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The Development and Correction of Children's False Memories

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Children who are witnesses or victims of a traumatic event oftentimes talk about their experiences to a variety of parties. For example, some will talk to friends or their parents and/or will be formally interviewed by the child protection or the police. During such conversations, there is always a chance that children receive questions about details or entire events that were not part of the original experience. When this happens, memory for the original experience can become contaminated resulting in children remembering events that they did not experience. Memories for events which were never truly experienced are also called false memories (e.g., Loftus, 2005).

Such false memories can exert devastating consequences. To provide some examples, when false memories appear in child protection contexts, families might be torn apart because a child might incorrectly recall having been mistreated by the father (e.g., Erens et al., 2022; Wood & Garven, 2000). In legal contexts, false memories of sexual abuse might lead to false accusations and even wrongful convictions (e.g., Schreiber et al., 2006). Furthermore, such false memories can be damaging as well for those who have come to remember false events, as such memories "feel" as authentic as true memories (Bernstein & Loftus, 2009). In this chapter, we will first present a brief history of several key legal cases that catalysed scientific research on children's false memories[1]. We will then present several lines of evidence showing how children's false memories can be formed and which factors underpin the development of such

[1] We will focus primarily on the formation of false memories induced by suggestion and will not discuss research on spontaneous false memories.

false memories. Finally, we will discuss ways in which children's false memories can be prevented or corrected.

A Brief History on Legal Cases Concerning Children's False Memories

In the 1980s and 1990s, several countries witnessed an outbreak of legal cases in which groups of children testified that they had been (sexually) abused. These cases were also called day care abuse cases (e.g., Ceci & Bruck, 1995). These cases were characterized by highly suggestive child interviews conducted by, for example, social workers. These suggestive interviews likely led to the production of false memories in children. We will now discuss several important day care abuse cases.

McMartin Preschool Case. The McMartin Preschool case was initiated in 1983 in Manhattan Beach, California, when a parent reported that their child had been abused. A letter was then sent from the police to the families of more than one hundred children attending McMartin Preschool. This letter warned parents of the possibility that their children could have been abused by teachers of the preschool. In the letter, parents were urged to interview their children about whether they were also victims of abuse. After being interviewed by their own parents, these children were questioned by social workers who used highly suggestive questions. A brief example of such a suggestive interview from the McMartin preschool case is the following (Garven et al., 1998; p. 28):

> Interviewer: "Can you remember the naked pictures?"
>
> Child: (Shakes head "no")

Interviewer: "Can't remember that part?"

Child: (Shakes head "no")

Interviewer: "Why don't you think about that for a while, okay? Your memory might come back to you".

These suggestive interviews not only led to children acquiescing to this pressure, but also resulted in accounts of bizarre events subsequently reported by the children. For example, some children reported experiencing satanic rituals, seeing witches fly on brooms, and children being flushed down toilets. Memory researchers argued that the suggestive questions used during the interviews might have caused false memories in these children (Garven et al., 1998).

Wee Care Nursery Case. The Wee Care Nursery case started in 1985 at a day care center in New Jersey. Kelly Michaels, a daycare worker at the nursery, was accused of abusing several children at the center. Like the former case, the school sent a letter to parents to interview their children about possible abuse. In the letter, parents were told that child sexual abuse is very common. As in the McMartin Preschool Case, children sometimes made bizarre claims such as that Kelly Michaels was licking peanut butter off children's genitals, making children drink urine, and raping children with Lego blocks (Schreiber et al., 2006). Because of these allegations, Kelly was sentenced to 47 years in prison in 1988. In 1993, the conviction was overturned. The court declared that children were interviewed in a highly suggestive fashion, rendering their accounts unreliable.

