FACTORS THAT INFLUENCE ADULTS' FALSE MEMORIES ALSO INFLUENCE CHILDREN'S FALSE MEMORIES

by

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A thesis
Submitted to the Victoria University of Wellington
in fulfillment of the
requirements for the degree of
Doctor of Philosophy
in Psychology

Victoria University of Wellington
2005

Abstract

The primary aim of this thesis was to investigate whether Mazzoni et al.'s (2001) model for adult false memory development also accounts for children's false memory develoment. Thus, three studies were conducted targeting different aspects of Mazzoni et al.'s model.

Study 1 examined whether children could become equally confident, and develop just as many memories of a plausible as a less plausible false event. Thus, Study 1 targeted both the plausibility and memory construction components of Mazzoni et al.'s (2001) model. Over three interviews 6-year olds and 10-year olds were shown two true photos and two false photos created using Photoshop®—one depicted a plausible event and one depicted a less plausible event. Children described what they could remember about each of the four events, and rated their confidence and how much they could remember. The results showed that, within each age group, children were just as confident and claimed to remember just as much about the plausible as the less plausible event. Moreover, children developed just as many memories of the plausible as the less plausible event. In addition, children were just as likely to develop memories of the false events when they were told that those events had happened in the distant past versus the recent past.

Study 2 examined whether including personalised detail in the false photo makes it easier for children to construct images of the false event, and therefore increases the likelihood of children developing false memories. Thus, Study 2 further examined the memory construction component of Mazzoni et al.'s (2001) model. Ten-year olds saw four

photos, one of which was false. For some children the false photo included personalised detail, while for others the false photo included only generic detail. The results showed that children who saw the personalised detail in the false photo were more confident, and claimed to remember more about the false event than children who did not see the personalised detail. Moreover, children who saw the personalised detail were also more likely to develop images and memories of the false event.

Study 3 examined whether event information would help children develop more false memories then protagonist information alone. Thus, Study 3 also examined the memory construction component of Mazzoni et al.'s (2001) model. Ten-year olds were asked about for events. All children saw a photo of their family members from the relevant time period. However, half the children also saw a photo depicting an aspect of the specific event to be recalled. The results showed that children who saw a photo depicting an aspect of the event were not more confident, nor did they claim to remember any more than children who saw only a photo of the protagonists. In addition, there was no difference in the rate of false memories and images between children who did and did not see a photo depicting an aspect of the event.

Taken together, the results of these studies demonstrate that Mazzoni et al.'s (2001) model does explain how children develop false memories. More specifically, these studies show that the level of detail, as well as the type of detail, are important factors in determining whether or not children will develop false memories.

Acknowledgements

There is no way I can find the words I need to convey the extent of my gratitude to the many people who have helped me during this long process. I get a lump in my throat and my eyes go misty every time I try. Many tissues later, I hope that these few words will convey, at least some, of what it is I want to say ... ...

First and foremost, I would like to acknowledge my supervisor and mentor: Dr Maryanne Garry. Maryanne, meeting you shaped the direction my life has, and will, take. I will be forever grateful for everything you have taught me and the opportunities you have given me. My only chance of repaying the incredible debt I owe you is to work towards a career that you will be proud of.

Next, I would like to extend my sincere thanks to Dr Todd Jones and Dr Rachel Sutherland for their advice, support, and brainstorming sessions along the way. I learnt so much from you both. Thank you.

In addition, I would like to thank the many, many schools willing to participate in this research, it never would have happened without you! To all the children and their parents, thank you for inviting us into your homes and sharing your family photos and history with us.

I would also like to acknowledge my dear friends and colleagues: Matthew Gerrie, Melanie Takarangi, and Lauren French. Every day I am grateful to have met you all, and to have you in my life. I will never be able to thank you enough for support you have given me. Please just know that I would not have made it to this point without you. I would also like to thank Drs Seema Clifasefi, Stefanie Sharman, and Kimberley Wade for not only showing me how it can be done, but for also showing me what I want to be.

Outside of the University there are so many people who have played a crucial role in this journey: Anouk, Rebekah, Tania, Liz, John, Janine, Sandra, Alastair, and Andrew. Thank you for understanding when I cancelled on you, was distracted around you, or simply bored you with details! Some day in some way I will repay you all.

Finally, I would like to try and thank my family. You have always been my biggest source of strength. You have always inspired and encouraged me to be what I wanted to be and to do what I wanted to do. You have challenged me, argued with me, cheered me up, and calmed me down, but more than anything, you were always there, behind me and beside me. Thank you for believing in me, and always, always, supporting me.

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Chapter 1

Child Sexual Abuse Cases and Child Suggestibility Research

In the late 1980s child sexual abuse seemed to have reached epidemic proportions. The media and the courts throughout Western countries were clogged with child sexual abuse cases. These cases usually began in daycare centers and inevitably resulted in widespread panic in communities[1]. Sometimes those cases involved multiple perpetrators, but more often than not there were multiple victims.

In retrospect, the epidemic was fueled by a widespread belief that when children are first asked, they do not typically confirm that they have been abused (Bruck & Ceci, 2004). In fact, investigative interviewers were lead to believe that it might take a few interviews before children admit to any abuse. Summit (1983) developed the concept of Child Sexual Abuse Accommodation Syndrome to account for this belief. He asserted that early denials and later retractions and altered allegations are to be expected from children in any case of sexual abuse. Based on Summit's assertions, if investigators suspected that sexual abuse had occurred, children were repeatedly interviewed over weeks and sometimes months (Bruck & Ceci, 1995; Hood, 2001).

Analyses of interview transcripts suggest that it was fairly common for those investigative interviews to be full of leading questions, questions that

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[1] The following are just a few examples of childcare facilities that have been embroiled in sexual abuse allegations: McMartin Preschool, California, US: Country Walk, Florida, US; Small World, Minnesota, US; Fells Acres, Massachusetts, US; Georgian Hills, Tennessee, US; Rogers Park Jewish Community, Illinois, US; Manhattan Ranch, California, US; Craig's Country, Maryland, US; Felix's, Nevada, US; East Valley YMCA, Texas, US; Glendale Montessori, Florida, US; Old Cutler, Florida, US; Little Rascals, North Carolina, US; Faith Chapel, California, US; Fran's, Texas, US; Christchurch Civic Creche, Christchurh New Zealand; Seabeach Kindergarten, Sydney, Australia; Kent, Nottingham, and Congleton, Cheshire, England.

implied guilt on the part of the suspected perpetrator. In addition, children were sometimes threatened, coerced, bullied and bribed until investigators found the answers they were looking for (see for example Bruck & Ceci, 1995; Hood, 2001). As a result numerous people were arrested, and charged with bizarre and heinous crimes. While some of these cases were likely genuine examples of terrible abuse, some were not. Sadly, developmental researchers and defense lawyers had no evidence to support their assertions that the children's allegations were simply a result of repeated suggestive questioning on the part of overzealous investigators (Ceci & Bruck, 1993; Bruck & Ceci, 1995). As a result, they could do little except watch and testify to their beliefs, while those accused were convicted and jailed.

Take for example, the case of People v Akiki (1993). In 1991, Akiki was a volunteer Sunday School teacher at Faith Chapel in Spring Valley California. After a series of interviews with police, social workers, therapists and undoubtedly their parents, 4- and 5-year old children in Akiki's care began to divulge stories of him killing a human baby, an elephant, a giraffe and other animals. In addition, children alleged he had kidnapped them, taken them in his car, raped them, dunked them in feces-filled toilets, sodomized them with curling irons and toy fire-truck ladders, as well as forced them to play naked sex games, hung them upside down, threatened them with guns and knives, and urinated on them. The abuse was said to occur during the weekly church service, in a little school-room adjacent to the church.

There was no evidence to support the children's allegations. None of the children's parents or the Sunday School supervisor ever noticed

anything unusual, and there was no physical evidence to suggest anything may have happened to the children: no signs of abuse, and no signs of animal sacrifice. However, Akiki was still charged and tried on 35 counts of sexual abuse committed against dozens of children. He spent two and a half years in prison before being acquitted on all counts. While Akiki's case sounds implausible, it is unfortunately far from unique.

Peter Ellis, in New Zealand, found himself facing eerily similar charges (see Hood, 2001, for a review), as did Margaret Kelly Michaels , in New Jersey (State of New Jersey v Michaels). They too were accused of murder and sodomy, as well as keeping children in cages, taking them on secret trips through tunnels and trapdoors, forcing them to eat feces and drink urine, and subjecting them to naked games. In fact, just like Akiki's case, nobody noticed anything unusual, and there was no evidence of any wrong-doing by Ellis or Michaels—except, of course, for the children's testimony. In the end that testimony and the community panic was enough. Both Ellis and Michaels were convicted of their suspected crimes. Ellis served his full sentence. Michaels was released on appeal after five years in jail, 18 months of which had been spent in solitary confinement.

If we assume that the allegations Akiki, Ellis, Michaels, and many others faced were indeed false, the obvious question we need to answer is this: how do children come to report such bizarre and horrific events if those events never really happened?

The research: the role of interviewers and interviewing procedures

More than 20 years of research has led scientists to some of the answers. For example, we now know that the way in which children are

interviewed has an enormous impact on their accuracy. More specifically, we know that children provide their most accurate reports in response to open-ended questions ("Would you like to tell me about that?") that are followed by open-ended prompts ("Is there anything else you can remember about that?"). Open-ended questions allow children to describe an event in their own words, and they reduce the risk that an interviewer will suggest details that children do not remember. In fact, as soon as specific questions begin, the potential for inaccuracies to creep in to children's reports increases (Lamb, Sternberg, & Esplin, 1998; Orbach, Hershkowitz, Lamb, Sternberg, Esplin, & Horowitz, 2000; Poole & Lamb, 1998; Wilson & Powell, 2001). Thus, "best practice" guidelines now routinely recommend that investigative interviewers begin with an open invitation for children to talk about what happened to them (Orbach et al., 2000; Home Office & Department of Health, 1992) and continue to maintain open-ended questions throughout the interview.

In addition, we now know that interviewers who believe they know what happened before they interview a child will typically find evidence to support their hypothesis. For example, Ceci, Leichtman, and White (1995) had a group of 3- to 4-year olds and 5- to 6-year olds participate in a game of tag. One month later the children were interviewed about what happened during the game. However, while the instructions the interviewers were given were the same, the information they were given about the event was not. All the interviewers were told to conduct an interview to determine how much information each child could still recall about the event. However, some of the interviewers were given misleading

information about what had actually happened during the game of tag (for example, that a child had been touched on the knee when they had not).

Ceci et al. (1995) told the interviewers to begin the interview by asking the child for a free narrative and to avoid all forms of suggestion and leading questions. Despite these constraints, Ceci et al. found that when the interviewers were given misleading information, 34% of the 3- to 4-year olds and 18% of the 5- to 6-year olds corroborated and elaborated on one or more of the false events that the interviewer believed had occurred (for example, one child claimed to have had their knees licked and marbles inserted in to their ears). By contrast, when the interviewers were given generic information, children provided accurate reports. Clearly, what an interviewer believes happened during an event can affect the evidence a child provides, even when the interviewer tries to avoid suggestive questions.

One reason why interviewers beliefs about what happened to children can affect their reports so markedly is that children will often provide an answer to a question regardless of whether or not those children think the question is bizarre or don't know the answer. For example, in a study by Walker, Lunning, and Eilts (1996), children watched a video of an event and then answered a set of multiple-choice questions about what they had seen. Some of those questions were misleading, such as "Did you see a boy or a girl in the video" when neither a boy nor a girl was actually in the video. Nevertheless, Walker et al. found that 82% of 3- to 4-year olds and 52% of 5- to 6-year olds chose one of the interviewers' options when they should have said "neither." In addition, Hughes and Grieve (1980) asked 5- to 7-year olds a series of bizarre, illogical, questions such as, "Is red heavier

than yellow?" At best, these questions required more information before children could provide a reasoned response. Regardless, children provided an immediate response in 88% of cases. Taken together, these studies illustrate children's faith that adults will ask reasonable questions that have reasonable answers. As a result, these studies provide further evidence to show how important open-ended questions are in interviews with children.

In short, we now know that many of the techniques common in cases such as Akiki's, Michael's and Ellis' can lead to inaccuracies in children's reports when used in isolation, let alone when used in combination with other suspect techniques. A study by Ceci and Leichtman (1995) demonstrates that a combination of suspect techniques will further increase chidren's inaccuracies.

Ceci and Leichtman (1995) were interested in how children's accuracy might be affected by information children received about a person before and after an event. Ceci and Leichtman interviewed 3- to 6-year old children about an event involving a character named Sam Stone. The event was extremely short and innocuous: Sam Stone entered the children's classroom and said "hello" to the children's teacher. He commented on the story she was reading the children, walked around the perimeter of the classroom, and said "goodbye." However, the teacher told some children stories about Sam before they met him. These stories were designed to induce a stereotype of Sam being a kind but very clumsy person. After Sam's visit, all children were then interviewed once a week for four weeks about what had happened. For some children, those interviews contained false information: that Sam Stone had dirtied a teddy bear and he had

ripped up a book. Finally, children were interviewed a fifth time by a new interviewer who asked the children to tell her everything they could remember about what happened when Sam Stone came to visit. Ceci and Leichtman found that when children were given the stereotype information before the event and the suggestive interviews after the event, 46% of the 3- to 4-year olds and 30% of the 5- to 6-year olds spontaneously claimed that Sam Stone had dirtied a teddy bear and ripped up a book when he visited their classroom. In other words, a substantial proportion of children were willing to accuse Sam Stone of "crimes" they had not seen him commit.

Taken together, this body of research demonstrates that the way children are interviewed can have an enormous effect on the accuracy of their reports. Accordingly, these studies provide a more prosaic explanation for the early denials and later retractions that Summit (1983) took to be an indication of sexual abuse. They also suggest that children might be willing to make an allegation in an investigative interview simply to appease an interviewer. However, they do not answer a crucial question: is it possible for children to systematically develop memories of entire events that never happened?

Children's false memories

Research by Ceci and colleagues goes some way towards answering this question. In their first study, Ceci and colleagues (Ceci, Huffman, Smith, & Loftus, 1994) asked children to talk about four events. Two of the events were true events supplied by the children's parents. However, two of the events were entirely false: that the child had got their finger caught

in a mousetrap and had to go to the hospital to have it removed; and that the child had gone for a hot air balloon ride with classmates. The children were interviewed six to nine times over consecutive days. At each interview, the children were asked to "think real hard" about the events and see what they could remember. However, the children were warned that some of the events might not have happened to them. Ten weeks after their initial interview children were interviewed a final time (their 7th or 10th overall) by a new interviewer who asked them to tell her everything they could remember about each of the events. Despite the reminder that some of the events might not actually have happened to them, 36% of the 3- to 4-year olds and 32% of the 5- to 6-year olds claimed at least one of the events really happened.

To determine whether children's true and false reports could be discriminated, Ceci et al. (1994) showed five true reports and five false reports to 109 professionals. The professionals were psychologists, psychiatrists, police officers, and social workers, and their task was to determine which of the events children had actually experienced. Ceci et al. also asked the professionals to rate their confidence (on a 7-point scale) that their decision was correct. The professionals performed at chance. In other words, they were just as likely to be wrong as they were to be right. These results suggest that the quality of children's false reports was good enough to fool professionals who work with children on a daily basis.

