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Dealing with False Memories in Children and Adults:

Recommendations for the Legal Arena

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**Abstract**

Children are often viewed as poor eyewitnesses. Fact-finders, lawyers, and researchers assume that children are exceptionally prone to accept external suggestive (leading) questions and to create false memories. Is this assumption justified? This review will show it is not. First, studies on spontaneous false memories—elicited without any suggestive pressure—reveal that children are less likely than adults to produce them. Second, under certain circumstances, children are even less prone to accept external suggestions than adults. This counterintuitive finding happens when false suggestions contain information that is associatively related but in actuality not experienced by children or adults. Using empirically-based interview protocols can maximize the retrieval of accurate memories in children and adults. Furthermore, expert witnesses should use alternative scenarios in order to better evaluate whether statements by children or adults are based on truth or fiction.

Keywords: False Memory; Development; Developmental Reversal; Expert Witness.

**Tweet**

Children are not poor eyewitnesses; they sometimes outclass adults in being less prone to external suggestion.

**Highlights**

- Children are often viewed as inferior witnesses
- Research shows that children are less prone to create spontaneous false memories than adults
- Children sometimes are even less vulnerable to include false suggestions in their testimonies than adults
- Children can provide highly accurate statements when they experience something traumatic

Dealing with False Memories in Children and Adults:  
Recommendations for the Legal Arena

Ask a random legal professional whether children are highly suggestible and prone to create memories for non-experienced events (false memories) and, in many cases, an affirmative answer will be given. The idea that children are inferior witnesses is so entrenched in the legal system that it almost seems to have become common sense. In fact, this commonsense is wrong. The current article shows that children can provide highly accurate statements and are sometimes even less suggestible—less prone to produce false memory—than adults.

For obvious reasons, children's testimonies play a crucial role in legal proceedings. This is especially true when such testimonies are the only piece of evidence that triers of fact can use for legal decision making (for a recent review, see Howe, Knott, & Conway, 2018). Legal professionals must understand whether the content of the testimonies accurately reflects what happened at the presumed crime scene. Furthermore, cases of child sexual abuse oftentimes entail statements available only from the alleged victim and the suspect (Brainerd, Reyna, & Ceci, 2008). In such cases, knowing whose story (alleged victim versus suspect) is the correct one is a chief aim of many legal professionals.

For another, more indirect reason, children's statements are important in court. The prevalence of child maltreatment, such as child sexual abuse, around the world has been estimated to be around 11.8% (Stoltenborgh, van IJzendoorn, Euser, & Bakermans-Kranenburg, 2011). Many of these sexually abused children will talk about their experiences to their family, friends, therapists, or the police. During such dialogues, children may be exposed to suggestive (leading) questions. The problem here is how likely are vulnerable children to come to accept suggestion and include it in their subsequent memory reports. Before explaining false memory

development in children and adults, we will first discuss various methods that elicit false memories in children and adults.

### **The Formation of False Memory**

Memory researchers started to devise experimental methods to study false memories because of – among other things – a number of legal cases in which children and adults appeared to have created faulty recollections of abuse (for a recent review of these methods, see Otgaar, Houben, & Howe, 2019). Daycare abuse cases played a significant role in research on how children would react when exposed to suggestive interviewing questions. Daycare abuse cases oftentimes involve many children allegedly abused by the same person(s). A noteworthy example of such a case is the McMartin Preschool case (Garven, Wood, Malpass, & Shaw, 1998). Here, seven teachers were accused of abusing hundreds of children over a 10-year period. None of the teachers were convicted because interviews with the children showed that they were questioned in a highly suggestive fashion, tainting their subsequent memory and hence testimony.