Christchurch Civic Creche Case. Around the same time, a similar daycare case was emerging in New Zealand. This case began on November 20, 1991 when the parent of a child attending the creche came forward with allegations of abuse by one of the teachers, Peter Ellis

(for a recent overview, see Howe, 2022; for a more exhaustive account, see Hood, 2019). As the investigation progressed, over 100 children from the creche were interviewed. During a preliminary court hearing, Peter Ellis faced an initial 45 charges of indecencies involving 20 children with a further 15 charges laid involving five children. These charges included accusations of having inserted his finger, penis, needles, sticks, and food into the children's vaginas, mouths, and anuses. He was also accused of making them eat his urine and feces. All of the children were between 6 and 9 years at trial (3 to 6 years at the time of the alleged offences). In the end, Peter Ellis faced 23 charges involving 13 children. On June 6, 1993, Peter Ellis was found guilty on three counts of sexual violation, eight counts of indecent assault, and five counts of performing indecent acts, and was sentenced to 10 years in prison.

As in similar cases, these children may have developed false memories of abuse through a sort of contagion; that is, collaborative false memories may have emerged through repeated conversations between children and parents, among the parents, and among the children themselves. Moreover, children were exposed to various forms of therapy, including scene reconstruction techniques using dolls, drawings, and toys.

Galileo Case. Although many day care abuse cases happened in the 1980s and 1990s, such cases still happen now from time to time. An illustrative example is the Dutch Galileo Case in 2009. In this case, parents of a young boy told the school that their son had been hit by a teacher. Like the previous cases, the school decided to send a letter to all parents of the school stating that more children could have been victimized. Parents were informed that they would receive detailed information on (behavioral) signs in children that would be indicative of abuse. After this letter was sent out, 20 children claimed to have been abused by several teachers at the school. Children were questioned about the alleged experiences by parents, therapists, and the

police. These interviews led to claims of a bizarre nature. For example, a child reported that one of the teachers had cut his genitals or that one of the teachers had living crocodiles at home. Because of the possibly suggestive nature of the letter and the different conversations with the children, it was concluded that the children in this case might have reported experiences that did not actually happen (Otgaar et al., 2017).

Jakarta International School Case. Another important observation in examples of day care abuse cases is that they do not only occur in Western countries, but have been occurred in Asian countries as well. A noteworthy example is the Jakarta International School Case in Indonesia starting in 2014 (Calado, 2022). In March 2014, two 6-year-olds, and one 7-year-old child reported to have been abused by six janitors and two teachers of the Jakarta International School. However, these claims originated through a series of suggestions. That is, these children initially denied being abused but were heavily (suggestively) influenced by their parents, therapists, and the police who questioned the children about the alleged abuse. For example, children were told by parents that they were sexually abused while initially no mention was made by children about any sexually abusive acts (Calado, 2022). These statements made by the children eventually led to the conviction of the suspects. One of them, a Canadian citizen, eventually received clemency from the Indonesian president's office.

Cases such as the ones described here have fueled the attention of memory scientists to study the conditions by which children can come to falsely remember autobiographical experiences. To that end, several false memory paradigms have been devised to investigate how suggestion can instill the formation of false memories.

False Memory and Suggestibility Paradigms

One of the most well researched methods used to study (children's) false memories elicited by suggestion is the misinformation paradigm (Loftus, 2005; Loftus & Klemfuss, 2023). This paradigm generally uses the following procedure: Participants are presented with some stimuli (e.g., video of crime) or are involved in an interactive event (e.g., mock crime). After this, they receive misinformation (i.e., false suggestive information) concerning the stimuli or the event itself. Examples of such misinformation include participants being presented with a supposed eyewitness account of the stimuli/event which contains false information (e.g., stating that the culprit had a gun when in fact it was a knife) or participants receiving suggestive questions about the experiences (e.g., "The culprit was carrying a gun, right?"). Last, participants' memory for the original stimuli/event is tested. The central finding is that a significant proportion (about 30%; see Wylie et al., 2014) of participants accept the misinformation and report to have experienced it during the original stimuli/event presentation.