In a second study, Ceci and colleagues (Ceci, Loftus, Leichtman, & Bruck, 1994) tried to encourage children to actively imagine what the events would have been like. Children were asked about eight events (four true and four false) at 11 interviews spaced a week apart. Rather than

simply asking the children to "think real hard," Ceci et al. told the children they were playing a "picture in the head game." Then they told the children that their parents had said that *all* of the events had really happened. Using this more suggestive method more children claimed the false events had really happened: 45% of the 3- to 4-year olds and 40% of the 5- to 6-year olds. In addition, Ceci et al. showed a selection of the children's reports to professionals and asked them to determine which were reports of actual events. Once again, the professionals performed at chance. Since these original studies, other researchers have used similar methodologies to look at children's false reports (Bruck, Ceci, & Hembrooke, 2002; Ghetti & Alexander, 2004; Jones & Powell, 2005; Lee, Cameron, Doucette, & Talwar, 2002; McBrien & Dagenbach, 1998; Powell, Jones, & Campbell, 2003; Quas et al., 1999). Across those studies, children consistently claim to have had even somewhat bizarre experiences after being interviewed several times (such as seeing an alligator eating an apple on an airplane; McBrien & Dagenbach, 1998).

Taken together, these studies demonstrate that a substantial proportion of children can come to claim that entirely false events happened to them. However, those researchers (Ceci et al., 1994a; 1994b; Bruck et al., 2002; Ghetti & Alexander, 2004; Jones & Powell, 2005; Lee et al., 2002; McBrien & Dagenbach, 1998; Powell et al., 2003; Quas et al. 1999) were only interested in the pattern of children's "yes" responses over the course of the interviews. They did not examine what children said about those events or how confident children were that the events really happened. While some of the children undoubtedly developed an actual memory of the suggested event (certainly the professionals thought some of the children were

describing real memories), we have no way of knowing whether there was a systematic pattern. In other words, we do not know whether children's false claims typically translate into false memories, and if they do, how those false memories actually develop.

As a result, while 20 years worth of research shows how children's testimony can be corrupted, there are still gaps in what we know. We have a good grasp on how details of a children's report can change over time, but we do not understand how children can come to believe that an entirely false event happened to them. However, if we turn to the adult literature we can get some idea of how children's false memories might develop. Thus, the following chapter examines research on how false memories develop in adults.

Chapter 2

Adult Memory Implantation Studies

While developmental researchers focused on children's suggestibility and ways of minimizing false reports, other adult memory researchers focused on the problem of "recovered memories." They too were inspired to understand a real life phenomenon. For around the same time that the daycare sexual abuse cases reached media prominence, many adults were beginning to uncover memories of their own childhood abuse—abuse that they had "repressed" for many years. Articles about repression and people who had recovered memories appeared in respected newspapers and magazines, on daytime talk shows, and current affairs programs (Kantrowitz, 1991; Oldenberg, 1991; Ritter, 1991; Toufexis, 1991). However, despite the widespread popular belief that our minds regularly repress events that we do not want to deal with, there was and still is no scientific support to suggest that it is possible (for a review of the research see, Holmes, 1990; 1995).

Nevertheless, the lack of scientific evidence did not prevent criminal cases built on a recovered memory from reaching the courts, or the resulting convictions (e.g., see Loftus & Ketcham, 1994). Without any scientific evidence to show that repression does not exist juries tended to believe the recovered memories were real. The only recourse available to researchers who wanted to halt the surge of recovered memory cases was to provide an alternative explanation. In other words, in order to stop recovered memory cases reaching the courts, researchers had to show how

vivid, detailed, and entirely false memories could develop in the laboratory.

False Narrative Paradigm

Loftus and Pickrell (1995) were the first to provide evidence that people could systematically develop memories of entirely false events under experimental conditions. In what has become known as the *false narrative paradigm*, participants were recruited to participate in family pairs. One family member became the confederate, and one the subject. The confederate supplied details of three true events from the subject's childhood. The subject was then mailed a 5-page booklet containing narratives describing four events: the three true events provided by the confederate and one false event. The false event was that the subject had been lost in a shopping mall. For example, this is what one subject read about the false event:

> You, your mom, Tien, and Tuan all went to the Bremerton K-Mart. You must have been 5-years old at the time. Your mom gave each of you some money to get a blueberry Icee. You ran ahead to get into the line first, and somehow lost your way in the store. Tien found you crying to an elderly Chinese woman. You three then went together to get an Icee.

Although the specific detail differed from subject to subject, the basic structure of the narrative was the same: participants were with their family in a large store or mall, they got lost, and were rescued by an elderly person.

Participants were first asked to write down everything they could remember about each of the events. Then, they were interviewed face-to-face in two separate interviews spaced one to two weeks apart. During these interviews, the participants were told that the researchers were interested in how much detail they could remember about the specific events and how their memories of those events would differ from those of their family members. Again, they were asked to recall everything they could about the four events. In addition they were asked to rate the clarity of their memories and their confidence in those memories.

Not surprisingly, participants remembered the vast majority of the true events. However, 25% of Loftus and Pickrell's (1995) participants also came to remember details of the false "lost in a shopping mall" event. Some of these false memories were full of sensory detail and some of the participants had difficulty believing that the event had never really happened. These participants struggled to believe that their memory of getting lost was merely the product of a suggestion combined with their own imagination.

Since Loftus and Pickrell (1995), seven peer-reviewed studies have employed the false narrative paradigm. Participants have come to remember a wide range of events covering an equally wide range of emotions, from the embarrassment of wrecking havoc at a family wedding (Hyman, Husband, & Billings, 1995), to the fear of an animal attack (Porter, Yuille, & Lehman, 1999), to the relief of being rescued from drowning by a lifeguard (Heaps & Nash, 2001). Collapsing across those studies, the weighted mean rate of false memories is 44%, and more than half of those false memories are clear, vivid memories full of sensory detail (Garry &

Wade, in press; Hyman & Billings, 1998; Hyman et al., 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek, Finger, & Hodge, 1997; Porter et al., 1999).

The development of false memories

Hyman and Kleinknecht (1999) were the first to propose a theoretical model to explain how participants could come to remember an event that never happened (see also Hyman & Loftus, 1998).

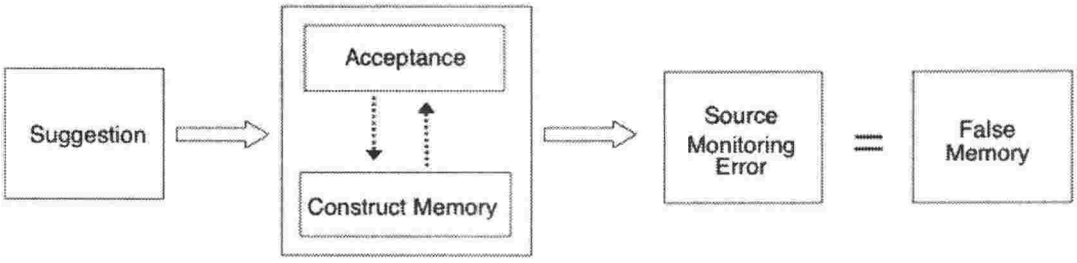


Figure 2.1. Hyman & Kleinknecht's (1999) model for how a false memory develops.

As Figure 2.1 shows, Hyman and Kleinknecht suggested that there are three processes involved in the creation of a false memory. Once the false event is suggested, participants must accept that the event is indeed possible and construct a memory of what that event would have been like. Accepting that the event really happened could happen before or after the subject constructs a memory. In addition, constructing a memory may increase the likelihood of accepting that the event really happened and vice versa (as represented by the dotted lines connecting the two processes). However, before the constructed memory becomes a false memory, participants must mistakenly attribute the constructed memory to actual experience rather than to their own imagination. That is, they must commit a source monitoring error as described by the Source Monitoring Framework (SMF; Johnson, Hashtroudi, & Lindsay, 1993).

Refining Hyman & Kleinknecht's (1999) model

More recently, research by Mazzoni, Loftus, and Kirsch (2001) helped to refine Hyman and Kleinknecht's (1999) model. As Figure 2.2 illustrates,

they divided the "acceptance" stage in to two separate processes: finding the suggested event plausible, and developing a belief that the event happened. Mazzoni et al. asked participants to rate the plausibility of a series of childhood events, and how sure they were that they had experienced each of those events. Embedded in that list were two target events: a plausible event (almost choking), and an implausible event (witnessing a demonic possession). Three months later, participants read a series of articles designed to increase the plausibility of the target events. Later, participants were asked to rate the plausibility of all the events and to report how sure they were that they had experienced those events a second time.

Mazzoni et al. (2001) found that while plausibility ratings increased, subject's confidence that those events had happened to them did not always increase. In other words, plausibility and belief were not significantly correlated. Consequently, Mazzoni et al. suggested that "accepting" an event could have happened is not the same thing as believing that it did happen and therefore divided the acceptance stage of Hyman and Kleinknecht's (1999) model into two separate processes:

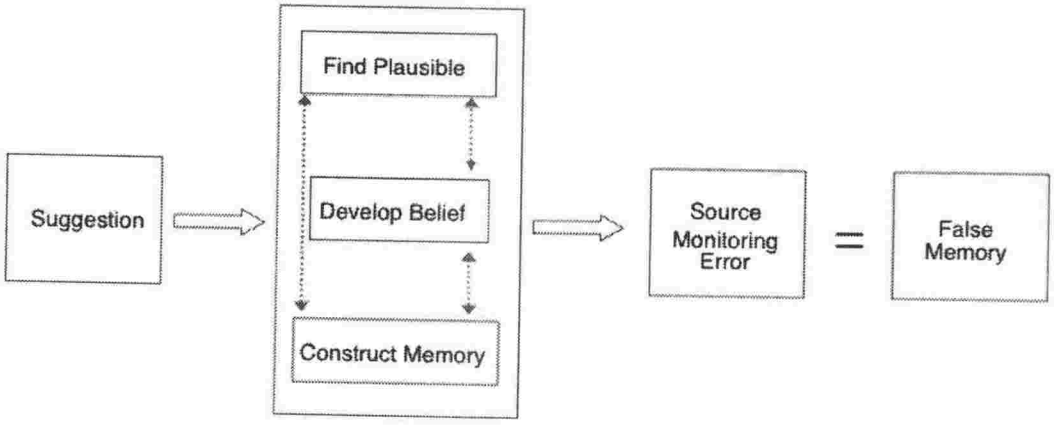


Figure 2.2. Mazzoni et al.'s (2001) model for how a false memory develops.

finding the event plausible and developing a belief that the event happened. However, as the dotted lines in Figure 2.2 show, developing a belief that the suggested event may have happened might influence whether participants find the suggested event plausible. In addition, developing a belief that the suggested event may have happened might influence whether participants go on to construct a memory of that event. In other words, the processes may interact and do not necessarily occur in a hierarchical or linear manner.

Evidence for the model

Taken together, the research by Hyman and colleagues and Mazzoni and colleagues identifies four processes that must occur before participants will develop a false memory. In the following sections the evidence for each of those four processes will be discussed separately.

Plausibility

Logically, it makes sense that people come to remember an event only if it seems plausible to them. Indeed, numerous studies in several different paradigms demonstrate the importance of plausibility when it comes to remembering false experiences (Mazzoni & Loftus, 1998; Mazzoni et al., 2001; Pezdek et al., 1997; Pezdek & Hodge, 1999; Spanos, Burgess, & Burgess, 1994; Spanos, Cross, Dickson & DuBreuil, 1993; Scoboria, Mazzoni, Kirsch, & Relyea, 2004; Thomas & Loftus, 2002; Thomas, Bulevich, & Loftus, 2003).

For example, many of the participants in the studies conducted by Hyman and colleagues (Hyman & Billings, 1998; Hyman et al., 1995; Hyman & Pentland, 1996) were able to reject the false event based on self-

relevant knowledge. Hyman and colleague's false event was that the subject had spilled a bowl of punch over the parents of the bride at a wedding as a child. However, to many of their participants the false event was entirely implausible for one very good reason. They knew that they had never attended a wedding as a child. This knowledge posed a rather substantial stumbling block in the road to developing a false memory.

In addition, in several studies Pezdek and colleagues have demonstrated that the plausibility of the suggested false event is an important factor in whether or not people will develop a false memory (Pezdek et al., 1997; Pezdek & Hodge, 1999). In Pezdek et al.'s (1997) first experiment they asked some Jewish and some Catholic high school students about five events from their childhoods: three of those events were true and two were false. The false events focused on an embarrassing event that happened either after having received communion (a Catholic event) or during the shabbot prayers (a Jewish event). They predicted that Jewish students would find the Jewish event relatively more plausible than the Catholic event, and thus be more likely to develop a memory for it over the course of two interviews. Of course they predicted the opposite pattern for Catholic students. That is exactly what happened: Jews were more likely to falsely recall the Jewish event than the Catholic event, and Catholics were more likely to falsely recall the Catholic event than the Jewish event. In other words, both groups were able to reject the false event when it did not correspond with their own religion.

Pezdek et al. (1997) suggested that the reason the students were able to reject the religious event that did not correspond with their own religion was because they did not have the script-relevant knowledge available in

memory to create a memory of it. As a result, participants would have found the event implausible. Pezdek et al. explored this idea in a second experiment. They repeated Loftus and Pickrell's (1995) study with one variation. Half the participants were asked to remember getting lost in a shopping mall, what Pezdek et al. called the plausible false event. The remaining participants were asked to remember the time they had to be given a rectal enema, what Pezdek et al. called the implausible false event.

Pezdek et al. (1997) predicted that participants would be less likely to develop a memory of receiving a rectal enema because they would not have the script-relevant knowledge available in memory to create a memory of it. That is exactly what happened: no subject developed a memory for the implausible event, while 15% developed a memory of getting lost in a shopping mall. In a follow-up study Pezdek and Hodge (1999) replicated Pezdek et al.'s (1997) earlier results with a sample of 5- to 7-year olds and 9- to 12-year olds. In both age groups children were more likely to develop a memory of the more plausible event "getting lost in a shopping mall" than the less plausible event "receiving a rectal enema". Thus, Pezdek et al. concluded, participants will develop memories only for events that they find plausible, and for which they have script-relevant knowledge.

However, as Mazzoni et al. (2001) observed, plausibility is far from a fixed construct. Instead, judgments about what is plausible can change over time, and even events considered implausible can come to be believed if participants have enough evidence. In Mazzoni et al.'s (2001) study participants rated witnessing a demonic possession as less plausible than almost choking, but claimed to have never experienced either event. Three

months later, as part of a seemingly unrelated experiment, participants read a collection of short passages on four different topics, including passages about one of the two target events. Half the participants read about the base rate of choking, including testimonies from people who had choked; the other half read similar passages about demonic possession. One week later, Mazzoni et al. (2001) gathered new plausibility and belief ratings from their participants. They found that participants who read about demonic possession rated witnessing it as more plausible than they had initially. While they still rated it as less plausible than choking, by the end of the study participants were equally likely to say that they had witnessed a demonic possession as they were to say they had choked. In fact, 18% of the participants changed their response from a "definitely did not happen" to a "definitely did happen" by the end of the study. Thus, Mazzoni et al.'s research suggests that, at least for some participants, even implausible events can become plausible, and small changes in what we think is plausible can lead to substantial changes in our autobiographical beliefs.

