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The origin of children's implanted false memories: Memory traces or compliance?

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ABSTRACT

A longstanding question in false memory research is whether children's implanted false memories represent actual memory traces or merely result from compliance. The current study examined this question using a response latency based deception task. Forty-five 8-year-old children received narratives about a true (first day at school) and false event (hot air balloon ride). Across two interviews, 58/32% of the participants developed a partial/full false memory. Interestingly, these children also showed higher false recall on an unrelated DRM paradigm compared to children without a false memory. The crucial finding, however, was that the results of the deception task revealed that children with partial and full false memories were faster to confirm than to deny statements relating to the false event. This indicates that children's implanted false memories reflect actual memory traces, and are unlikely to be explained by mere compliance.

Scientific interest in the fallibility of children's memory has accumulated as the result of high profile cases of child sexual abuse. In a number of these cases, suggestive interviewing likely caused these children to falsely remember that they were sexually abused (e.g., Garven, Wood, Malpass, & Shaw, 1998). A longstanding question in false memory literature is whether actual memory traces underlie such false memories, or whether they can be explained by social influences, such as compliance (e.g., Bruck & Ceci, 1999). Our study was designed to investigate this issue by using a deception task.

Several paradigms have been developed to elicit false memories in both children and adults. One of the most well-known is the Deese/Roediger–McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995). In this paradigm, a false memory is present when studying semantically-related words (e.g., *alive, coffin, corpse, grave, black*) causes participants to falsely remember a thematically associated, but unpresented word (also called critical lure; i.e., *dead*). Myriad studies (see Brainerd, Reyna, & Ceci, 2008) show that this spontaneous memory illusion is predominantly caused by endogenous processes (i.e., spreading activation through semantic memory networks; monitoring processes). As such, this spreading activation account suggests that false memories elicited in the DRM paradigm are mainly driven by memory traces.

The same, however, cannot be said for false memories that are induced by suggestion. In the misinformation paradigm, for example, participants receive suggestive information about an experienced event and some participants incorporate the suggestive information into their memory reports, developing false memories of details (e.g., e.g., Bruck, Ceci, & Hembrooke, 2002; Loftus, 2005; Sutherland & Hayne, 2001). Such false memories are affected by both endogenous and exogenous (e.g., social influences) processes. Indeed, Brainerd et al. (2008, p. 346) specifically stated that "there is a longstanding question as to whether the false memory responses in misinformation designs are due to actual memory distortion or to nonmemorial factors, especially susceptibility to social influence." There are studies indicating that in both children and adults, false memories of details induced by the misinformation paradigm are likely sustained by memory traces (see e.g., Loftus, 2005; Loftus, Donders, Hoffman, & Schooler, 1989; Sutherland & Hayne, 2001). This is corroborated by studies that have looked at behavioral consequences of adults' false beliefs and memories (Geraerts et al., 2008; Scoboria, Mazzoni, & Jarry, 2008). In general, these studies show that falsely suggesting that participants experienced a food-related aversive event (e.g., getting sick from egg salad) affects attitudes (e.g., disliking the egg salad), but also behavior (e.g., eating less egg salad). Furthermore, studies even show that providing warnings to people about the possible occurrence of misinformation does not make them immune for the misinformation effect (e.g., Eakin, Schreiber, & Sergent-Marshall, 2003). Together, studies on misinformation suggest that children's and adults' false memories reflect

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[1] We are aware that using the term "false memories" already implies that this phenomenon reflects memory traces. However, to be consistent with the terminology used in the false memory literature, we decided to use the term "false memories" instead of terms as "false recall", "commission errors", etc.

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memory impairment in part and cannot solely be accounted for in terms of compliance (Loftus, 2005).

In the misinformation paradigm described above, false memories for details of already existing memories are elicited. In such cases as child sexual abuse, false memory for entire events is of even more interest. This type of false memory is typically studied using the implantation paradigm. In a typical implantation paradigm, participants receive narratives about supposedly experienced events (see Loftus & Pickrell, 1995; Otgaar, Candel, Merckelbach, & Wade, 2009; Otgaar, Candel, Scoboria, & Merckelbach, 2010b). Unbeknownst to the participants is that one of the narratives describes a fictitious event. After multiple suggestive interviewing occasions, participants are asked what they can still remember about the events. This suggestive manipulation causes a non-trivial percentage (30–40%) of participants to partially and fully falsely remember entire, rich, complex events (Wade, Garry, Read, & Lindsay, 2002).

To what extent actual memory traces underlie false memories elicited by the implantation paradigm has often been debated (e.g., Bruck & Ceci, 1999; Goodman, Quas, & Redlich, 1998). As has been mentioned earlier, there are clear differences between how false memories are being elicited by the misinformation or implantation paradigm. First of all, in the implantation paradigm, false memories for entire rich complex events are induced while in the misinformation paradigm, false memories for details are elicited. Second, in the implantation paradigm, participants receive suggestive information immediately whereas in the misinformation paradigm, participants first witness an event or are exposed to stimuli (e.g., video) before being presented with suggestion (see Loftus, 2005 for a detailed explanation of the differences between these paradigms). So, while in the misinformation paradigm, suggestion is presented about existing memories, the implantation paradigm concentrates on implanting an entire memory that did not happen. Furthermore, the implantation paradigm has been less often used than the misinformation paradigm (Pezdek & Lam, 2007). Taking these differences into account, empirical studies on the possible mechanisms behind children's implanted false memories are still in their infancy.