Such misinformation procedures have been studied with children as participants. A canonical example is the Mr. Science experiment (e.g., Poole & Lindsay, 1995). In these experiments, children (ranging oftentimes between 3- and 7-years old) interacted with Mr. Science who previously showed the children several science demonstrations (e.g., folding different types of paper airplanes). After several months, their parents read the children stories about this interaction. These stories contained events that were experienced, but also events that were not experienced (e.g., that Mr. Science wiped children's faces with a smelling wipe). Moreover, the children were asked suggestive questions about these events (e.g., "Did you make paper airplanes with Mr. Science?"). What was detected is that children made many errors, ones consistent with the suggestions, when they were interviewed about their interaction with Mr. Science.

Another procedure that has been used to induce (children's) false memories is the false memory implantation paradigm (Loftus & Pickrell, 1995). In this procedure, participants are told that they experienced several events in their childhood. While several of these really happened and are provided by participants' parents, one of these events is fabricated and invented by the experimenter. These latter events are also confirmed by the participants' parents as not having occurred. For example, in one of the first studies, participants were falsely told that they got lost in a shopping mall when they were children. After several suggestive interviews, a quarter of participants became convinced that they experienced the false event and came up with elaborate accounts of the (false) experience.

A critique of false memory implantation studies is that they have sometimes used different scoring systems which might have affected false memory propensity (e.g., Shaw, 2018). Therefore, Scoboria and colleagues (2017) re-analyzed previous false memory accounts using a new scoring system that was based on the latest insight into false memory production. They found that between 30 and almost 50% of participants fall prey to these suggestions in these studies and create false autobiographical memories for entire events (Scoboria et al., 2017; see also Arce et al., 2023 for a meta-analysis). Furthermore, a large variety of false events have been successfully implanted in children's and adults' memory, such as committing a crime (Shaw & Porter, 2015), receiving a rectal enema (Otgaar et al., 2010), and going on a hot air balloon ride (Wade et al., 2002).

In one such study, Pezdek and Hodge (1999) suggested to nineteen 5- to 7-year-old children and twenty 9- to 12-year-old children that they experienced two false events when they 4 years old. Specifically, they were told that they were lost in a shopping mall and that they received a rectal enema. In general, children were more likely to falsely assent to the shopping

mall narrative than to the rectal enema narrative. Specifically, while 14 children falsely remembered the plausible (but not implausible) event, only 1 child falsely recalled the implausible event but not plausible event. Although both the misinformation and false memory implantation paradigms have yielded false memory reports successfully with both children and adults, there are also false memory paradigms specifically designed for children. One illustrative example is the rumor mongering paradigm.

The rumor mongering paradigm has been developed to deal with natural conversations that occur between children or between children and their parents (Principe et al., 2006). Such conversations can sometimes be highly suggestive when they concern sensitive topics such as abuse (e.g., Principe & Schindewolf, 2012). In one of the first demonstrations, four groups of 3- to 5-year-olds watched a staged magic show at their school (Principe et al., 2006). During the magic show, a magician tried to pull a rabbit out of his hat. Despite several attempts, the magician failed, apologized, and left the school. Children were divided into four groups: Overheard, classmate, witness, and control group. In the 'Overheard' group, children heard two adults talking to each other and alleging that the trick failed because the rabbit had gotten loose in the school. Children in the 'Classmate' group did not hear this conversation and were classmates of the children in the overheard group. The critical question was whether children in the 'Classmate' group would later on hear about this rumor by the 'Overheard' group children and falsely recall that the rabbit had gotten loose in the school. Children in the 'Control' group were not exposed to any rumor and children in the 'Witness' group did witness a loose rabbit at the school.

After two weeks, all children were interviewed about the magic show. The most interesting finding was that children in the 'Overheard' and 'Classmate' groups were as

susceptible to wrongly claiming to have seen the loose rabbit as children in the 'Witness' group who had actually seen a loose rabbit. This finding demonstrates that rumors can leak into children's recollections thereby showing the possible suggestive nature of natural conversations (Principe et al., 2006).

Taken together, several false memory methods have been constructed to investigate the production of false memories in adults as well as in children. Apart from these false memory paradigms, several theories have been developed to explain the how false memories can occur. We will not explain all of them but have made a selection of some key theories, laid out below.