Considering Mazzoni et al.'s (2001) results, how should we understand Pezdek and colleagues' results (Pezdek et al. 1997; Pezdek & Hodge, 1999)? Recently, Scoboria et al. (2004) suggested that the answer may lie in Pezdek and colleagues' definition of plausibility. Pezdek et al. measured participants' schematic knowledge of their two false events: getting lost in a shopping mall and being given a rectal enema. Participants knew less about receiving an enema than they did about getting lost, results Pezdek et al. interpreted as evidence that a rectal enema was a less plausible event then getting lost in a shopping mall. But when Scoboria et al. investigated

whether participants' schematic knowledge was related to how plausible they judged a series of events, there was no correlation. In other words, Scoboria et al. showed that schematic knowledge is a poor substitute for plausibility. Thus, Pezdek et al.'s conclusions, that subject's will develop memories only for events that they find plausible (based on schematic knowledge), seems premature.

Scoboria et al. (2004) were also interested in the distinction between personal plausibility (what is plausible for me) and general plausibility (what is plausible for most people). Scoboria et al. asked participants a set of questions about 10 childhood events that varied in likelihood from losing a toy, to getting abducted by a UFO. The questions asked participants to rate on a scale from 1 ("not at all plausible" or "definitely did not happen") to 8 ("extremely plausible" or "definitely happened") [1] how plausible it is that at least some people would experience the event before the age of 6; [2] how plausible it is that the event could happen to the subject before the age of 6; [3] how likely it is that the event did in fact happen to the subject before the age of 6; and [4] if the subject actually remembered the event happening before the age of 6. Scoboria et al. found that participants always rated events as more likely to happen to the general public than themselves, and always gave equal or higher ratings for the plausibility of the event than they did for their belief that the event happened to them. Thus, these results illustrate that it is not enough for participants to consider an event plausible. If they are going to develop a memory of the event, participants must find the event personally plausible.

In summary, research has demonstrated that finding an event plausible is a crucial step in the development of both children's and adult's false

memories. In addition, research has clarified that an event must be judged personally plausible, not just generally plausible. As such, the "Find Plausible" component of the model has been amended to "Find Personally Plausible" in light of the more recent literature.

Autobiographical Belief

In addition to finding the false event personally plausible, participants must develop a belief that the suggested event happened to them. Autobiographical beliefs, just like plausibility judgments, are surprisingly malleable. Research has shown that our beliefs can change when we are exposed to a manipulation as quick as an imagination exercise (Garry, Manning, Loftus, & Sherman, 1996; Goff & Roediger, 1998; Heaps & Nash, 1999; Paddock et al., 1999), as innocuous as solving a set of anagrams (Bernstein, Whittlesea, & Loftus, 2002), or as persuasive as false feedback (Lindsay, 1997; Mazzoni, Loftus, Seitz, & Lynn, 1999; Mazzoni & Loftus, 1998).

Garry et al. (1996) were the first to demonstrate that our confidence in childhood events can change after a quick imagination exercise. They asked their participants to rate how confident they were that a list of events had happened to them during childhood. Sometime later, they asked participants to imagine some of the listed events and not others, and then to rate their confidence a second time. They found that participants became more confident that events they had imagined had happened, compared to those that they did not imagine. Garry et al. termed this increase in confidence after imagination "imagination inflation."

Garry et al.'s (1996) effect has since been replicated in a series of experiments (Heaps & Nash, 1999; Paddock et al., 1999). For example we

now know that imagination inflation does not just occur for imagined childhood events, but also for imagined recent actions, and that the more times something is imagined the more inflation we can expect (Goff & Roediger, 1998). In fact, more recent studies show that similar increases in confidence can be induced by asking participants to paraphrase a passage of text (Sharman, Garry, & Beuke, 2004), or by asking participants to solve a series of anagrams (Bernstein, Godfrey, Davison, & Loftus, 2003).

For example, Bernstein et al. (2002) first taught participants how to solve a set of anagrams. The anagrams were difficult and this phase of the study was intended to create the expectation that any task involving anagrams would also be difficult. Next, they asked participants to rate their confidence that a series of events had happened to them during childhood. Some of the event statements were presented intact (won a blue ribbon at the fair) while others were presented with one word as an anagram (broke a nwidwo playing ball). These anagram sentences included contextual detail, which made solving the anagram a much easier task than the participants had been led to expect. Bernstein et al. predicted that participants would attribute the surprising ease of solving these anagrams as an indication that they had experienced the events as a child. That is exactly what happened: participants gave higher confidence ratings to events for which they had solved an anagram.

Finally, Mazzoni et al. (1999) demonstrated the impact of false feedback on people's autobiographical beliefs. First, participants rated their confidence that a set of events had happened to them in childhood. Embedded on that list were two target events: getting lost in a shopping mall, and getting bullied. Then, one to two weeks later, in a seemingly

unrelated experiment, some participants participated in a dream interpretation experiment with a clinician. No matter what the content of the subject's dream, the clinician interpreted the dream as an indication that the subject had either gotten lost in a shopping mall as a child or, had been bullied. Finally, a further one to two weeks later, the participants rated their confidence a second time that the set of events happened to them in childhood. In addition, participants were asked to provide a description of their memory for five of the events, including the target event. Mazzoni et al. found that participants became more confident that the target events had happened to them after the dream interpretation session. More importantly, of those participants who did become more confident in the target event, 57% provided a memory of the suggested event. By contrast, 30% of those whose confidence did not increase provided a memory. Taken together, these studies show that developing an autobiographical belief that a false event occurred is a crucial step in the development of a false memory.

Memory Construction

When we think about or relive a memory of an event it is usually accompanied by information about that event, such as images of what aspects of the event looked, sounded, smelled, and felt like. Thus, it is necessary to generate these types of details to construct a memory of an event. Research has highlighted many different factors that may influence memory construction. In short, any task that involves, thinking about, imagining, or talking about a false event is likely to encourage the generation of false images, and therefore increase the chances of making a

source monitoring error, and thus of having a false memory (Hyman & Kleinknecht, 1998).

For example, using the false narrative paradigm (Loftus & Pickrell, 1995), Hyman and Pentland (1996) examined the impact of an instruction to imagine on false memory development. They asked one group of participants to spend one minute imagining what it would have been like to spill punch over the parents of the bride at a wedding, and then asked them to describe what they had imagined. By contrast, control participants were simply asked to sit quietly and think about the event for one minute. They found that 37.5% of the Imagery participants reported clear or partial memories of the false event, while only 12.1% of Control participants did. Hyman and Pentland concluded that the instruction to imagine encouraged participants to actively imagine different aspects of the event leading them to create a more coherent and detailed memory for it.

In addition, Hyman et al. (1995) found that false memories are more likely to develop when participants draw on other relevant autobiographical events to embellish the memory. Hyman et al. examined whether participants included relevant background knowledge in their reports during the first two interviews. They then examined the false memory rates at the third interview for those that did include relevant background knowledge compared to those that did not. They found that participants who did include relevant background knowledge in their descriptions of the event during the first two interviews were more likely to develop memories than those who did not (37% versus 10%).

In summary, these studies clearly demonstrate that the more detailed the constructed memory, the more likely participants are to go on to

develop a false memory. However, it is possible for a subject to find an event plausible, to believe that it may have occurred, and to construct a memory of it, and still not have a false memory. To have a false memory, participants must forget that they imagined the event, and instead believe that they actually experienced the event.

Source Monitoring Error

The final stumbling block in the development of a false memory is to falsely attribute the constructed memory to a real experience. In other words, participants must make a source monitoring error (Johnson et al., 1993).

Source errors are fairly common in everyday life. Most people regularly forget where they heard a news item, or who told them a joke. According to the Source Monitoring Framework (SMF; Johnson et al., 1993; Mitchell & Johnson, 2000) these errors occur because we do not typically store memories with information about their source. Instead, when a memory is activated it is accompanied by a phenomenological experience. That phenomenological experience might be a general feeling of familiarity, or a more specific sense of reliving the perceptual or emotional details of the original event. Memories of real experiences and memories of imagined events are usually accompanied by different phenomenological sensations.

For example, Suengas and Johnson (1988) asked participants to either perform (an external event) or imagine (an internal event) a set of events. The next day Suengas and Johnson asked those participants to rate the clarity, sensory detail, context, thoughts and feelings, and intensity associated with each of the performed and imagined events. They found

that memories for performed events were rated higher on each of the characteristics than imagined events. This basic finding, that memories of actual experiences contain more sensory and perceptual information than memories of imagined events, has been replicated in several studies (Finke, Johnson, & Shyi, 1988; Hashtroudi, Johnson, & Chrosniak, 1990; Johnson, 1988; Johnson, Foley, Suengas, & Raye, 1988). Johnson and colleagues (Johnson et al., 1993; Mitchell & Johnson, 2000) suggest that we develop a heuristic, whereby if a memory meets a certain level of detail we assume it is a memory of an actual experience as opposed to an imagined experience. Clearly therefore, errors are likely to occur if an imagined event meets that pre-determined level of detail.

In addition, other research has highlighted that the ease with which participants are able to imagine an event also affects whether or not they will commit a source monitoring error. For example, Finke et al. (1988) presented participants with a set of simple shapes. Half of the shapes were presented intact. However, half were not. Instead participants only saw half of the shape and were instructed to imagine the other half. Finke et al. varied whether participants had to imagine the other half of the shape on the horizontal or vertical axis. They were interested in whether participants would correctly remember which shapes they had seen whole and which they had had to imagine whole. They predicted that it would be harder to imagine the other half of the shape on the horizontal axis, and as a result, participants would be more likely to remember the "cognitive operations." In other words, the harder participants found the task, the more likely they should be to remember completing the task, and therefore the less likely they should be to make a source monitoring error. That is exactly what

happened. Participants had much more difficulty remembering the process of imagining the other half of shapes when they were presented vertically because it was a much easier task.

Taken together, these studies show that the more elaborate a constructed memory is, the more likely it is to be mistakenly attributed to a genuine experience. In addition, the easier it is to generate an image of an event the less likely it is that the image will carry any trace of the cognitive operations required to create it. In either situation, once the source monitoring error is committed participants have developed a false memory.

Summary

In summary, there is a substantial body of research to support the importance of each of the four processes in the development of false memories in adults. The purpose of the studies in this thesis was to evaluate whether the adult model can also explain children's false memories. In the following chapter I return to the child suggestibility literature to explain how I chose to use a particular means of suggesting false events to children.

Chapter 3

Choosing a Means of Implanting False Memories

Taken together, the research presented so far illustrates that there are numerous factors that need to be taken into account to ensure that the information a child reports in an interview is as accurate, yet as detailed, as possible. The safest and most reliable option for investigative interviewers is to rely primarily on open-ended questions (Lamb et al., 1998; Orbach et al., 2000; Poole & Lamb, 1998; Wilson & Powell, 2000). Unfortunately, research also illustrates that the ability to use retrieval strategies is a skill that develops relatively late in childhood. As a result, the amount of information young children provide in response to open-ended questions is often fragmented (Davies, Westcott, & Horan, 2000; Obach et al., 2000; Sternberg, Lamb, Davies, & Westcott, 2001) and is typically more limited than that of older children (Brown, Bransford, Ferrara, & Campione, 1983; Brown & DeLoache, 1978; Kobasigawa, 1977; Salmon, 2001; Schneider & Bjorklund, 1998). Consequently, children are more reliant than the typical adult on external cues to help them remember aspects of an event (Brown & Reeve, 1987; Kobasigawa, 1974; Salmon, 2001).

In an attempt to try and enhance children's ability to recall events, investigative interviewers and therapists have used many different cues, props, toys, models and drawings in a quest to find a tool that increases the amount of information children report, without increasing the errors children make. That quest has not been particularly fruitful. Indeed, research suggests two primary reasons why external cues or props are effective recall aids for children. The first reason is that the cues help

children to stay focused for longer periods. Although it may seem a fairly inconsequential reason, it is not. The longer children are engaged in the recall task, the more information they have the chance to recall. Of course, a more comprehensive, more detailed report is likely to be much more helpful to investigators than a less detailed report. The second reason external cues are helpful for children is because cues reduce the cognitive demands of remembering a) an event that often happened a long time ago, and b) the details children have already given earlier in the interview (Butler, Gross, & Hayne, 1995; Salmon, 2001; Steward & Steward, 1996; Wesson & Salmon, 2001).

However, in most cases research suggests that the utility of cues and props is quite limited: Despite sometimes increasing the amount of information children report, cues and props can also increase the number of errors children make. For example, dolls were used widely in clinical contexts in the late 1980s to early 1990s. Clinicians thought that the way children interacted with the dolls reflected children's experiences and their emotional state (Marans, Mayes, & Colonna, 1993; Pynoos & Eth, 1986; Vizard, 1991). In addition, anatomically-detailed (AD) dolls were used in investigative interviews in which sexual abuse was suspected. In these situations the dolls were thought to help children feel more comfortable. In addition, they were thought to help children describe events that they might not otherwise have had the words for (Koocher, Goodman, White, & Friedrich, 1995). However, subsequent research made it clear that the reports children gave with the help of AD dolls were not reliable. In fact, when AD dolls were used by children to report touching that occurred on their own body, the number of errors children made increased, in some

cases substantially (DeLoache, 1995; DeLoache & Marzolf, 1995; Goodman & Aman 1990; Goodman et al., 1997; Gordon et al., 1993; Saywitz, Nicholas, & Moan, 1991). Thus, DeLoache and Marzolf (1995) concluded that children, especially young children, do not understand that AD dolls are meant to represent real people (typically themselves). As a result, "best practice" guidelines now advise against the use of AD dolls in investigative interviews (Orbach et al., 2000). Nonetheless, there are techniques that do help children increase the amount of accurate information they report with no change in errors. Unfortunately, such results seem possible only when interviewers do not introduce any misleading information.

Draw and Tell interview

Asking children to draw during an interview is fairly common in clinical contexts, especially in cases where sexual abuse is suspected. One reason why clinicians ask children to draw an event is because children appear to feel more comfortable in what can be a highly stressful and disturbing experience (Poole & Lamb, 1998; Cohen-Lieberman, 1995; Riordan & Verdel, 1991). Indeed, research by Hayne and colleagues (Butler et al., 1995; Gross & Hayne, 1998; 1999) supported drawing as a recall aid. Hayne and colleagues found that when children were asked to draw a picture of an event and narrate what they were drawing, children reported more information than those simply asked to talk about that event (Butler et al., 1995; Gross & Hayne, 1998; 1999). In fact, asking children to draw while they talked about events improved children's reports relative to a control group no matter how old children were, what the emotional

content of the event was, or whether children were interviewed one week or a year after the event.

However, when children draw details of an event, or even whole events, that did not really happen, drawing too becomes problematic. For example, Bruck, Melnyk, & Ceci (2000) invited children to watch a magic show and later interviewed those children about what had happened. During the interviews children were asked to draw or simply talk about some things that had happened and some that had not happened during the magic show. Bruck et al. found that when children drew the false details they were more likely than children who did not draw to later claim that the false details really did happen.

Gross (2000) found similar results. They took children on a tour of a police station and later interviewed those children about what they had seen. In a design similar to that of Bruck et al. (2000), Gross had two implantation interviews. During the implantation interviews, they asked children about some true events (getting their fingerprints taken, looking in a jail cell) and some false events (putting on handcuffs, a lady coming in to report the theft of her son's bike). Some children were asked to draw the events, and others watched the interviewer draw and talk about the events. Six weeks later all children were re-interviewed about the trip to the police station, including a group of children who did not participate in the implantation interviews. Gross found that children in both the child-draw and interviewer-draw conditions spontaneously reported the false events. However, when children had drawn the false events themselves, they were more than twice as likely to claim those events had really happened.