Cases in which adults started to remember having been abused after going to suggestive therapeutic sessions were at the foreground of the so-called “memory wars” (as named by Crews, 1995). The memory wars during the 1990s concerned the debate between scientists and therapists on whether memories could be repressed and later recovered in a safe, therapeutic environment. Researchers argued that such recovered memories were actually false memories produced during therapeutic sessions (Loftus, 1993). Daycare abuse and recovered memories cases fueled the need for research on the parameters involved in eliciting false memories. Here, we focus on false memory methods that been used in children *and* adults. Thus, these paradigms are informative on developmental trends in false memory production.

**Spontaneous false memories.** Spontaneous false memories arise without any external (e.g., suggestive) influence. Such false memories result from memory mechanisms such as spreading activation. One of the best-known procedures to evoke spontaneous false memories—the Deese/Roediger-McDermott (DRM; Deese, 1959; Roediger & McDermott, 1995) paradigm—entails lists of associatively-related words (e.g., *bed, dream, night, pillow*). The words in these lists converge to a non-presented word called the critical lure (i.e., *sleep*). Memory tests (recall and recognition) show that participants oftentimes erroneously remember the critical lure with high confidence (Gallo, 2011; Roediger & McDermott, 1995).

Although much of the work on spontaneous false memories uses DRM word lists, other variants induce spontaneous false memories. For example, 7- and 10-year-old children falsely remembered not-presented but related sentences among presented sentences (e.g., Paris & Carter, 1973). Furthermore, inserting words from DRM lists in stories thereby made the semantic structure of the presented materials even more obvious (e.g., Howe & Wilkinson, 2011).

Visual variants of the DRM paradigm also been constructed to study the production of false memories. For example, picture DRM lists can elicit false memories in adults (Koustaal & Schacter, 1997). Also, recently, visual scenes (e.g., of a beach) and videos (e.g., of a fight) have revealed the formation of spontaneous false memories. These scenes presented certain typical details to participants (e.g., sea, sand) but also left out several related details (i.e., bath towel, beach ball). Many participants spontaneously remember having seen these related but not presented details (e.g., Moritz, Woodward, Rodriguez-Raecke, 2006; Otgaar, Howe, Peters, & Moritz, 2014; Otgaar, Howe, Peters, Sauerland, & Raymaekers, 2013). To summarize, several methods examine the formation of spontaneous false memories ranging from simple word tasks to more realistic materials such as visual scenes and videos.



**Suggestion-induced false memories.** Several methods present external suggestive material to children and adults. One of the most studied methods is the *misinformation paradigm* (Loftus, 2005). In this paradigm, participants are presented with, for example, a video of a theft. Then, they receive a suggestion concerning the event (e.g., that the thief was stealing jewelry while in fact a watch was stolen). During a final memory test, a significant minority of participants include the suggested misinformation in their verbal account of what happened in the video.

The *false memory implantation paradigm* was developed to study whether false autobiographical memories could be implanted in children and adults. The procedure is as follows. Experimenters contact the parents of the participants asking them about several events that happened to their offspring during their childhood (e.g., trip to a theme park). Furthermore, the experimenters ask the parents to verify a false event that was not experienced by their children. Experimenters then invite participants to report everything they can remember about the experienced and non-experienced events. What these studies show is that a substantial proportion of the participants recall non-experienced events, which thus can be classified as false memories (Scoboria et al., 2017).

The first pioneering study using this false memory implantation paradigm (Loftus & Pickrell, 1995) showed that after several suggestive interviews, 25% of participants reported having experienced a suggested false event (i.e., being lost in a shopping mall). Since then, studies have been able to implant a wide range of events in children and adults, such receiving a rectal enema (Pezdek, Finger, & Hodge, 1997), going to the hospital (Hyman, Husband, & Billings, 1995), a UFO abduction (Otgaar, Candel, Merckelbach, & Wade, 2009), and a hot air balloon ride (Wade et al., 2002).