False Memory Theories

Source Monitoring Framework. One influential theory underlying the formation of false memories is the source monitoring framework (SMF; Johnson et al., 1993). Basically, the SMF postulates that people make judgments about the origin or source of their memories. The source can refer to the context or circumstances by which a memory is obtained. For example, someone who witnesses the robbery of bank acquires a memory in the context (spatial, temporal, and visual context) of this experience. Indeed, we can have memories for events that we truly experienced, such as in this case the bank robbery (i.e., these have an external source). However, we can also have memories for events that we did not actually experience, but simply imagined or dreamed of (i.e., these have an internal source). People are often unable to directly retrieve the source of a memory, but they can make attributions concerning the source of their memories. These attributions stem from the phenomenology of mental representations – memories with different origins seem to differ from each other in certain phenomenological characteristics. So, for example, when a mental representation contains many visual, spatial, and auditory details,

people attribute this mental representation as originating from an external source. Thereby, they decide that the mental representation refers to a true memory of an event that they actually experienced. However, when a mental representation contains many cognitive operations (e.g., thinking or reasoning about an experience), people might attribute this representation to an internal source such as an imagined event.

The process of source monitoring is not error proof. Source monitoring errors might arise if, for example, mental representations based on internal sources contain as many memory characteristics as mental representations based on external sources. Such a situation can arise if, for example, someone is confronted with external suggestions about an event and then imagines what could have occurred. This process can then lead to a mental representation that has a phenomenology akin to that of a memory for an experienced event. In such a case, source monitoring errors can evolve in which the mental representations are then attributed to an external rather than internal source. Such a misattribution can then lead to a false memory that the suggested event was truly experienced.

Fuzzy Trace Theory. According to the Fuzzy-trace Theory (FTT; Brainerd et al., 2008), people store two independent memory traces when experiencing an event. Specifically, FTT postulates that people store verbatim and gist traces during an experience. Verbatim traces refer to memories of specific details of an event. In the example of the bank robbery, a verbatim trace might be the color of the jacket of the bank robber. Gist traces, on the other, involve the storage of the underlying meaning of an event. Going back to the bank robbery example, a gist trace here might be that the experience concerned a bank robbery. Verbatim traces fade rapidly over time as the details of an experience are forgotten. According to FTT, this means that people will increasingly rely on the retrieval of gist traces. Since retrieving gist traces involves the

recollection of non-specific information and the general meaning of an event, gist trace extraction fosters false memory production, leaving room for the rememberer to add in (suggested) details later.

Associative Activation Theory. Associative-activation Theory (AAT; Howe et al., 2009) uses the notion of spreading activation to explain the formation of false memories. AAT postulates that the encoding an event leads to spreading activation across a network of related concepts (also called 'nodes') which can result in the activation of concepts that are related but not experienced during an event. Looking back at the bank robbery example, when the witness is thinking about or remembering the robber, the spreading activation might trigger concepts such as a weapon. Activation of the concept of 'weapon' can lead to the remembrance that the culprit carried a gun while in fact the culprit had a knife (a different weapon). Hence, spreading activation can lead to the activation of related non-presented details leading to the creation of false memories.

In sum, several theories exist to elucidate the formation of false memories. These theories have been important in the study of the different factors that might affect the propensity (of children) to form false memories.

Factors involved in False Memory Creation

We will now discuss several factors that have been shown to affect the risk of producing false memories. Some of them have been studied because of predictions that were borne out of several false memory theories. Many of the studies conducted in the area of suggestibility and false memory creation are lab-based studies. This limits the generalizability of these studies to complex cases of child sexual abuse in which a multitude of factors (e.g., social factors) might

have led to false memories. Nonetheless, lab-based studies are informative as they are able to examine potential false memory factors in a controlled setting.

