wald = 5.16$, $\text{Exp}(B) = 2.87$, $p < .05$). This finding concurs with other studies on developmental differences in false memory formation. Younger children are more prone to suggestive techniques than older children, presumably because they do not have the source-monitoring capabilities to discriminate between experienced and imagined events (Lindsay, Johnson, & Kwon, 1991; for an overview see Roberts & Blades, 2000).

CONCLUSION

This study examined the effect of prevalence information on implanting plausible and implausible false memories in 7–8 and 11–12 year old children. Our central finding is that combining false descriptions with prevalence information increased the rate of false memory reports in younger children during an initial interview. Prevalence information made younger children more likely to report memories of a fictitious plausible event (almost choking on a candy) and a fictitious implausible event (being abducted by a UFO). A substantial number of children (over 70%) falsely remembered that they were abducted by a UFO. Although previous studies have looked at the cognitive characteristics of individuals who report UFO abductions (Clancy, McNally, Schacter, Lenzenweger, & Pitman, 2002; McNally, Lasko, Clancy, Macklin, Pitman, & Orr, 2004), this is the first study that succeeded to *implant* false memories of UFO abductions. The implications of this finding for forensic and clinical contexts are clear. Although we do not want to claim that children's testimonies about bizarre and implausible events, like those in the 'McMartin Preschool' case, are always false, this study clearly shows that children easily develop false memories about a highly implausible event.

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