In addition, Strange, Garry, and Sutherland (2003) showed that drawing also increased the likelihood that children would claim to have had entire bizarre experiences. In a three-stage procedure, Strange et al. first asked 5- to 6-year olds whether they had ever experienced a list of events. Embedded on that list was a set of highly unlikely target events, such as, "have you ever been swimming with the mermaids at the bottom of the sea?" In the second stage, a different interviewer asked some children to draw pictures of what it would be like if some of those target events really happened. This interview occurred several days after the first interview and appeared as though it was entirely unrelated. Finally, in the third stage, only an hour later, children were re-interviewed by the original interviewer. She claimed that she had lost their original answers to her questions and needed to ask them all over again. Strange et al. found that children were more likely to change their answers from "no that never happened" to "yes that really happened" when they had earlier drawn the events.

Taken together, research suggests that just like many of the other information-gathering techniques, drawing is somewhat limited in situations where false details might creep in to children's reports and their accuracy is crucial. As such, researchers recommend that drawing must also be used in therapy and investigative interviews with extreme care (Bruck et al., 2000; Gross, 2000; Strange et al., 2003). However, a review of recent clinical literature reveals increasing interest in a new information-gathering technique: photographs.

Photographs

Photos have been used in clinical practice for more than 30 years (Weiser, 2001). However, the way in which they have been used in research differs markedly from the way they are used in clinical practice. As far as the research is concerned, using photos as retrieval cues does reduce errors compared to when children are invited to play or interact with props (Aschermann, Dannenberg, & Shultz, 1998; Hudson & Fivush, 1991; Patterson, 1995). For example, Hudson and Fivush (1991) took a group of 5-year old children on a trip to a museum of archaeology. They then interviewed those children about what had happened after delays of six weeks, one year and six years. At each interview Hudson and Fivush introduced cue photos after children had exhausted their memory in free recall. The photos depicted key aspects of the museum trip, such as digging for artifacts and making clay models. Hudson and Fivush found that after the photos were introduced, children reported as much information at six years as they had at six weeks. Perhaps most significantly, children made very few errors overall and errors did not increase over time. Hudson and Fivush's (1991) results are not unique. Aschermann, et al. (1998) found a similar result for a wider age group. After participating in a contrived event, Aschermann et al. found that 3- to 7-year old children provided more correct answers and made fewer errors when they were interviewed with photos than when they were interviewed without them.

Taken together, these studies suggest that photos are effective cues that produce fewer errors than merely encouraging children to talk about an experience. Indeed, from a theoretical standpoint these results make sense.

According to the encoding specificity principle, photos should be an effective recall cue to the extent that they depict the features of an event present at encoding (Tulving & Thomson, 1973).

However, in clinical contexts there is rarely a photo depicting the events clients want or need to talk about. Instead, photos act more like spring-boards that launch the retrieval of other events. They are used to help people to talk about the events that trouble them, because they evoke memories and emotions relevant to the depicted events. For example, Weiser, a leading advocate of photo therapy techniques, claims that photos are effective recall prompts with almost all age groups and issues, including sexual abuse (2001, 2002, personal communication, February 23, 2005). However, the way in which photos are used in therapy can be very different from how they are used in experimental contexts. For example, Weiser (2001) wrote:

> During Photo Therapy sessions, photos are not just passively reflected upon in silent contemplation, but also actively created, posed for, talked with, listened to, reconstructed, revised to form or illustrate new narratives, collected on assignment, re-visualised in memory or imagination, integrated into art therapy expressions or even set into animated dialogue with other photos. Further applications will certainly appear once therapists and counselors become more comfortable using various digital technologies (p. 12).

In addition, Weiser (2002) eagerly awaits the "exciting possibilities...for using photos as counseling tools with clients who have scanners...[and] photo-manipulation software" (p.24). Thus, in therapy, photos appear to be used in a much more speculative or reconstructive manner than they are in

experimental contexts. However, Weiser appears to advocate not just using photos to reinterpret the past, but to potentially construct a different past. Weiser implies that in the not-to-distant future, therapists and counselors will soon be using digitally enhanced photos, perhaps even entirely doctored photos with their clients. What could be the effect of presenting doctored photos of entirely false events to children? Would those false photos change the way children remember their past? No research has examined the impact of "false photos" on children's memory. However, researchers have begun examining the impact of false photos on adults' memories.

False Photo Paradigm

With the increasing availability of photo manipulation software, Wade, Garry, Read, and Lindsay (2002) were interested in whether photos could induce false memories. Wade et al. adapted the false narrative paradigm developed by Loftus and Pickrell (1995), replacing the narratives describing the target events with photos of those events. Participants were recruited in family pairs. One of those participants became the confederate, and the other became the subject. The confederate provided the experimenters with a collection of the subject's childhood photos, three of which were used during the study to represent the true events. However, Wade et al. used some of the remaining true photos to create a false event in Photoshop® depicting the subject and family members going for a ride in a hot air balloon.

Participants were interviewed three times over one to two weeks. At each interview, they were presented with an event booklet containing

photocopies of the three true event photos and the false event. The false event always appeared in the third position. The participants were told that the purpose of the study was to examine how people reminisce about childhood events, and were asked to tell the experimenter everything they could remember about each of the events. If they had difficulty recalling an event they were given a few minutes to concentrate on getting the memory back. Wade et al. told the participants that the second purpose of the study was to examine the efficacy of certain memory retrieval techniques. Thus, for any event that the participants had difficulty recalling (and always the false event) participants were given guided imagery and context reinstatement instructions (imagine being back in the hot air balloon; what might it have been like? Who is with you?). After three interviews 50% of the participants came to recall details of the event. Clearly then, false photos can induce false memories.

In this thesis, Wade et al.'s (2002) false-photo paradigm was adapted to determine whether photos can also be used to induce children's false memories. If photos can induce children's false memories, then Weiser's (2001) prediction, that digital technologies will soon be employed in therapy, will need to be revisited and reevaluated. It would be unsafe to recommend a technique that can have significant negative consequences. In fact, if photos can induce children's false memories then photos too will join children's drawings, toys, props and AD Dolls on the list of external cues that need to be used by therapists and investigative interviewers with extreme care (Bruck et al., 2000; Gross, 2000; Strange et al., 2003). Indeed, if photos can induce children's false memories, then the way in which photos are already used in therapy may actually be detrimental rather than

beneficial (Weiser, 2001, 2002). The following chapter provides an overview of the studies in this thesis.

Chapter 4

Overview of the Experiments

The primary aim of this thesis was to investigate whether Mazzoni et al.'s (2001) model for adult false memory development also accounts for children's false memory development. To address this issue, three experiments were conducted targeting different aspects of Mazzoni et al.'s model (see Figure 4.1).

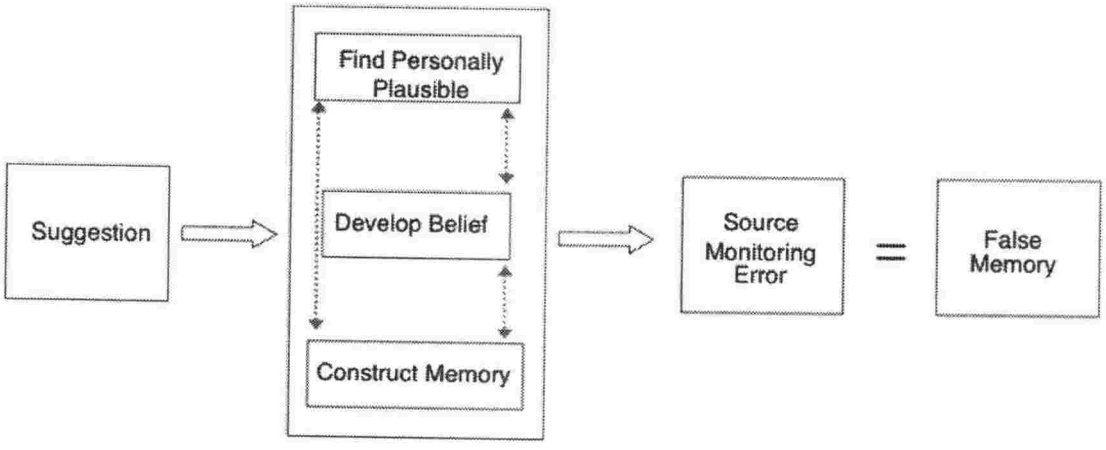
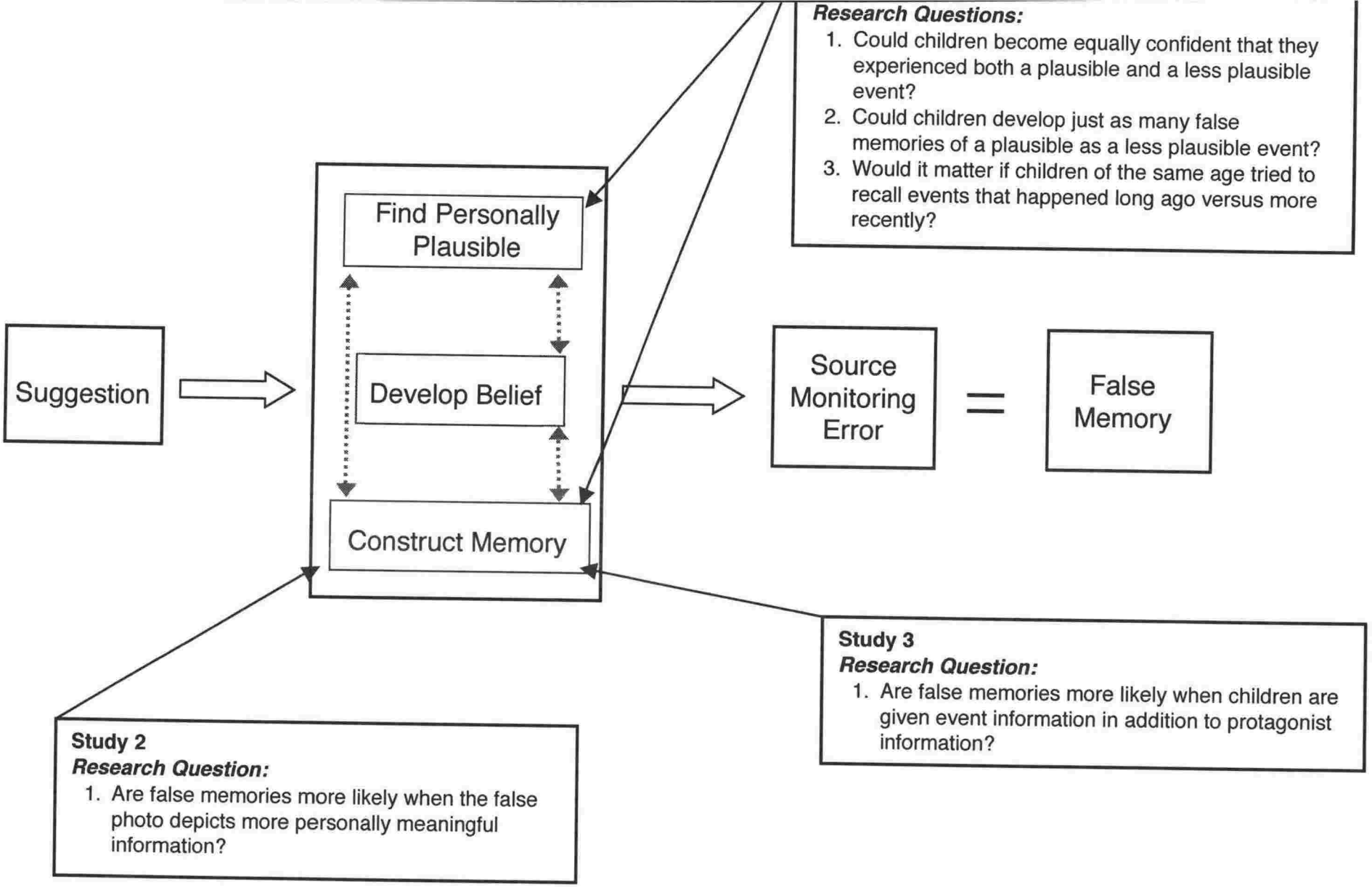


Figure 4.1 Mazzoni et al.'s (2001) model for how a false memory develops.

Figure 4.2 provides an overview of the manipulations in each of the three studies.


Research Questions:
1. Could children become equally confident that they experienced both a plausible and a less plausible event?
2. Could children develop just as many false memories of a plausible as a less plausible event?
3. Would it matter if children of the same age tried to recall events that happened long ago versus more recently?
Find Personally Plausible
Suggestion
Develop Belief
Construct Memory
Source Monitoring Error
=
False Memory
Study 2
Research Question:
1. Are false memories more likely when the false photo depicts more personally meaningful information?
Study 3
Research Question:
1. Are false memories more likely when children are given event information in addition to protagonist information?

Study 1: Plausibility and Recency

In Study 1, Wade et al's (2002) false photo paradigm was adapted to examine if and how the plausibility of the false events would affect false memory development. Therefore, Study 1 targets the Plausibility component of Mazzoni et al.'s model (see Figure 4.1). Six- and 10-year old children were shown two true and two false photos at three interviews over one week. One of the false photos depicted a more plausible event (a hot air balloon ride) and one depicted a less plausible event (having tea with Prince Charles). At each interview children told the interviewer everything they could remember, rated how confident they were that each event really happened and how much they could remember about it.

There were three research questions. First, could children become equally confident that they experienced both a plausible and a less plausible event? Second, could children develop just as many false memories of a plausible event as of a less plausible event? If the answer to both of these questions is yes then we could conclude that Pezdek and colleagues (Pezdek et al., 1997; Pezdek and Hodge, 1999) results did not tell the whole story. Instead, if children can become equally confident, and develop just as many memories of a plausible and a less plausible event, then such a pattern of results might go some way towards helping us understand how children could report the bizarre events characteristic of the sexual abuse cases that clogged the courts in the 1980s and 1990s.

The third and final research question focused on the recency of the false events. Specifically, would it matter if children of the same age tried to recall events that happened long ago versus more recently? Therefore, Study 1 also targets the Memory Construction aspect of Mazzoni et al.'s

(2001) model. To answer this third question, some 10-year olds were asked to recall distant events (age 2) and some were asked to recall recent events (age 6), roughly before or after the offset of childhood amnesia (for a review see Hayne, 2004). The SMF (Johnson et al., 1993) suggests that children who try to remember distant false events will be more likely to develop false memories than children who try to remember recent false events. However, other research leads us to predict the opposite pattern: that children who try to remember distant events will be less likely to develop false memories than children who try to remember recent false events. Chapter 5 will explore these predictions further.

In summary, Study 1 targets both the Plausibility and Memory Construction aspects of Mazzoni et al.'s (2001) model (see Figure 4.1).

Study 2: Personally relevant detail

The purpose of Study 2 was to determine whether including personalised detail in the false photo would make it easier for children to construct a memory of the balloon ride. More specifically, would false memories be more likely when the false photo depicts more personally meaningful information? To answer this question, some children saw a doctored photo depicting them and other family members going for a hot air balloon ride. By contrast, other children saw a photo depicting an unknown group of people in the hot air balloon. Study 2 therefore targeted the Memory Construction aspect of Mazzoni et al's (2001) model (see Figure 4.1).

Drawing on the SMF (Johnson et al., 1993) there are two equally plausible predictions concerning the role of personally meaningful detail in

the false photo. On the one hand, we know that the more information included in the false photo, the easier children are likely to find it to construct a memory of the balloon ride. If children use a more heuristic approach to monitor the source of their memories, they will be more likely to make a source monitoring error, and thus more likely to have a false memory. Therefore, one prediction is that children who see more personally meaningful information in the false photo will develop more false memories than those who do not. On the other hand, if children use a more systematic process to monitor the source of their memories, then the personalised detail is likely to help them reject the false events. Thus, the second prediction is that children who see more personally meaningful information in the false photo will develop fewer false memories.