Age. An important factor when considering false memory creation is the question of whether children or adults are more or less likely to produce false memories. Research in the area of false memories induced by suggestion seems to show a rather consistent pattern. Specifically, suggestion-based false memory development follows an age-related decrease. This means that younger children are more at risk of producing false memories than older children who are in turn more susceptible to false memories than adults (e.g., Sutherland & Hayne, 2001). This age pattern is nicely explained by the SMF which stipulates that children experience more difficulties in monitoring the sources of their memories than adults (Lindsay et al., 1991). For example, Sutherland and Hayne (2001; Experiment 2) presented 11- and 12-year-olds and adults with a video (i.e., child getting lost and being found by a policeman) and presented them - amongst others- with misleading information. The authors found that the children were more likely to go along with the misleading information than the adult participants.

However, theories such as FTT and AAT predict a so-called developmental reversal effect, suggesting that children are less likely to form false memories than adults (Brainerd et al., 2008; Otgaar et al. 2018). In many studies on suggestion-induced false memories, the necessary *ingredients* are missing to find and examine such developmental reversals. That is, according to the tenets of FTT and AAT, developmental reversals in suggestion-induced false memories can appear under certain circumstances. Specifically, developmental reversals appear if the encoded stimuli contain semantically-related or associatively-related details, and when the misinformation contains false details that are associatively related to the encoded experience. Studies containing such critical ingredients have indeed found that in some contexts, false memories are more likely

to occur in adults rather than children, and more in older rather than younger children (Brainerd et al., 2008; Ceci et al., 2007; Goswick et al., 2013; Otgaar et al., 2016).

Plausibility. Memory scholars have argued that before false memories can be implanted, two conditions should be first met (e.g., Mazzoni & Kirsch, 2002; Scoboria et al., 2004). First, people should appraise a false event as an event that could plausibly occur. Then, people need to start to believe that the false event happened. Only when such a false belief has been formed, can implanted false memories be induced. If true, this theoretical position predicts that plausible false events ought to be more easily implanted than implausible false events.

False memory research has indeed revealed that false memories for plausible events are easier to be evoked than false memories for implausible events. For example, Pezdek et al. (1997; Experiment 2) suggested to 20 adult participants that they experienced a plausible (lost in a shopping mall) and an implausible event (receiving a rectal enema) in their childhood. Fifteen percent (n = 3) falsely recalled the plausible event, but no one endorsed the implausible event. This finding was also replicated in children (see above) in which the plausible false event was more likely to give to rise to implanted false memories than the implausible event (Pezdek & Hodge, 1999).

However, Strange and colleagues (2006) argued that event plausibility can be affected by many different factors which might also influence false memory production. In their study, 6-year-olds and 10-year-olds were interviewed thrice about true events and two false events. The first false event was deemed plausible and was a hot air balloon ride while the implausible event concerned drinking tea with Prince Charles. Interestingly, in this study, participants received doctored photographs depicting them in the false events, rendering the events more personally plausible. The authors found that false memories were equally likely to be implanted for the

plausible and implausible event (for similar results see Otgaar et al., 2009). The argument that event plausibility can be affected by certain factors is supported by Scoboria and colleagues (2006) who showed that if participants receive information that an event happens commonly (also called prevalence information), the personal plausibility of an event increases.

Valence. Another important variable of interest in the formation of children's false memories is the valence or emotional aspect of an event. FTT and AAT would predict that negative false memories are easier to induce than neutral false memories (e.g., Bookbinder & Brainerd, 2016; Howe et al., 2010). According to FTT, emotionally negative experiences enhance gist memory thereby facilitating false memory formation. AAT stipulates that emotionally-negative experiences lead to more interrelated and dense memory networks which increases the chance that spreading activation will activate non-presented but related concepts in the memory system (Howe et al., 2010).

A recent systematic review did not reveal a consistent pattern on the link between valence and adults' false memories induced by misinformation (Sharma et al., 2023). The only finding (based on a limited set of studies) was that false memories were most likely to be produced for peripheral negatively-valenced misinformation. Research into children's implanted false memories is also scarce. One study did find that negative false memories were more easily implanted than neutral ones (Otgaar et al., 2008), but clearly more research is needed in the area of valence and suggestion-induced false memories. In this latter study, children were suggested that they were accused of copying off their neighbor's homework in class (i.e., negative event) or were suggested that they had to move to another classroom (i.e., neutral event). In two interviews, it was shown that children produced more false memories for the negative than neutral event.