In the *memory conformity paradigm*, participants look at certain stimuli (e.g., video of a theft) in pairs on two computer screens. Participants assume that they are viewing the same stimuli, but in fact they are watching slightly different versions of the event (e.g., in one video, the culprit has a gun, but not in the other one). After this, participants have to discuss in pairs what they have seen. Because they were presented with different versions, participants are unintentionally influencing each other's recollections of the event. Following this, participants have to individually recall what they remember from the video. The standard finding is that during the final memory test, many participants recall details that were actually only witnessed by the other participant (Wright, Memon, Skagerberg, & Gabbert, 2009).

To recap, suggestion-induced false memories can be elicited using a host of different methods. Some procedures focus on the elicitation of false memories for details (misinformation and memory conformity), while other paradigms (memory implantation) concentrate on autobiographical false memories for entire events (see Otgaar et al., 2018, for an overview).

### **Associative Activation as a Mechanism Underlying False Memory Development**

Several theories concern the formation of false memories. Associative activation theory (AAT) uses the notion of spreading activation among associated content to explain the production of false memories (Howe, Wimmer, Gagnon, & Plumpton, 2009; Otgaar, Howe, Muris, & Merckelbach, in press; see also Anderson, 1983; Anderson & Pirolli, 1984; Collins & Loftus, 1975; Landauer & Dumais, 1997). AAT postulates that when experiencing an event (e.g., going to a specific restaurant), immediate activation spreads to related nodes in one's knowledge base (e.g., memories that you were badly served last time in that restaurant). The basic tenet of AAT is that this associative activation also leads to the activation of related, but not experienced,

concepts. The consequence is that these concepts might be falsely recollected as something that was seen or heard (i.e., false memory).

AAT provides specific predictions about the susceptibility to false memories in children and adults. Specifically, throughout development, people acquire more knowledge, and this causes relations between concepts to become more widespread and stronger. This means that when adults experience an event, associative activation runs in a rapid and almost automatic way. This is in contrast to children for whom associative activation occurs in a slower, more conscious, and effortful fashion. Therefore, AAT predicts that false memories should increase with age because when relations are stronger and associative activation runs automatically in one's knowledge base, incorrect relations are more likely to occur (Howe et al., 2009).

### **Development of Suggestibility and False Memory**

Among many scholars, children seem exceptionally prone to suggestive questions and to form false memories. For example, “previous suggestibility and misinformation studies [have indicated] that false memory declines with age” (McGuire, London, & Wright, 2015, p. 334). Indeed, a first glance at the literature seems to imply that suggestibility and false memory proneness is a particular problem for children. For instance, the misinformation effect was more likely to be detected in younger children than in older children and adults (Sutherland & Hayne, 2001). In other work (Otgaar et al., 2009), 7-8-year-olds were more susceptible to implanted false memories than 11-12-year-olds (see also Otgaar, Candel, Scoboria, & Merckelbach, 2010).

One explanation for younger children's increased likelihood to fall sway to suggestive questions and form false memories might be that younger children are more compliant toward authoritative figures than older children and adults (Bruck & Ceci, 1999; Ceci & Bruck, 1993). The implication of this is that younger children are more likely to please people who, for

example, falsely suggest that something happened to them. Furthermore, younger children also have more difficulties with monitoring the sources of their memories than older children and adults (Lindsay, Johnson, & Kwon, 19991). So, they are less likely to monitor whether false information referred to an experienced event or whether it was only suggested to them. The net effect would be that children are especially prone to form false memories.

However, based on associative activation theory, one would actually predict the opposite, namely that children should be less likely to create false memories than adults. Indeed, research investigating developmental trends in the DRM false memory illusion have confirmed this prediction. That is, after receiving DRM word lists, adults, and not children, are most susceptible to false memory creation—a memory phenomenon dubbed developmental reversal (Brainerd et al., 2008).