Study 3: Event and Protagonist Information

The purpose of Study 3 was to determine whether event information would help children develop more memories than protagonist information alone. More specifically, would false memories be more likely when children are given event information in addition to protagonist information? Study 3 therefore also targeted the Memory Construction aspect of Mazzoni et al.'s (2001) model (see Figure 4.1). To answer this question, some children saw a photo depicting the potential protagonists in the false event, and were told that they went for a balloon ride. Other children saw two photos: one depicting the potential protagonists in the false event, and one depicting the hot air balloon (the event), and were told that they went for a balloon ride.

Drawing again on the SMF (Johnson et al., 1993), there are two equally plausible predictions. On the one hand, children who see both event and protagonist information should have a much easier time generating images of the event simply because they are given more information about it. In addition, children who see both event and protagonist information should generate more detailed images, which we know are more likely to lead to source monitoring errors. Thus, one prediction is that children who see both event and protagonist information will be *more* likely to develop false memories. On the other hand, children who see both event and protagonist information should find it easier to monitor the source of their hot air balloon images, attributing them to the photo of the balloon rather than their own memories. Thus, the second prediction is that children who see both event and protagonist information will be *less* likely to develop false memories.

Summary

Taken together, the three studies in this thesis were designed to determine whether Mazzoni et al.'s (2001) model for how false memories develop in adults also accounts for how false memories develop in children. Thus, the three studies target aspects of Mazzoni et al.'s model: plausibility, memory construction, and source monitoring errors.

Chapter 5

Study 1

Plausibility and Recency of false events

In light of Scoboria et al.'s (2004) contention that Pezdek and colleagues (Pezdek et al. 1997; Pezdek & Hodge, 1999) measured script-relevant knowledge rather than plausibility, Study 1 was designed to revisit the role of plausibility in the development of children's false memories. More specifically, Study 1 was designed to answer three questions. First, could children become equally confident that they experienced a plausible and less plausible experience? Second, could children develop just as many memories of a less plausible event as a plausible event? Finally, does the recency of the false events affect whether children develop a false memory?

Unlike Mazzoni et al. (2001) no attempt was made to change children's plausibility ratings over time. Instead, the purpose of Study 1 was to determine whether children's confidence and false memories could change over time for two false events. Thus, 6- and 10-year old children were shown authoritative, objective evidence, designed to enhance the personal plausibility of those false events and provide a spring-board or a platform to help children generate additional details. More specifically, children saw a mix of true and doctored photos of past events at three interviews, and told the interviewer everything they could remember about each event. One event was a higher plausibility event (taking a hot air balloon ride with other family members) and the other was a lower plausibility event (having a cup of tea with the Prince). The relative

plausibility of both events was determined by gathering plausibility ratings from children of various ages, as well as from adults. Finally, children rated how confident they were that each event really happened, as well as how much they could remember about it.

If children's perceptions of plausibility are fixed, then we might expect the answer to the first research question to be "no": children would remain less confident about tea with Prince Charles than about the ride in the balloon. On the other hand, if children's perceptions of plausibility can change, we might see a similar outcome to what Mazzoni et al. (2001) found for adults: children's confidence would increase for both events, and perhaps be indistinguishable by the final interview.

In addition, we know from Mazzoni et al.'s (2001) results that participants' confidence that the false events happened should affect the likelihood that they develop false memories. If this is also true for children then children's confidence should affect their false memory development. In other words, if children remain less confident about having tea with Prince Charles, then there should be fewer false memories for that event.

To determine whether the recency of the false event matters, one group of 10-year olds was asked to recall events from their distant past (age 2), while the other group was asked to recall events from their recent past (age 6), roughly before or after the offset of childhood amnesia (for a review see Hayne, 2004). What should be the effect of having the false events occur either before the offset of childhood amnesia or after? On the one hand, the SMF (Johnson et al., 1993) predicts that distant false events will be more likely to be mistaken for real experiences than recent false events. Research shows that distant memories contain fewer perceptual, spatial, and

temporal details than recent memories and memories of real experiences typically contain more of these same details than memories of imagined experiences (Johnson et al., 1988; Johnson et al., 1993; Mitchell & Johnson, 2000; Suengas & Johnson, 1988). Therefore, children's distant false memories should be qualitatively similar to distant real memories, whereas recent false memories should be qualitatively different from recent true memories. This difference should be particularly salient because children are asked to recall a true event immediately before recalling the false events. Thus, research on source monitoring suggests that children who try to remember distant false events should be more likely to develop false memories than children who try to remember more recent false events.

On the other hand, other research leads us to predict the opposite pattern: that children who try to remember distant events should be less likely to construct a false memory than children who try to remember recent events. Both the adult and children's literature show that we draw on relevant self-knowledge to remember experiences. In the adult literature, Hyman and Pentland (1996) found that participants were more likely to develop a false memory if they were able to incorporate personally meaningful details from their past into their narrative (see also, Hyman et al., 1995; Hyman et al., 1998). In the children's literature, Fivush, Haden and Adam (1995) found that experiences tied to a coherent narrative are more likely to be remembered over long periods than those that are not. To Fivush et al., a coherent narrative is filled with meaningful idiosyncratic details that increase the personal relevance of the experience, or what they call the "larger social and descriptive context" (p.35). Taken together, both of these lines of research suggest that children who try to

recall false events from before the offset of childhood amnesia should be less likely to develop a false memory because they would have little relevant self-knowledge to draw on to produce a coherent story of the false event.

Method

Participants

One hundred and twenty-nine children from 10 elementary schools in Wellington, New Zealand were recruited to participate. Of those, 115 (or 89%) completed all phases of the study (60 girls). There were 76 10-year olds (M = 10.20, SD = 0.60), and 39 6-year olds (M = 6.40, SD = 0.40). Children came from diverse socio-economic backgrounds[2] and all had written parental consent to participate.

Design

The design was a 3 (age group: $6_{\text{recall at 2}}$, $10_{\text{recall at 2}}$, $10_{\text{recall at 6}}$) x 2 (false event: balloon, tea with the Prince) x 2 (interview: 1, 3[3]) mixed design. As Figure 5.1 illustrates, there were three age groups, created from two variables: the child's age at the time of the interview (first column), and the child's age at the time of the target event (middle column). More specifically, the 10-year-olds were divided into two groups: one group recalled events from their recent past (age 6, N = 37), and the other group recalled events from their distant past (age 2, N = 37). All of the 6-year-olds

[2] According to the New Zealand Ministry of Education's Decile classification system. Participating schools in this study covered the range from 1 – 10.

[3] In line with the convention in false memory studies (Garry & Wade, in press; Hyman & Billings, 1998; Hyman et al., 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek, Finger, & Hodge, 1997; Porter, Yuille, & Lehman, 1999), data from interview 2 was not analysed because we are interested in the change from children's initial responses to their final response.

recalled events from age 2 (N = 39). The third column shows the annotation used to refer to these groups.

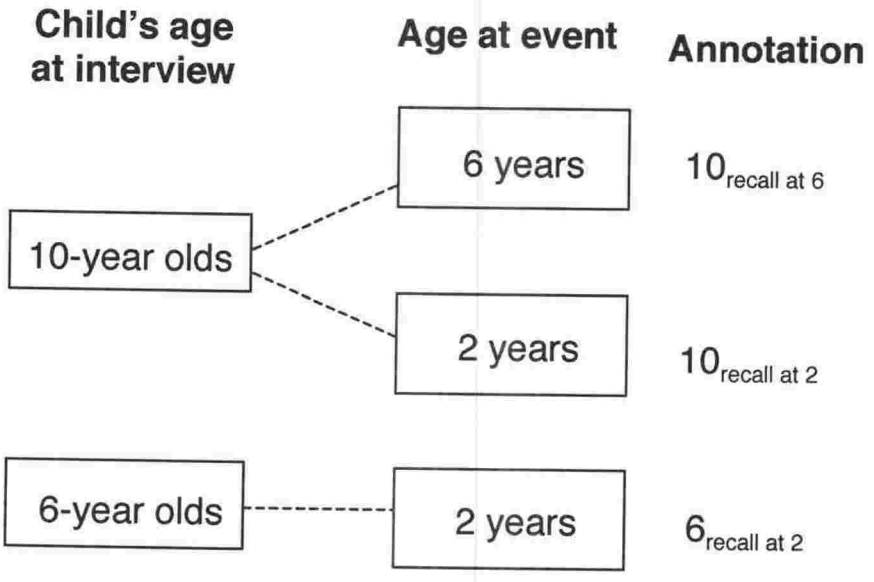


Figure 5.1 Experimental design showing child's age at the time of interview (6 years; 10 years) and child's age at the time of the event (2 years = distant past; 6 = recent past).

Procedure

Plausibility of the false events

To ensure that having a childhood hot air balloon ride would be considered more plausible than having a cup of tea with Prince Charles, the first step was to gather plausibility ratings from children and adults for a broad range of events. Thus, three different age groups (5- to 6-year olds, 9- to 10-year olds, and over 18's) rated how likely a series of 35 events were to happen to "someone like you" during childhood. Participants rated each event on a 7-point scale, where 1 was equal to "would never happen" and points 2 to 7 were equal to "would hardly ever happen" to "would always happen." Having "a ride in a hot air balloon" appeared in position 16, and having "a cup of tea with Prince Charles" appeared in position 23. The

means and standard deviations for each event and each age group appear in Table 1.

As Table 1 shows, all age groups rated having a ride in a hot air balloon as more likely to happen to the typical child than having a cup of tea with the Prince [5- to 6-year olds: t (6) = 3.04, p = .02; 9- to 10-year olds: t (33) = 5.30, $p < .01$; over 18's: t (42) = 6.52, $p < .01$]. Thus, the hot air balloon event was chosen to be the "more plausible" event and having tea with Prince Charles was chosen to be the "less plausible" event.

Table 5.1 Mean plausibility ratings (standard deviations) for the Balloon ride and Tea with the Prince events in response to the question "how likely is it that someone like you could [go on a hot air balloon ride] before they were 10."

Group	Balloon	Prince
5 - 6-year olds (N = 7)	5.29 (2.63)	2.14 (2.27)
9 – 10-year olds (N = 34)	4.94 (1.74)	2.79 (1.68)
Over 18-year olds (N = 43)	4.11 (1.75)	2.25 (1.55)

Materials

As Figure 5.2 illustrates, the true photos (positions 1 and 2) depicted moderately significant events, such as a birthday party or family holiday. The first true photo was of a recent event taken within the last 12 months. This event was used as a warm-up to get children used to the task, and as such is not considered in any analyses. The second of the true photos and the two false photos were the target events, and all depicted the child at the target age (either 2- or 6- years old). Of the false photos, the more plausible false event (position 3) showed the child and one or more of their family members in a hot air balloon. The less plausible false event (position 4) showed the child having a cup of tea with Prince Charles (a member of the British Royal Family). The false photos were created using a Macintosh

iMac and Adobe Photoshop® 7.0. An image of each child was extracted from a real photo (provided by children's parents) and inserted into a target false photo. The false photos were then sized to 15cm x 10cm, and printed by a commercial photo-processing lab so that they matched children's real photos.

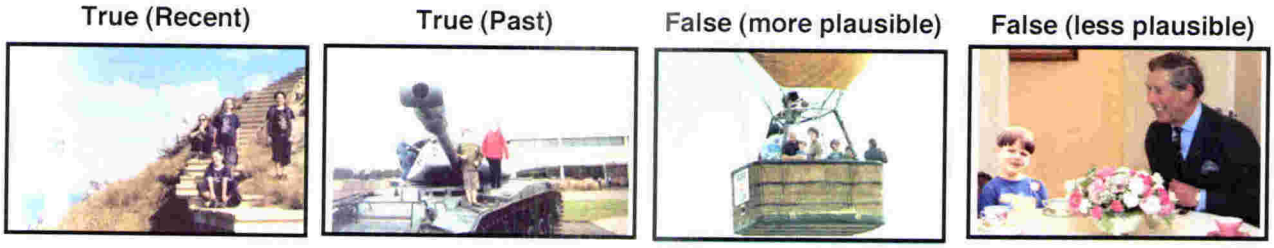


Figure 5.2 An example of the photos that children saw.

Interviews

Children were interviewed individually, three times over a week by the same female interviewer. All interviews were audiotaped. The interviewer presented the events to be recalled to the children one at a time in the same order of decreasing plausibility: True recent event, True past event, False more plausible event, False less plausible event. The interviewer gave the children each photo to hold and look at while they told her everything they could remember.

Interview 1 At the beginning of interview 1, after a period of informal rapport building, the interviewer explained that she was doing a "special project about what children remember from when they were young." She then presented children with their photos, one at a time. For each event, children were asked to name the people in the photo. If children had difficulty, the interviewer named them using information provided by children's parents (see Appendix A). Next, the interviewer asked children to describe everything they could remember about the depicted event. For

both the true and false events, if children had difficulty recalling information, the interviewer provided general prompts, such as, "Where might it have happened?" and "Who else might have been there?" These prompts were similar to those used by Pezdek and Hodge, (1999) and Ceci et al., (1994a; 1994b). Note, however, that when children responded to a prompt they were coded as "speculating" and as such, did not meet the criteria for a false memory.

When children told the interviewer that they could not recall any more information about the event, the interviewer asked children to use a *smiley face ruler* to rate how much they could remember about the event, and their confidence that the event had occurred. The smiley face ruler represented a child-friendly 1 – 5 Likert scale, similar to those used in previous studies (Roebers, 2002). The ruler was a wooden block (25cm x 3cm) with two posts (10cm high) at each end suspending a wire with a moveable bead. It was brightly coloured with four smiley faces increasing in size along the front. Thus, 1 on the scale was represented by no smiley face and was equal to "I remember nothing" or "I know it never happened." Points 2 - 5 were equal to "I remember a little bit" or "I'm a little bit sure" to "I remember heaps and heaps" or "I'm really sure it

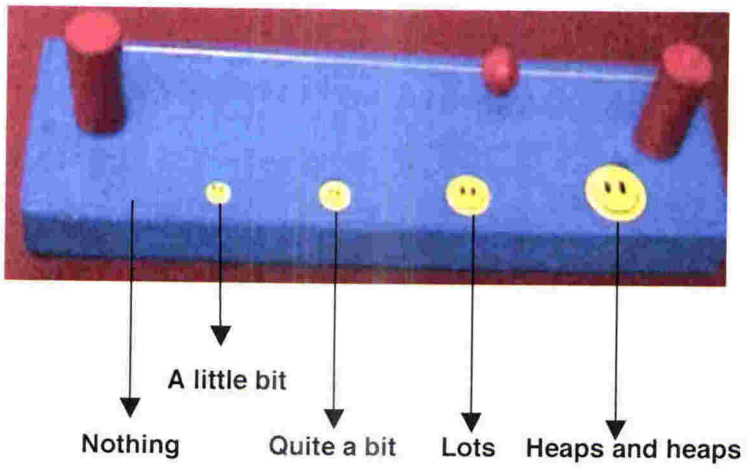


Figure 5.3 The "smiley face ruler."

happened." The scale is depicted in Figure 5.3.