Prior Knowledge. Another important variable that can affect (children's) false memories is having prior knowledge of an event. An interesting demonstration of the role of prior knowledge in false memory formation was published by Castel and colleagues (2007). In their study, participants with low or high levels of knowledge about American football had to learn a list of animal names which were also names of American football teams (e.g., lions, broncos, bears). The participants who had more knowledge of American football not only remembered more animal names correctly, but were also more likely to remember names that were related but not presented during encoding (e.g., eagles) than participants with low knowledge of American football. Clearly, this finding shows that having knowledge can come at a cost because it might amplify false memory generation. In essence, this finding is related to spreading activation accounts of false memories (e.g., Howe et al., 2009). Having elaborate knowledge goes hand in hand with an elaborate knowledge base and memory network in which spreading activation can easily activate related but not presented concepts.

The role of prior knowledge has also been examined in the context of children's false memories. The study by Pezdek and Hodge (1999) which showed that children were more likely to form false memories for a plausible than implausible event was also argued to be a study in which children had more script related knowledge (knowledge about the sequence of an event) about the plausible event than the implausible event. However, this means that it is not clear whether the false memory findings were mainly driven by plausibility or also script knowledge.

Hence, Otgaar and colleagues (2010) used two false events that were equated on levels of plausibility and valence but differed in script knowledge (receiving a rectal enema: low script; having your fingers stuck in a mousetrap: high script). The events were chosen based on a pilot study in which children were asked to report what typically happens during certain events (i.e.,

script knowledge). Based on this pilot study, two events were selected that statistically differed in terms of the children's amount of script knowledge. Children aged 7 and 11 were suggestively interviewed on two occasions and told that they had experienced the high or low script event when they were 4-years old. Children receiving the high script event were more susceptible to false memory generation than children in the low script group. Furthermore, 23% of the younger children (n = 7) falsely recalled the enema event at Interview 1 and 19% (n = 6) at Interview 2. None of the older children falsely assented to the enema event. Like the work by Castel and colleagues (2007), this study suggests that having knowledge about an event might increase children's willingness to go along with suggestion.

Correcting and Preventing Children's False Memories

An important goal in child forensic interviews is to prevent false memories from happening as they might lead to false accusations and miscarriages of justice. Several ways exist to prevent children from developing false memories. A straightforward manner is to ensure that child forensic interviewers are trained to use open-ended questions which maximize the amount of accurate reporting and not to use suggestive questions (Saywitz & Camparo, 2014). The use of open-ended questions is imperative because children are able to accurately recount events, even when the events are traumatic in nature (e.g., Paz-Alonso et al, 2012).

One such training method is The National Institute of Child Health and Human Development (NICHD) interview protocol. The NICHD interview has been proven to be an effective way to stimulate detailed accounts in children (e.g., LaRooy et al., 2015; Lamb et al., 2007). The NICHD protocol makes use of several phases. In the first phase, children receive several ground rules concerning the interview such as telling them that it is okay if they do not