Investigating the mechanisms underlying children's implanted false memories is especially relevant, as especially children are vulnerable for social influences (Ceci & Bruck, 1993). Children's suggestion-induced false memories may therefore reflect social influences rather than actual memories. Research into this domain is also highly theoretically significant. For example, such research would give rise to crucial insight into specific cognitive functions (e.g., executive functioning) that are involved in children's implanted false memories. That is, examining the potential causes of children's implanted false memories could elucidate the factors implicated in children's susceptibility to source misattributions, yet could also illuminate the social elements involved in developing false memories.

There is evidence suggesting that *compliance* is the mechanism that drives children to acknowledge having experienced the implanted event. It is well-known, for instance, that children are more likely to show demand characteristics and please interviewers (or parents, therapists) compared to adults (e.g., Ceci & Friedman, 2000; Ceci & Huffman, 1997). Also, although some participants in false memory implantation studies are surprised that the false event was not experienced by them when they were debriefed, other participants claim that they knew that the event was fictitious and that they succumbed to the social pressure during the interview (e.g., Otgaar, Candel, & Merckelbach, 2008, Otgaar et al., 2009). Another reason to believe that children's implanted false memories are caused by compliance is that implanted false memories fade more rapidly over time than true memories (Huffman, Crossman, & Ceci, 1997). Huffman et al. (1997) examined the durability of children's implanted false memories and true memories after two years. Specifically, 3- to 6-year-old children that were involved in a false memory implantation experiment two years earlier were interviewed again about their memories. The authors found that while children remained highly accurate in their reports of the true events, they retracted their earlier false consents 77% of the time. A possible explanation for this finding could be that during the earlier interviews, some children knew that they did not experience the event but reported otherwise because they believed that was expected of them by the interviewer (but see London, Bruck, & Melnyk, 2009).

Are there any indications to suspect that children's implanted false memories are based on actual *memory traces*? One line of evidence for this comes from research showing that implanted false memories do not differ from true memories in terms of Criteria-Based Content Analysis (Blandon-Gitlin, Pezdek, Lindsay, & Hagen, 2009) or Reality Monitoring criteria (Otgaar, Candel, Memon, & Almerigogna, 2010a). These studies indicate that implanted false memories have similar phenomenological characteristics as true memories, suggesting that they are experienced as genuine memories. Furthermore, participants who take part in an implantation paradigm are extensively debriefed that the false event could not have happened to them. Interestingly, some studies show that some participants (both adults and children) display great surprise after the debriefing session, and maintain that they truly experienced the false event (Ceci & Huffman, 1997; Otgaar et al., 2009; Wade et al., 2002). For example, in a study by Otgaar et al. (2009), 39% ($n = 13$) of the 7/8- and 11/12-year-old children who developed false memories were absolutely confident after the debriefing that the false event occurred to them. Taken together, there are reasons to assume that children's implanted false memories are of a similar nature as memory traces of actual events.

The main purpose of the present study was to examine the possible mechanisms (memory vs. compliance) underlying 8- to 10-year-old children's implanted false memories by using a validated deception task (Spence et al., 2001; Verschuere, Spruyt, Meijer, & Otgaar, 2011). This age group has often been used in false memory research and is under certain conditions highly susceptible to suggestion (e.g., Otgaar et al., 2009; Strange, Sutherland, & Garry, 2006). In the original task, participants are presented with statements (e.g., Drunk coffee?) on a computer screen. These statements refer to specific acts that participants indicated to have or have not performed during the day. Their instruction is to answer the statements as fast as possible with a *yes* or *no* response button. *Yes* and *no* reminder labels appear on the screen and remain present throughout the task, but vary in color. When the *yes* and *no* labels appear in one color (e.g., yellow), participants are instructed to answer truthfully, whereas they have to lie when the labels are in another color (e.g., blue). Lying results in increased response latencies and higher error rate relative to truth telling (Spence et al., 2001; Verschuere, Spruyt, et al., 2011). We adapted this task so that it could be employed in a false memory implantation paradigm. Two sets of statements were used in the deception task: Validation statements concerning school-related details (i.e., school-related event; e.g., "I am in the third grade") and statements concerning the implanted false event (i.e., hot air balloon ride; e.g., "I have been on a hot air balloon ride"). Dependent on the color of the *yes* and *no* labels, participants had to respond truthfully or deceitfully (e.g., yellow means truth, blue means lying). So, for example, for a child with a false memory instructed to lie for blue labels, the required response to the statement "I have been on a hot air balloon ride" that is accompanied with yes and no response labels, is no.[2]

The rationale behind this task is the following. If children's implanted false memories are based on memory traces, denying that the event took place constitutes a lie. These trials should then show increased response times and error rates compared to trials where they have to acknowledge the event took place. However, if implanted false memories are based upon mere compliance (i.e., they never believed the event took place, but merely said so to please

[2] In the deception literature, lying refers to an intentional act to withhold the truth (Vrij, 2008). Children who develop a false memory, however, do not intentionally report to have experienced a false event. Still, to keep our terminology consistent with the original task as described by Spence et al. (2001), we use the term "lying" in the current manuscript to refer to responses that are not in accordance with reality.