The interviewer trained children with practice questions until it was clear children understood how the scale worked and the difference between being sure and being able to remember. For example, the practice questions began with "how much do you remember about being born" and "how sure are you that you were born." Follow-up questions focussed on children's first day at school, the birth of a sibling, and what they had for dinner the night before the interview. Children grasped the difference quickly, typically requiring only one or two sets of questions before it was clear they understood how the scale worked. In addition, children typically used the verbal labels associated with each smiley face to answer the questions (when they did, the interviewer asked the child to point to the corresponding smiley face to ensure they were correct). No child required more than four sets of questions before it was clear they understood how the smiley face ruler worked.

At the end of the first interview, the interviewer explained that she would be coming back twice more to talk about all of the photos. She asked the children to think about all the events in the meantime and if they remembered anything else to remember to tell her at the next interview.

Interview 2 The second interview followed the same procedure as interview 1 and took place 3 - 4 days later. The interviewer presented the four photos one at a time and asked the children to tell her everything they could remember. Then, after they had finished talking about each photo, the interviewer asked the children to rate their confidence and how much they could remember about each event using the smiley face ruler.

Interview 3 The third interview followed the same procedure as Interviews 1 and 2. However, at the end of the interview, the interviewer explained the purpose of the study, and demonstrated how the false photos had been created. Children were then given a small gift for participating and a questionnaire to take home to their parents. The questionnaire asked parents to describe how children had reacted to the deception involved in the study, whether they thought their child had guessed the true nature of the study, and whether they had discussed the true nature of the study with their child during the interview period.

Preparation of report transcripts for coding

Before the judges were given children's report transcripts to code those transcripts were "cleaned," such that all conversation regarding children's ratings of their confidence, or how much they could remember about each event, was removed from the reports so as not to influence judge's interpretation of those reports. In addition, all conversation designed to build a rapport between the interviewer and the child was removed.

Two independent judges reviewed those cleaned reports from interviews 1 and 3 and classified those reports along several dimensions. The coding scheme was adapted from those used in similar studies and appears in Appendix B (Garry & Wade, in press; Lindsay et al., 2004; Wade et al., 2002). The judges coding notes appear in Appendix C. Judges also used a copy of children's photos so that they were able to determine what detail was present in those photos. Therefore, it was impossible to keep judges blind to children's age group. The judges were experienced using similar coding schemes and extensively trained in our coding scheme.

Results and Discussion

All parents confirmed that they had not discussed the true purpose of the study with their children and that their children had enjoyed participating in the study.

True events

To determine the percentage of true memories children remembered, judges' classified children's true memory reports in to two groups "remembered" or "not remembered." Judges agreed on 84% of classifications at interview 1 and 88% at interview 3, and were confident in those classifications (Int 1: $M = 2.42$ out of 3, $SD = .50$; Int 3: $M = 2.54$, $SD = .40$). When judges did disagree, the reports were assigned to the more conservative "not remembered" category. As Figure 5.4 shows, by interview 3, judges classified 74% of all 6-year olds as remembering their true event, 78% of 10-year olds remembering back to when they were 2, and 95% of 10-year olds remembering back to when they were 6 as remembering their true event. A comparison between the two groups of 10-year olds revealed that 10-year olds remembering back to when they were 6 were more likely to remember their true event than the 10-year olds remembering back to when they were 2, χ^2 (1, $N = 76$) = 4.77, $p = .03$[4]. This result provides preliminary evidence to suggest that it was harder for children in the distant group, the 10-year olds remembering back to age 2, to remember. Taken together, these results suggest that the false memories reported in this study are not all the result of children trying to appease the

[4] Alpha was set at .05 for all significance tests in this thesis. However, where possible, exact p values will be reported for clarity.

interviewer because many children were quite comfortable telling the interviewer when they could not remember their true events.

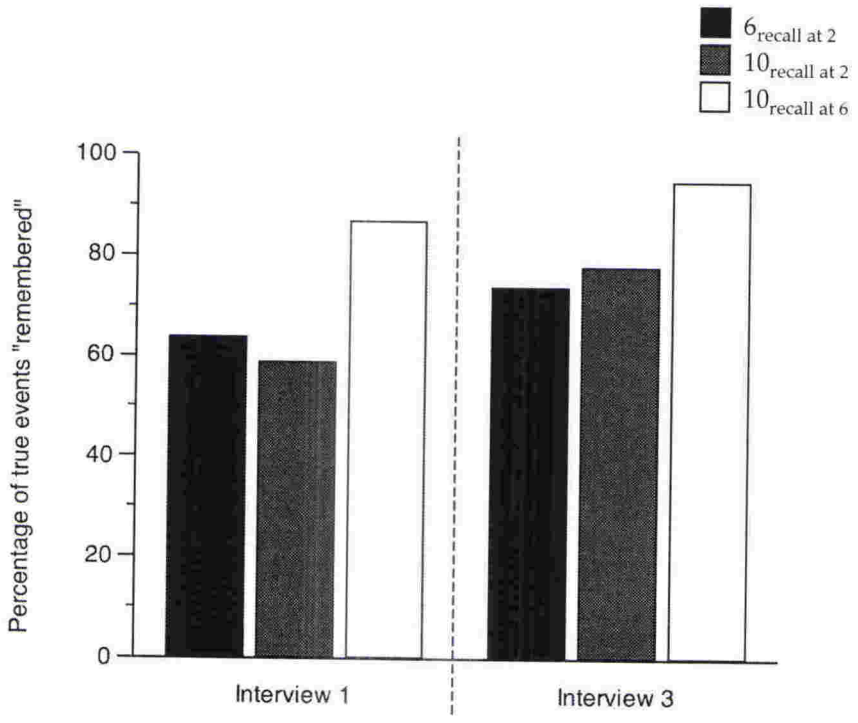


Figure 5.4 Percentage of true events children remembered by age group and interview.

False events

Children's Confidence

The first question was whether children could become equally confident over the course of the interviews that they had experienced both a plausible and a less plausible event. To answer this question, children's mean confidence that they went for a ride in a hot air balloon and had tea with the Prince were calculated for both interview 1 and interview 3. These means are plotted in Figure 5.5.

The left panel of Figure 5.5 shows children's confidence for the hot air balloon ride at interview 1 and 3; the right panel shows children's

confidence for the tea with the Prince event at interview 1 and 3. As Figure 5.5 shows, by the final interview children were just as confident about the balloon ride as they were about having had tea with the Prince.

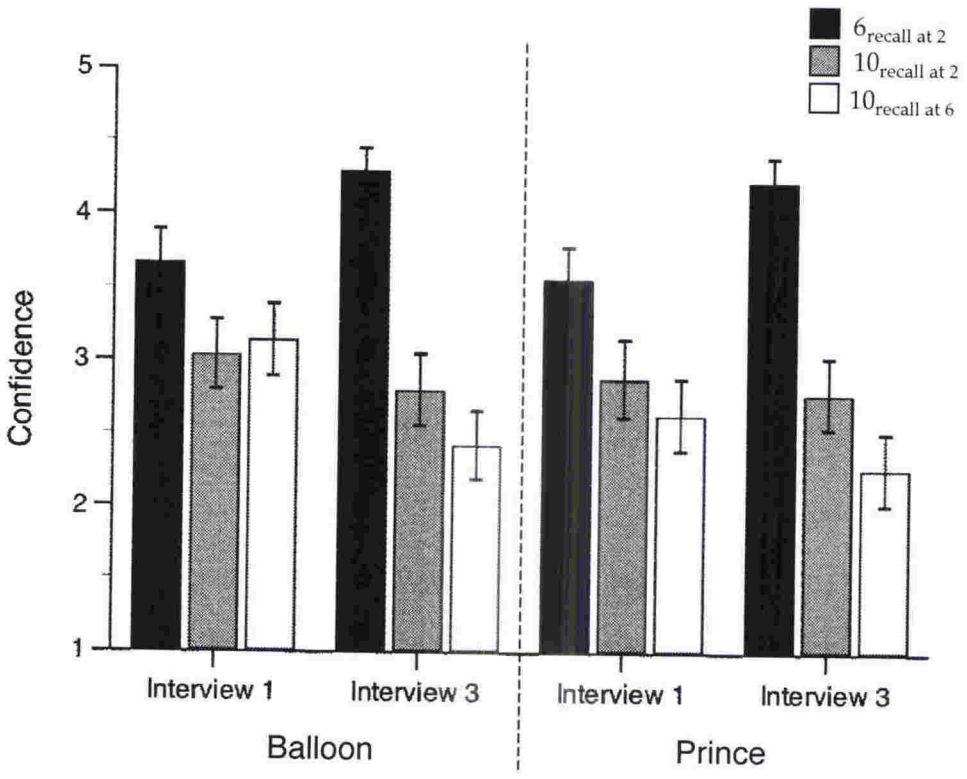


Figure 5.5 Children's confidence ratings by age group and interview.

A 3 (age group) x 2 (false event) x 2 (interview) mixed ANOVA revealed two important results. First, children's confidence changed over interviews, regardless of the false event. However, the direction of that change was different for each age group, such that there was an age group x interview interaction, F (2, 112) = 8.90, $p < .01$. More specifically, a series of Bonferroni-corrected follow up t-tests ($\alpha = .017$) for each age group, collapsing across the false events, revealed that the 6 year olds became more confident, t (154) = 3.11, $p < .01$. By contrast, the grey bars show that 10 year olds who recalled events from age 2 did not change confidence, with their confidence hovering around the "quite sure" mark, $t < 1$. Finally,

the white bars show that 10-year olds who recalled events from age 6 tended to become less confident, eventually settling on a rating between "a little bit sure" and "quite sure," however, with the correction this was not a significant change, t (154) = 2.16, p = .03. There were no other interactions.

The second important result was that overall, children were more confident that they had a hot air balloon ride than that they had tea with the Prince. In other words, there was a main effect for the type of false event, F (1, 229) = 8.52, p = .02. To examine this difference further a series of Bonferroni-corrected follow up t-tests (α = .008) were conducted. These tests show that the difference in confidence was not consistent across the three age groups. In fact, only 10-year olds remembering back to when they were 6 were more confident about the balloon ride than they were about having had tea with the Prince, and even then, only at interview 1 [$10_{\text{recall at }6}$: t (38) = 3.28, $p < .008$; $10_{\text{recall at }6}$: $t < 1$; $6_{\text{recall at }2}$: $t < 1$). In other words, within each age group, by interview 3 children were equally confident about experiencing the balloon ride and tea with the Prince (ts < 1).

In summary, the answer to the first research question is "yes": by the third interview children were equally confident that they had experienced a plausible and a less plausible event. In other words, children's confidence that they had been for a ride in a hot air balloon and had tea with a Prince changed over time. While the direction of that change was different for each of the age groups, the end result was the same. By the final interview, within each age group, children were just as confident about both events.

The next question was whether children's false memories would follow the same pattern as children's confidence. In other words, would

children be just as likely to develop a false memory of having a balloon ride as having tea with the Prince?

Children's False Memories

To determine whether children developed memories of the two false events it was first necessary to classify children's reports. Thus, two judges were trained to use the coding scheme developed by Lindsay et al. (2004) and used by Garry and Wade (in press). The judges independently reviewed the transcripts of children's reports and assessed whether children described "no memories or images," "images only," or "memories and images." A report was judged to be a memory when the child appeared to clearly remember the event, and believe what they were reporting was a real memory. If children showed any hesitation, or appeared to merely be speculating about details of the event, they were coded as reporting images only. For example this child was coded as reporting "memories and images" of the balloon ride:

> This...is ...this is me, Michael and Granddad and um we went in a balloon, in Christchurch somewhere. And it was a sixplay *[display]* of balloons. And we had to pay like $5 or something for the ride. And we went in there for like half an hour or something and we went over Christchurch.
> And...yeah. And we were down there for, on holiday...And after...I had done this I went and saw my Dad in the dairy [convenience store] and he gave, and my grandma gave me free lollies [candy] and all that.

By contrast, this child was coded as reporting an image:

> I'm in the balloon with my Dad, and some other people. And some of them might be my family and...it's probably in Palmerston North or Foxton. Um...I think my Mum's taking the photo 'cos it's only me and my Dad that are in the photo and...yeah. That's it.

Judges agreed for 87% of interview 1 classifications and 83% of interview 3 classifications, and were confident in those classifications (Int 1: $M = 2.54$ out of 3, $SD = .50$; Int 3: $M = 2.44$, $SD = .50$). In the cases where judges disagreed, they adopted the more conservative category.

Once children's reports were classified the percentage of children within each age group who reported "memories and images" of the balloon ride and having tea with the Prince, at interviews 1 and 3, were calculated. Those percentages are plotted in Figure 5.6. The left panel of Figure 5.6 shows the percentage of children who developed a memory of the hot air balloon ride at interview 1 and 3; the right panel of Figure 5.6 shows children who developed a memory of having tea with the Prince at interview 1 and 3. Figure 5.6 shows that by the final interview both groups of 10-year olds children were just as likely to have developed a memory for the balloon ride as they were to develop a memory for having tea with the Prince. While 6-year olds appear more likely to have developed a memory of the balloon ride then having tea with the Prince, there was no significant difference in the rate of false memories.

A 3 (age group) x 2 (false event) x 2 (interview) Logistic Regression[5] [complete model: χ^2 (7, $N = 460$) = 60.89, $p < .01$, $r^2 = .15$] revealed a very

[5] Terms were entered simultaneously: one 3-way interaction, 3 2-way interactions, 3 main effects. The 3-way interaction was removed first ($p = .98$), and the analysis was re-run. Next, the age group x event interaction ($p = .70$) was removed. Finally, the event x interview interaction was removed ($p = .11$).

similar pattern of results to the pattern of results seen for children's confidence. More specifically, there were two important results. First, the number of false memories children reported changed over interviews. However, the direction of the change depended on children's age group, resulting in an age group x interview interaction, χ^2 (2, N = 115) = 6.09, p = .05. More specifically, a series of Bonferroni-corrected follow up chi-squares (α = .017) revealed that both the 6-year olds and the 10-year olds remembering back to when they were 2 developed more memories over time [$6_{\text{recall at 2}}$: χ^2 (2, N = 78) = 17.0, $p < .01$; $10_{\text{recall at 2}}$: χ^2 (2, N = 74) = 16.18, $p <$ .01]. In fact, the odds of a 6-year old having a false memory were 5 times greater at interview 3 compared to interview 1. Ten-year olds remembering back to age 2 were 18 times more likely to have a false memory at interview 3 compared to interview 1. However, 10-year olds remembering back to when they were 6 did not change. They had just as many false memories at interview 3 as they did at interview 1, $\chi^2 < 1$ (θ = 1.49).