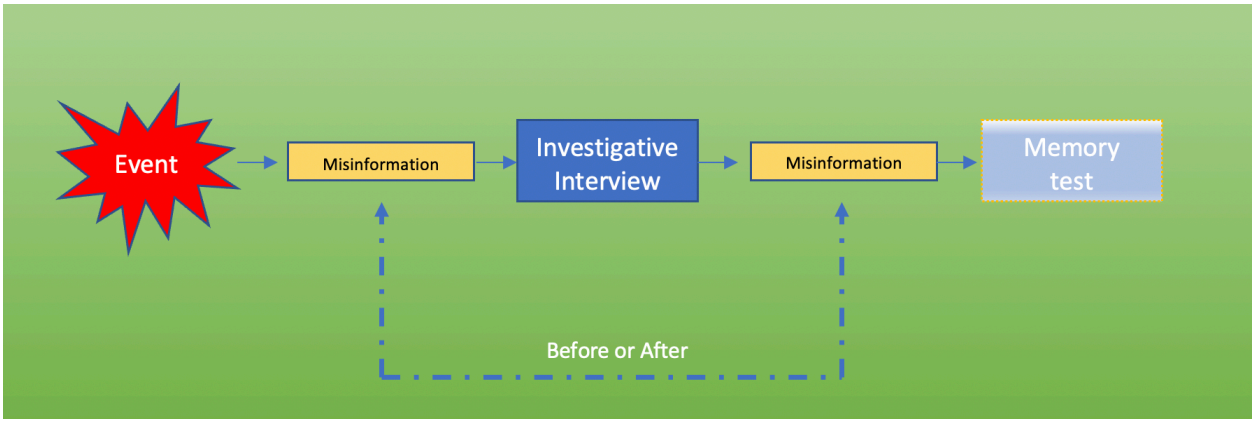
know the answer to a question they are asked. Following this the interview commences with a rapport building phase. Rapport building is embedded to increase children's level of trust with the interview and interviewer (e.g., asking about hobbies or favorite foods). The idea behind rapport building is to create an environment in which children would feel more comfortable to talk about traumatic events. After the rapport building phase, children engage in an episodic memory training in which they are asked to provide a detailed account of an autobiographical experience (e.g., what they did the day before the interview). The rationale underlying this is that children get accustomed in the retrieval of autobiographical memories. This is important as they need to retrieve autobiographical memories concerning an alleged traumatic event as well, later on in the interview. The most important phase is the part where children receive open-ended questions about the alleged event. Specifically, child forensic interviewers are trained in asking so-called invitation questions which are questions in the form of "Tell me what happened". The crux of these questions is that they facilitate the reporting of detailed and accurate accounts. Only after children's recall is exhausted with invitation questions, interviewers can shift to the use of more closed questions such as directive (e.g., "Where did it happen?") or option-posing ("Did it happen at home or somewhere else?"). However, even when interviewers resort to the use of such closed questions, the goal of the NICHD protocol is always to combine these questions again with invitations (also called pairing).

Research has demonstrated that when child forensic interviewers are trained in using the NICHD protocol, they ask more invitation questions than non-trained interviewers. Furthermore, the NICHD protocol has been shown to lead to a reduction in the use of suggestive questions thereby protecting children against the formation of false memories (Benia et al., 2015). Equally

interesting, the use of the NICHD protocol has been associated with an increase in the number of reported details in children (e.g., Erens et al., 2022).

Although following the NICHD protocol prevents the use of suggestive questioning in interviews, sometimes the suggestive damage has been done *before* any forensic interview is conducted. For example, it is not uncommon that children have talked about an alleged traumatic event with parents (e.g., Principe & London, 2022). During such parental conversations, it can happen that parents ask their children in a suggestive fashion about experienced and non-experienced incidents. Moreover, *after* a well-conducted child forensic interview, children might also be confronted with suggestive information. This can happen, for example, when they go back home and talk with parents and friends (see Figure 1). A pivotal issue arises questioning whether a well conducted interview (such as one delivered via the NICHD protocol) can counteract previously presented misinformation or protect against subsequent misinformation.

Figure 1. Schematic representation showing that misinformation can occur before or after an investigative interview (arrows shows that the point where misinformation can occur [before or after]; adopted from Otgaar et al., in press).



Empirical research on whether a well-conducted child interview can neutralize the debilitating effects of previously encountered misinformation has shown that such interviews can sometimes decrease children's reporting of this misinformation at a later memory test. For example, in one experiment, 4 and 8 year-old children were presented with a video of a birthday party (Holliday, 2003). After one day, children received misinformation regarding the video. Then, one group of children received an empirically-based interview (i.e., the Cognitive Interview) while another group was interviewed using a control interview. Following this, children received a final memory test about the video. When children were questioned by the Cognitive Interview they were less likely to report misinformation in their own accounts later on than those who were not interviewed by an empirically validated interview protocol (but see also Hayes & Delamothe, 1997).