An often-posed critique concerning the formation of DRM false memories is that they say little concerning the production of autobiographical false memories (e.g., DePrince, Allard, Oh, & Freyd, 2004). However, some aspects of the DRM false memory illusion *do* align well with what has been found in the realm of autobiographical false memories. For example, negative DRM word lists lead to higher false recognition rates than neutral DRM word lists (e.g., Howe, Candel, Otgaar, Malone, & Wimmer, 2010), an effect similar to showing that negative false events are more easily implanted in children’s memory than neutral false events (Otgaar, Candel, & Merckelbach, 2008; see also Porter, Bellhouse, McDougall, ten Brinke, & Wilson, 2010). However, an accumulating body of research has also shown that the susceptibility to the DRM false memory illusion is weakly related to the formation of suggestion-induced false memories (e.g., Otgaar & Candel, 2010; Patihis, Frenda, & Loftus, 2018).

These discrepant findings led us to examine the idea that under certain circumstances, *suggestion-induced* false memories should be less likely in children than in adults just as in the development of *spontaneous* false memories. The critical recipe to find such an effect would be to show children and adults stimuli (e.g., a video of a crime) containing associatively-related details (e.g., the robber, vault, the bank). After this, misinformation should be presented implying false details that were not presented, but related to the video (e.g., gun). Associative activation theory would predict that because of their more extensive knowledge base, adults would be more vulnerable to accept this misinformation than children (Otgaar et al., in press).

In fact, recent studies have confirmed this prediction. For example, four misinformation experiments examined developmental trends in suggestion-induced false memories by presenting children (4- to 12-year-olds) and adults with a video containing associatively-related details. Following this, participants received misinformation falsely implying that certain details were present in the video. Next, a recognition memory test was provided. Across all experiments, older children and adults accepted misinformation more than younger children.

In another recent memory conformity study (Otgaar, Howe, Brackmann, & van Helvoort, 2017), 7-8-year-olds, 11-12-year-olds, and adults viewed pictures of scenes (e.g., a desk). The scenes contained associatively-related details (e.g., laptop, books). Participants looked at these scenes in pairs and assumed that they were presented with the same pictures. However, although the theme of the pictures was the same (e.g., a desk), some related details that were present in one picture were absent in the other. Next, participants had to talk with each other and together recall the pictures. Following this was an individual final recall task. At both recall times, children were not more prone to report false details than adults. Even more, when correcting for

response bias, adults were more likely than children to falsely remember having seen unrepresented details (see Kim, Kwon, & Ceci, 2017, for a similar finding).

Children can, sometimes, be accurate witnesses in that they are less likely than adults to produce suggestion-induced false memories . Although perhaps obvious for the development of spontaneous false memories, this is not conventional for the development of suggestion-induced false memories (Otgaar, Howe, Muris, & Merckelbach, 2018). Moreover, these new developmental findings are not solely confined to false memory paradigms that rely on external suggestion. Adolescents (14-17-year-olds) were more prone to misidentify an innocent bystander than children (11-13-year-olds) in a line-up procedure (Brackmann, Sauerland, & Otgaar, in press). How should these nuanced findings on the development of false memory impact the way legal professionals deal with false memories in the courtroom?

### **Recommendations for Expert Witnesses**

In many cases where children or adults provide testimonies about what they witnessed or experienced, forensic technical evidence supporting those claims is often lacking (e.g., Brainerd et al., 2008). Legal professionals then have to decide reasonably whether the testimonies are mostly true, mostly false, or somewhere in between. An often-used but flawed procedure to reach this decision is to look at the content of the testimonies. The assumption here is that the content of statements might be a good indicator of whether statements are based on true or false memories.

For example, instruments such as Criteria-based Content Analysis (CBCA) and Reality Monitoring (RM) investigate whether the content indicates the truth value of witnesses' statements. CBCA and RM assume that certain details in one's statements are, for example, indicative of the truthfulness of the statement (e.g., CBCA: logical structure; RM: visual details).

However, content differences between true and false memories are limited, a general finding in studies that examined CBCA (Blandon-Gitlin, Pezdek, Lindsay, & Hagen, 2009) and RM (Otgaar, Candel, Memon, & Almerigogna, 2010).