Second, overall, children were more likely to develop a memory of having a hot air balloon ride than having tea with the Prince, χ^2 (1, N = 115) = 7.85, $p < .01$. However, just like children's confidence, this difference was not consistent across the three age groups and disappeared by interview 3. A series of Bonferroni-corrected follow up chi-squares (α = .008) revealed that only 10-year olds remembering back to when they were 6 were more

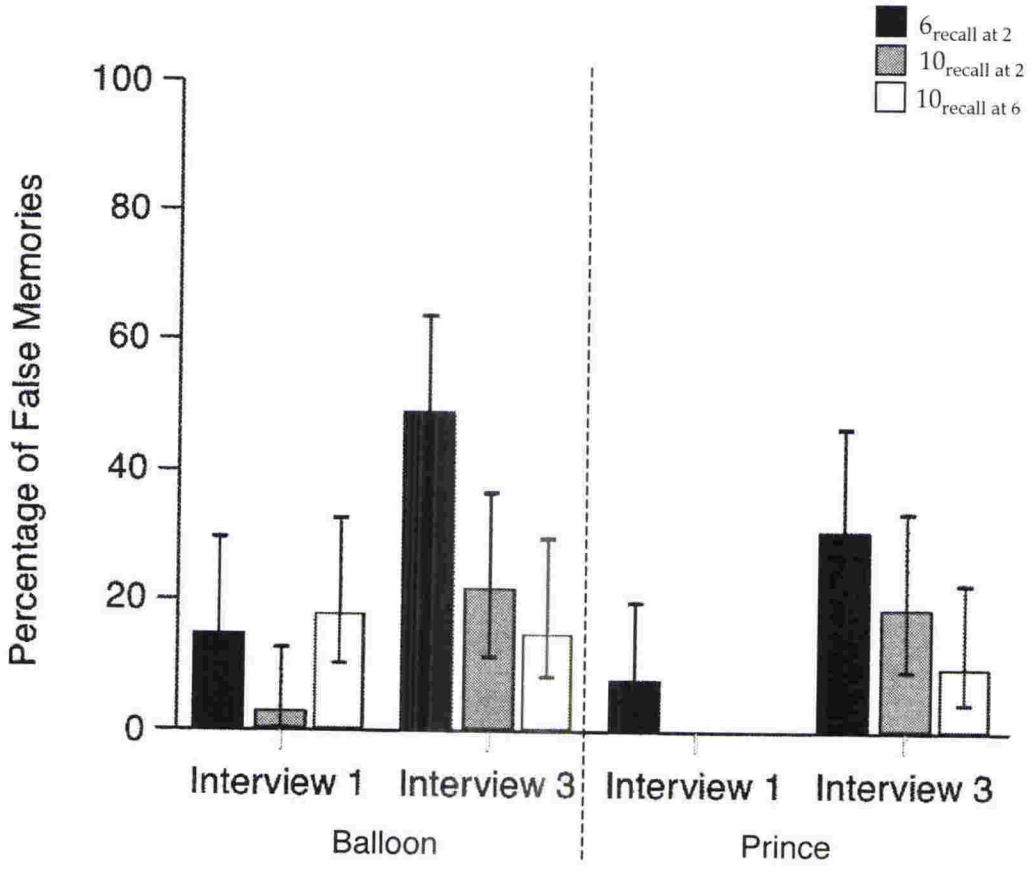


Figure 5.6 The percentage of false memories children had for each event by age group and interview.

likely to have a memory of the hot air balloon ride than having tea with the Prince, and then only at interview 1 [$10_{\text{recall at 6}}$: χ^2 (1, N = 78) = 10.4, $p < .008$; $10_{\text{recall at 2}}$: χ^2 (1, N = 74) = 1.4, $p = .24$; $6_{\text{recall at 2}}$: χ^2 (1, N = 78) = 1.15, $p = .28$]. By interview 3, within each age group, the rate of false memories for each event was the same [$10_{\text{recall at 6}}$: $\chi^2 < 1$; $10_{\text{recall at 2}}$: $\chi^2 < 1$; $6_{\text{recall at 2}}$: χ^2 (1, N = 78) = 2.64, $p = .10$].

In summary, the answer to the second research question was also "yes": children developed just as many false memories of the plausible event as the less plausible event. Thus, the pattern of results observed for children's confidence was reflected in the pattern of results for children's false memories. By interview 3, within each age group, children were just as likely to have developed a memory for the hot air balloon ride as they

were to have developed a memory for the less plausible experience of tea with the Prince.

Recency of the false event

The third research question was whether children would be more likely to develop memories for more distant events. To answer this question the rate of false memories for the two groups of 10-year olds were compared at interview 3. Collapsing across the false events there was no difference in the rate of false memories between the two groups of 10-year olds, χ^2 (1, N = 152) = 1.5, p = .21. However, when the reasons why children *did not* develop false memories are considered, it is clear that the results are consistent with the idea that self-relevant knowledge is crucial in determining whether or not children will go on to develop a false memory.

Judges classified children's reasons for rejecting the false events in to three categories: technology (e.g., "you can make that in Photoshop") self-knowledge (e.g., "My mum and dad would not let me go in a balloon without them") and no memory (e.g., "I'd remember if [the Prince] came to visit"). Figure 5.7 displays the results. Panel A of Figure 5.7 shows the reasons 10-year olds remembering back to when they were 2 rejected the false events, while Panel B of Figure 5.7 shows the reasons 10-year olds remembering back to when they were 6 rejected the false events. The left side of each panel displays the reasons for rejecting the balloon event; the right side of each panel displays the reasons for rejecting the tea with the Prince event.

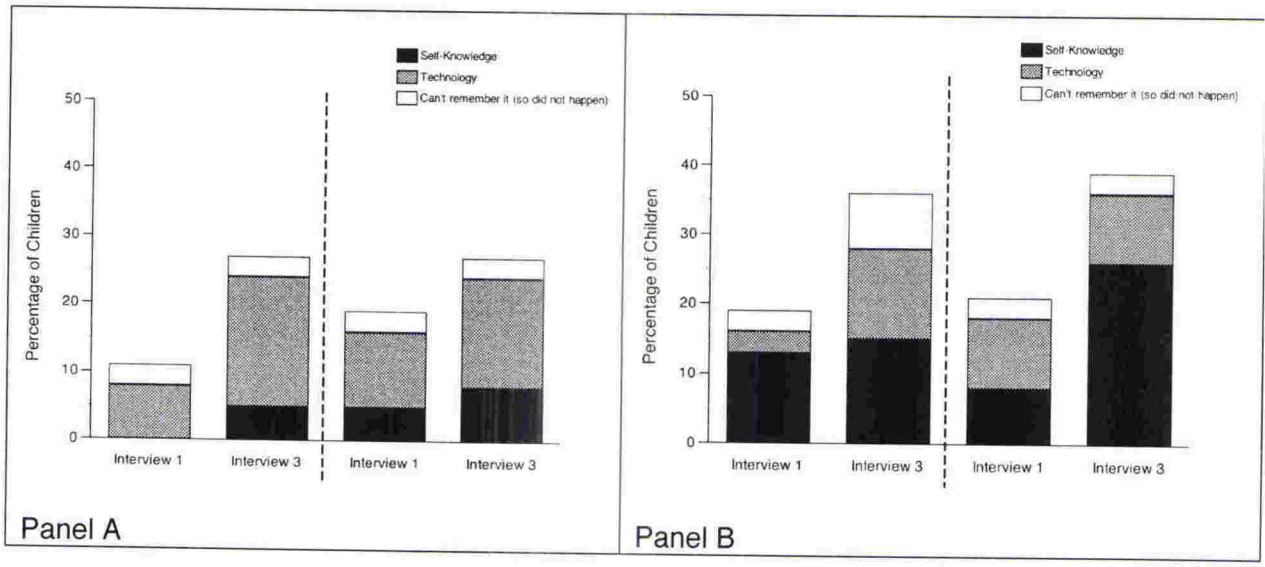


Figure 5.7 Panel A: reasons 10-year olds remembering back to age 2 rejected the false events. Panel B: reasons 10-year olds remembering back to age 6 rejected the false events.

Considering both Panel A and Panel B, it is clear that children became more likely to explicitly state that the false events did not happen over the course of the interviews. However, the reasons why children rejected the events were slightly different across the two age groups. As the black portion of the bars illustrates, 10-year olds remembering back to age 2 were not as likely as those remembering back to age 6 to rely on a self-relevant knowledge explanation (7% v 21%). Such a finding supports the prediction that these children would have less self-relevant knowledge to draw on from this period. In addition, recall that these 10-year olds also remembered fewer of their true events than the 10-year olds remembering back to when they were 6. Thus, it may be that these 10-year olds simply accepted that they could not remember the false events, because they could not remember their true events, and thus being unable to remember events from this age seemed fairly normal.

By contrast, 10-year olds remembering back to when they were 6 should not have had the same experience. Instead, it likely seemed unusual that they could not recall the false events, and that those events had not

been talked about in the recent past. Indeed, as Panel B of Figure 5.7 shows, their knowledge of other experiences from when they were 6- years old was the predominant reason these children claimed the false events did not happen. In summary, by the end of the study, the rate of false memories was the same for each of the 10-year old groups. However, it seems that children remembering back to age 2 simply did not have access to the same amount of detail from their past to support or refute the possibility that the false events had really happened, so instead were more willing to say "I don't know."

Correspondence between adult and child ratings

To determine whether children's remember ratings matched the adult judges' impressions of the quality of children's reports, the pattern of results for each measure is examined separately and then compared.

Remember Ratings: Children's mean ratings of how much they claimed to be able to remember about the balloon ride and having tea with the Prince were calculated for both interview 1 and interview 3. These means are plotted in Figure 5.8. The left panel of Figure 5.8 shows children's ratings of how much they claimed to be able to remember about the hot air balloon ride at interview 1 and 3; the right panel shows children's ratings of how much they claimed to be able to remember about the tea with the Prince event at interview 1 and 3. As Figure 5.8 shows, within each age group, by the final interview children claimed to be able to remember just as much about the balloon ride as they did about having had tea with the

Prince.

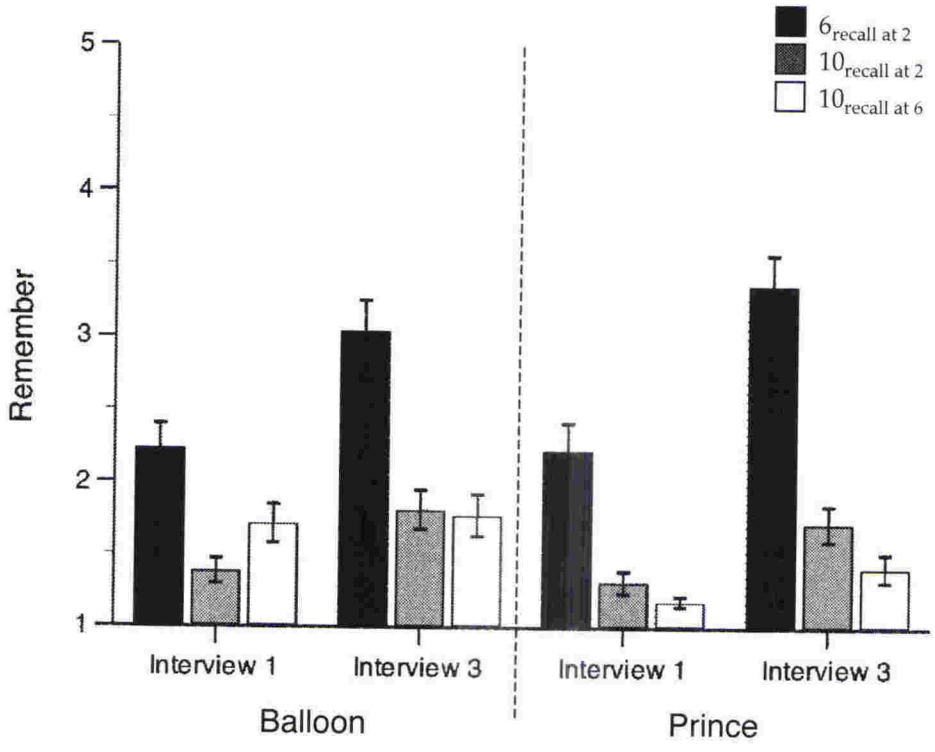


Figure 5.8 Children's remember ratings by age group and interview.

A 3 (age group) x 2 (false event) x 2 (interview) mixed ANOVA on children's remember ratings revealed two important results. First, children's remember ratings changed over interviews; however, once again, the nature of that change depended on age group, F (2, 112) = 6.64, p < .01. More specifically, a series of Bonferroni-corrected follow up t-tests (α = .017) revealed that both the 6-year olds and 10-year olds remembering back to age 2 remembered more over time. By contrast, 10-year olds remembering back to age 6 did not change, instead they remembered just as much at interview 1 as they did at interview 3 [$6_{\text{recall at 2}}$: t (154) = 4.73, p < .01; $10_{\text{recall at 2}}$: t (146) = 3.45, p < .01; $10_{\text{recall at 6}}$: t (154) = 1.14, p = .25].

Second, how much children said they could remember also depended on a combination of age group and the particular false event; that is, there was an age group x event interaction, F (2, 112) = 7.02, p < .01. More

specifically, a series of Bonferroni-corrected follow up *t*-tests ($\alpha = .008$) revealed that 10-year olds remembering back to when they were 6 claimed to be able to remember more about the balloon ride than they did about having tea with the Prince, but only at interview 1 (Int 1: $t\ (154) = 3.32$, $p < .01$; Int 3: $t\ (154) = 1.87$, $p = .07$). By contrast, the remaining age groups remembered similar amounts about each event at each interview (all ts < 1).

In summary, by the end of the third interview, children made no distinction between the two false events. They said that they remembered just as much about the balloon ride as they did about having tea with the Prince.

Judges quality-of-memory ratings: Judges reviewed children's reports of the two false events at interviews 1 and 3. They assessed those reports for the *overall quality of the memory* on a scale from 1 – 5, where 1 was equal to "nothing like a real memory" and 5 was equal to "as complete and detailed as a memory should be." Judges were highly confident in their ratings, (Int 1: $M = 2.40$, out of 3, $SD = .40$; Int 3: $M = 2.30$, $SD = .50$). The mean of the two judges' ratings was calculated for each event, within each age group, at interview 1 and 3. These means are plotted in Figure 5.9. The left panel of Figure 5.9 shows judges quality-of-memory ratings for the balloon ride at interview 1 and 3; the right panel shows judges quality-of-memory ratings for the tea with the Prince event at interview 1 and 3. As Figure 5.9 shows, the pattern of judges' ratings was remarkably similar to the pattern of children's remember ratings. By the third interview, within each age group, judges considered the reports of both the balloon ride and tea with the Prince to be the same.

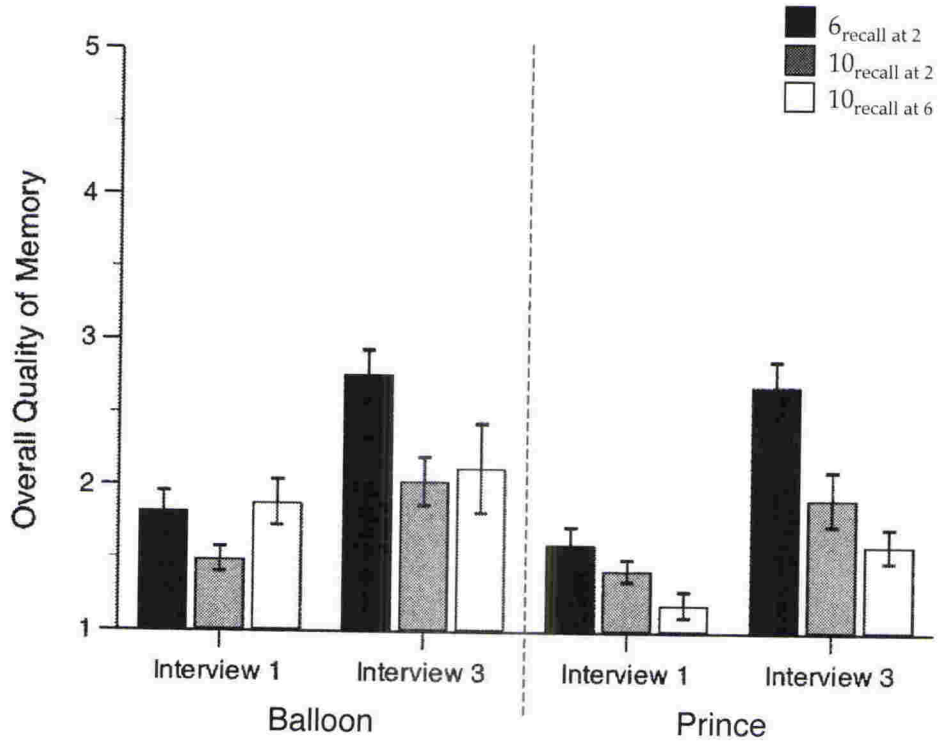


Figure 5.9 Judges ratings of the quality of children's reports by age group and interview.