This finding is reminiscent of post-warning studies on the misinformation effect (Blank & Launay, 2014). These studies have revealed that when participants are told that they, for example, have been confronted with misinformation, they are less likely to endorse this misinformation on later memory tests than participants who were not warned. Although interesting, research with children in this area is still highly limited (Blank & Launay, 2014). [2]

Another possibility is to examine whether a well-conducted interview might protect from the reporting of misinformation that is presented after the interview. The idea here is that when children are interviewed using empirically based principles (e.g., asking open-ended questions), they will form detailed and accurate accounts of an event. Remembering this level of detail might protect children from incorporating misinformation that they receive at a later stage (e.g.,

[2] There is also research on pre-warning and false memory creation. However, such work is less relevant for discussions on misinformation effects in real life cases as in such cases, it is not generally known whether people will be exposed to misinformation at a later stage.

Brainerd et al., 2008). However, findings in this research area are mixed. Some studies found that child forensic interview had no effect at all on the reporting of misinformation children are faced with later on (e.g., Holliday, 2003; af Hjelmsäter et al., 2012), while other studies have found that such interviews decrease (Erens et al., 2022) and even sometimes increase the reporting of misinformation (Otgaar et al., 2019).

Collectively, there are different strands of research on how children's false memories can be corrected or prevented. However, research in this area is limited and sometimes evinces inconsistent findings. Because of the obvious practical ramifications of this line of research, it is imperative that future research focuses on science-based ways to prevent or correct the production of children's false memories.

Concluding Remarks

A major reason for why scientific research in the area of children's false memories commenced is because of legal cases showing the corrupting effects of suggestion on children's memory reports (e.g., Garven et al., 1998). In general, research has shown that although children's memory can be highly accurate, even for traumatic events, they can also be highly vulnerable to suggestion thereby producing false memories. This knowledge is vital for legal professionals because it evidently shows that children are able to accurately talk about experienced traumatic events such as sexual abuse. Simultaneously, however, legal professionals should be wary of the fact that when there are signs that children's reports were influenced by suggestion, the reliability of their reports might have been jeopardized.

Hence, in cases where children's testimony is of high relevance for legal decision-making, it is advisable to consult expert witnesses with expertise on children's memory to

evaluate the reliability of children's testimony (e.g., Otgaar et al., 2017; Zajac et al., 2013). Such experts can advise the court on whether children's statements are grounded in reality or whether there are reasons to doubt these statements. Two key recommendations are important for experts working with child sexual abuse cases. First, when reading a case file concerning alleged child (sexual) abuse, it is imperative to examine the first disclosure of the alleged trauma and examine the context of this first statement. If the first statement of the child happened spontaneously, this supports the reliability of the account while if there are signals that children were asked suggestive questions then there are doubts concerning the reliability of the statement. Second, in expert witness work, it is recommended to use scenarios when evaluating accounts of children (Otgaar et al., 2017). That is, when expert witnesses are asked to evaluate the reliability of children's statements, they need to find elements in a case that supports a scenario that the statements refer to an experienced event (e.g., spontaneous statement). However, they also need to consider an alternative scenario where the children's statements refer to a non-experienced event and might be based on a false memory. Using multiple scenarios can reduce expert witnesses likelihood of falling prey to confirmation bias - only looking at elements in a case that support one scenario, thereby neglecting the possibility of other scenarios (Lidén, 2023; Vredeveldt et al., 2022).

Taken together, children's false memories can have damaging consequences in different areas such as child protective contexts or the legal arena. When children are interviewed about alleged incidents of trauma, it is vital that such interviews are conducted using science-based principles thereby reducing the formation of children's false memories. Furthermore, when children's statements appear in court, memory experts can educate the court about the reliability of these statements. Such expert witness testimony can help triers of fact to base their

judgements on true statements of children who were abused, yet also acquit innocent suspects who have been accused based on children's false memories.

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