So, what can legal professionals such as expert witnesses do to estimate the reliability of testimony? When asked to evaluate statements of children or adults concerning trauma, expert witnesses should examine the first disclosure of the one claiming to have experienced an event. Children and adults can provide highly accurate statements about traumatic experiences, even after a long delay. One study examined the memory accuracy of adolescent and adult victims of sexual abuse 12 to 21 years after the abuse (Alexander et al., 2005). The researchers had access to detailed information about these victims, such as the abuse duration and the relationship of the victim to the perpetrator. Comparing victim interviews with this information indicated memory accuracy was very high. Similar findings hold with child victims (e.g., Bidrose & Goodman, 2000; Leander, Christianson, & Granhag, 2007).

Thus, when expert witnesses examine case files containing victim statements and observe that the first disclosure probably occurred spontaneously, then there are reasons to believe that the statements contain a high degree of accuracy. However, when there are signs that the first disclosure happened under suspect circumstances (e.g., suggestive questions), then the chance for false reports and unreliable statements increases. This might be especially true when children are interviewed by their parents about suspected abuse, as research shows that such dialogues often contain considerable misinformation (Lawson, Rodriguez-Steen, & London, 2018).

### **Policy Recommendations**

Given the nuances of developing false memories, including certain safeguards in legal cases could help prevent the occurrence of false memories or at least obtain a better idea of

whether statements are accurate or not. A first safeguard is that interviews by legal authorities, such as the police, should follow empirically validated protocols. For example, the National Institute of Child Health and Development Interview Protocol has been proven to be an effective means to elicit reliable statements in children (e.g., Lamb et al., 2007). This protocol focuses on the continuous use of open-ended questions (“Tell me what happened”), which eschews suggestive questioning. Furthermore, this protocol attends to discovering the circumstances of the first disclosure, which might be helpful for expert witnesses to estimate the reliability of statements. The focus on open-ended questions is also vital in the Cognitive Interview (e.g., Fisher & Geiselman, 1992). This interview focuses on the interview of adult witnesses or victims and is a proven, effective way to gather reliable testimonies (e.g., Memon, Meissner, & Fraser, 2010).

A second safeguard concerns the way expert witnesses write reports for the courtroom. Expert witnesses are often involved in cases *after* interviews by, for example, the police have been conducted. In such cases, they usually have to write an expert witness report for the defense or prosecution. A potential problem that might arise here is that, without being aware of this, expert witnesses might write reports in favor of the one who made the request to provide a report. This allegiance bias has been shown to be present in forensic experts working in legal cases (Murrie & Boccaccini, 2015).

Expert witnesses can protect themselves from the allegiance bias by using the so-called alternative scenario method (Crombag & Wagenaar, 2000; Otgaar et al., 2017). In this method, expert witnesses look for elements in a case that support several scenarios. Take for example a situation where an expert witness is asked to investigate the reliability of statements of a young child claiming to have been abused. The rationale behind this method is that the expert witness



looks for elements supporting the scenario that the statements refer to an experienced event (e.g., spontaneous first disclosure). Furthermore, the expert witness searches for elements that might support an alternative scenario in which the child is fabricating the claim (e.g., presence of suggestive interviewing techniques). If more support is found for one scenario, compared to the other one, then that scenario will be considered superior and should guide expert witnesses to evaluate the reliability of statements.

### **Conclusion**

The current portrayal of findings on false memory development in children and adults should guide legal professionals in correcting the assumption that children serve as poor eyewitnesses. We have shown the contrary: Children can provide highly accurate accounts and are oftentimes less vulnerable to the formation of spontaneous memory errors, but also false memories, as the result of external suggestion. The implication is that age should not be used as a sole indicator on whether children or adults have provided accurate accounts or have formed false memories. Instead, more focus should delineate factors (e.g., spontaneous statements) that the science of memory has shown can support or undermine testimonies.

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