A 3 (age group) x 2 (false event) x 2 (interview) mixed ANOVA revealed two important results. First, the quality of children's reports changed over interviews, but the nature of that change depended on children's age group. In other words, there was an age group x interview interaction, F (2, 112) = 8.81, $p < .01$. More specifically, a series of Bonferroni-corrected follow up t-tests ($\alpha = .017$) revealed that both the 6-year olds and the 10-year olds remembering back to age 2 were judged to have better quality reports at interview 3 then they had at interview 1 ($6_{\text{recall at 2}}$: t (154) = 6.38, $p < .01$; $10_{\text{recall at 2}}$: t (146) = 3.54, $p < .01$). By contrast, 10-year olds remembering back to age 6 were judged to have stayed the same (t (154) = 1.21, $p = .23$).

Second, just like children's ratings of how much they could remember, the quality of children's reports also depended on both the event and their age group. In other words, there was an age group x event interaction, F (2,

112) = 3.45, $p = .04$. In particular, a series of Bonferroni-corrected follow up t-tests ($\alpha = .008$) revealed that 10-year olds remembering back to age 6 were judged to have better reports of the balloon ride than tea with the Prince, but once again, only at interview 1 (Int 1: t (76) = 3.87, $p < .01$; Int 3: t (76) = 1.03, $p = .31$). By contrast, judges found that the reports 6-year olds and the 10-year olds remembering back to age 2 provided for each of the false events were of similar quality at both interview 1 and 3 (all t's < 1).

Correlation analyses: Considering that the pattern of results for children's remember ratings and judges' quality-of-memory ratings were so similar, it is not surprising that they were highly correlated at both interviews 1 and 3. While the correlation was smaller at interview 3, it was not significantly reduced (Int 1: $r = .60$, $p < .01$; Int 3: $r = .52$, $p < .01$; $Z = 1.24$, $p = .21$). These results suggest that the way children appraised what they could remember was also reflected in the content and delivery of their reports and detectable to an adult judge.

Number of details children provided: In addition to classifying the quality of children's reports, judges also coded the number of details children reported that went beyond the detail available in the photo. Judges' grouped these details according to whether they described a specific location, an emotion, who was present, what happened before the event, or what happened after the event. Judges coded these details as "yes" the child provided the detail, "no" the child did not provide the detail, or "speculates" when the child expressed some doubt about a detail (eg: "mum might have been on the ground taking the photo"). Judges concurred on 82% of interview 1 classifications and 89% of interview 3 classifications. In the cases where judges disagreed, the detail was assigned

to the more conservative category (Yes > Speculates > No). The number of "yes" details per report was then calculated out of a possible 5 details. Then, the mean number of details for each event, within each age group, at interviews 1 and 3 was calculated.

Children's claims of remembering were significantly correlated with the number of specific details they reported (Int 1: $r = .59$, $p < .01$; Int 3: $r = .61$, $p < .01$). This result suggests that children did base their remember ratings on the content of their reports.

True versus false events

Confidence

To determine whether children's confidence in the false events was different to their confidence in the true events at interview 3 it was first necessary to create a mean confidence rating for the false events. Thus, a mean confidence rating for each subject was determined by collapsing across the type of false event. Then, the mean for each age group was determined. Finally, the true and false event means were compared in a 3 (age group) x 2 (event: true or false) mixed ANOVA. Regardless of age group, children were equally confident that their true event had happened. However, the pattern for false events was quite different. In other words, there was an event x age group interaction, F (2, 229) = 20.98, $p < .01$. More specifically, a series of Bonferroni-corrected follow up t-tests ($\alpha = .017$) revealed that 6-year olds were just as confident about their true events as they were about the false events, t (76) = 1.3, $p = .19$. However, both groups of 10- year olds were more confident about their true events than the false events [$10_{\text{recall at 2}}$: t (72) = 6.8, $p < .01$; $10_{\text{recall at 6}}$: t (76) = 9.5, $p < .01$].

However, when the analysis was re-run using only those children who developed a memory for each of the false events, the difference disappeared. Two separate *t*-tests (one for each event) comparing the mean true event confidence with the mean false event confidence revealed no differences (*t*s < 1). In other words, when children did have a false memory they were just as confident in those false memories as they were confident in their true memories.

Remember

To determine whether children's remember ratings for the false events were different to children's remember ratings for the true events by interview 3, a mean remember rating for each age group was determined just like the confidence analysis. Then, the true and false event means were compared in a 3 (age group) x 2 (event: true or false) mixed ANOVA. Once again, there was an age group x event interaction, F (2, 112) = 19.45, $p < .01$. More specifically, a series of Bonferoni-corrected follow up *t*-tests ($\alpha = .017$) revealed that just like we saw with children's confidence, 6-year olds showed no difference in their ratings of the true and false events ($t < 1$). By contrast, 10-year olds claimed to remember more about their true event than the false events the ($10_{\text{recall at 6}}$: t (76) = 12.91 $p < .01$; $10_{\text{recall at 2}}$: t (72) = 7.84 $p < .01$.

However, once again, when the analysis was re-run using only those children who developed a memory for each of the false events, the difference disappeared. Two separate *t*-tests (one for each event) comparing the mean true event remember rating with the mean false event remember rating revealed no differences (*t*s < 1). In other words, when children had a false memory they claimed to remember just as much about

those false memories as they claimed to remember about their true memories.

Summary of findings

Taken together, the results of Study 1 show that, similar to the outcome of Mazzoni et al.'s (2001) study with adults, children can also become just as confident that they had a plausible experience (the balloon ride), as a less plausible experience (having tea with the Prince). Moreover, children can develop just as many memories of a plausible event as a less plausible event. These results suggest that Pezdek and colleagues (Pezdek et al., 1997; Pezdek & Hodge, 1999) conclusions were incomplete. Instead, it seems that Mazzoni et al. were correct: with enough evidence the limits of what is typically considered plausible can be stretched.

While the false events suggested in this study certainly differ drastically from implausible traumatic experiences, they do provide some insight into how children could claim to remember the sorts of bizarre events characteristic of the sexual abuse cases that clogged the courts across the Western world in the 1980s and 1990s (see for example, People v. Akiki, 1993; State of New Jersey v Michaels, 1994; Ceci & Bruck, 1995; Hood, 2001). However, it should be noted that the results of this study do not necessarily mean that the plausibility of the false event is irrelevant. Because the four events were presented to children in a fixed order we do not know whether the plausibility of the less plausible Prince event was affected by seeing the true and more plausible events first. In other words, Study 1 confounds plausibility with order of event presentation. Thus, we

do not know whether children would typically develop just as many memories of a less plausible event as a more plausible event.

Nevertheless, these results suggest that Mazzoni et al.'s (2001) model of false memory development in adults also explains how children's false memories develop. Put another way, the same processes that lead to adult false memories—finding an event personally plausible, developing an autobiographical belief that it really happened, and constructing a detailed memory—also appear to be important processes in the development of children's false memories. Like Hyman and colleagues, these results also emphasize the importance of personally relevant details as essential building blocks in the construction of false memories (Hyman & Pentland, 1996; Hyman et al., 1995; Hyman et al., 1998). However, one question that remains unanswered by Study 1 is: what is it about the false photo that promotes false memories?

It is possible that the personalised detail doctored into the false photo (the child and other family members) provides a spring-board from which children can begin to generate images of the event. In addition, it is possible that, as authoritative evidence that the false event really happened, the personalised detail in the false photo enhances the personal plausibility of the false event (Scoboria et al., 2004) and encourages children to draw on other self-relevant knowledge (Hyman & Pentland, 1996; Hyman et al., 1995; Hyman et al., 1998) to construct a coherent and detailed memory equal in quality to that of children's true memories. If these ideas explain how children's false memories in this study developed, then we can predict that the more personalised detail children have in the false photo the more likely they will be to develop a false memory.

However, drawing on both the SMF (Johnson et al., 1993) and the results of Study 1, there are also reasons to suggest that the personalised detail in the false photo provides an easy means of monitoring the source of any images children generate. Thus, there are two equally plausible predictions concerning the role that personalised detail might play in the development of children's false memories. Therefore, Study 2 was designed to answer a specific question: are false memories more likely when the false photo depicts more personally meaningful information?

Chapter 6

What is it about the false photo that produces false memories?

The results of Study 1 showed that by the end of three interviews, 10- and 6-year old children were as confident that they had experienced a plausible event, a balloon ride, as they were that they had experienced a

In other words, it is possible that the personalised detail included in the false photo helped children to construct a detailed and coherent memory of the false events, making children more likely to make a source monitoring error. If this explanation accurately describes how the false photos promoted false memories then we can make a prediction: including personally meaningful detail (the child and other family members) in a false photo will lead to more false memories than a false photo that has little personally meaningful detail. However, both Study 1 and the SMF (Johnson et al., 1993) also suggest equally plausible reasons why false memories might be *less* likely when personally meaningful information is included in the false photo. Thus, Study 2 was designed to answer a specific question: are false memories more likely when the false photo depicts more personally meaningful information?

The Source Monitoring Framework

The SMF identifies two forms of source monitoring (Johnson et al., 1993) that, for the purposes of this thesis, are best thought of as independent (although it is important to note that the exact nature of the processes thought to underlie source monitoring continue to be debated, see Johnson, Kounios, & Reeder, 1994; McElree, Dolan, & Jacoby, 1999; Mitchell & Johnson, 2000). In the first form, a decision about the source of information is made rapidly, almost automatically, with little conscious deliberation or effort. This form of source monitoring is best described as a "heuristic" because it relies on a "match-to-averages" strategy (Chaiken, Lieberman & Eagly, 1989; Johnson et al., 1993). That is, if a memory seems detailed enough, or vivid enough, it will be attributed to actual experience

(Mitchell & Johnson, 2000). It is this form of source monitoring that is typically responsible for source monitoring errors.

The second form of source monitoring is the opposite of the first. It is slow, methodical, deliberate and effortful. In other words, it is more of a "controlled" process (Hasher & Zachs, 1979; Shiffrin & Schneider 1977). This form of source monitoring is best described as "systematic" (Chaiken et al., 1989; Johnson et al., 1993; Mitchell & Johnson, 2000) because it requires an evaluation of the memory based on other relevant information and sometimes requires that the subject gather additional information to confirm or disconfirm the memory.

The form of source monitoring people use is determined by factors such as peoples' biases, goals, meta-memory skills, and the importance of the task (Johnson et al., 1993; Mitchell & Johnson, 2000). Thus, in some situations people are likely to use a more heuristic approach to the source monitoring task, while in others people are likely to use a more systematic approach. Of course, in still other situations, people might be inclined to use a mix of both heuristic and systematic approaches. In this study, the form of source monitoring children use (heuristic or systematic) will affect the likelihood of children developing false memories.

Reasons why false memories might be more likely

Drawing on the SMF (Johnson et al., 1993; Mitchell & Johnson, 2000), if children rely more on a heuristic to monitor the source of their memories then they are likely to make source monitoring errors, and thus develop false memories. As Wade et al. (2002) noted, we place a great deal of faith in photos as accurate records of single moments in time. Wade et al.

speculated that it was this faith that made false photos such a compelling means of delivering a false suggestion and helping people to satisfy the "belief" and "plausibility" components of Mazzoni et al.'s (2001) model. However, the advantage of the false photo should not end there. Children who see themselves participating in a false event should have a much easier time generating images of what the false event would have been like, after all a lot of the work has already been done for them. In addition, the personally meaningful details may help children to create a memory of the false event by sparking other self-relevant information. For example, in Study 1 many children used the information in the photo to speculate about where the hot air balloon ride could have been ("well, if Grandma is with me then we must have been at Christchurch; they have lots of fairs there; it could have been there"), creating a more coherent and detailed memory (Hyman & Kleinknecht, 1999; Mazzoni et al., 2001).

If we turn to the source monitoring literature, we know that memories containing perceptual, semantic and emotional detail, regardless of whether they are imagined or genuine experiences are typically attributed to actual experience (Hashtroudi et al., 1990; Johnson et al., 1988; Johnson et al., 1982; Schooler, Gerhard, & Loftus, 1986; Suengas & Johnson, 1988). In addition, we know that images that seem to be easily generated are more likely to be mistaken for genuine experiences (Foley et al., 1991; Finke et al., 1988). We also know from research by Hyman and colleagues (Hyman et al., 1995; Hyman et al., 1998; Hyman & Pentland, 1996), and the results of Study 1, that participants who incorporate self-relevant knowledge into their construction of a false event, as if they were filling in the gaps of the memory, are more likely to go on to develop a full false memory of the

suggested event. One possible reason why incorporating self-relevant information increases the likelihood of a false memory is that the constructed memory becomes a combination of both true and false detail making it more difficult to monitor the source (in this case, the participants own imagination) of the memory.

In summary, if children rely on the more heuristic form of source monitoring and draw on additional self-relevant knowledge to help construct their false memories then it is likely that including personally meaningful detail in the false photo will lead to more false memories.

Reasons why false memories might be less likely

If children rely more on systematic source monitoring then they are likely to correctly attribute the source of their images to the false photo, and thus develop fewer false memories. While false memories occur because of a failure in our ability to monitor the source of information, accurate source monitoring can prevent false memories. Put another way, if children engage in a more systematic form of source monitoring they are likely to be more vigilant in monitoring any images they generate about the balloon ride. Thus, they are less likely to attribute those images to genuine experience. Although systematic source monitoring has received substantially less attention than heuristic source monitoring, it is certainly no less interesting[6]. Indeed, there are three routes by which children may reject the false events if they rely more on systematic source monitoring.

In the first of those routes, children avoid a source monitoring error because they correctly recognise the source of the personal detail. Recall

[6] My thanks to Marcia Johnson for drawing my attention to this aspect of the SMF.

that in order to create the false photo, the child is extracted from a true family photo and inserted in to the false photo. While a great deal of effort is put in to ensuring that children will not recognize the original source of the doctored image, it does happen. For example, in Study 1, one child recognised the source of the personalised detail in the first interview. As soon as he saw the photo he said, "That did not happen! I remember that photo it's from summer camp. I bet you made it. I never had tea with Prince Charles!" Rejecting the false events in this way is possible only when personally meaningful information is included in the false photo. Thus, if children do reject the false event in this way, the rate of false memories for children who see personalised detail in the photo may turn out to be lower than that of children who do not see any personalised detail.

In the second route, children are able to avoid a source monitoring error by rejecting the false event based on their knowledge of technology. Photoshop®—the software used to create the doctored photos—and other similar programs, are now widely available. In fact, as Wade et al. (2002) noted, they are often included with more traditional software packages when new computers are sold. Therefore, many children know about the software and what it can do. As a result, when children see a photo that they do not recognise, or do not remember anything about, they are likely to consider how that photo may have appeared. If they are aware of Photoshop® then children are likely to blame it for the balloon photo.

Indeed, in Study 1 a surprising 18% of children rejected the possibility that the false events had occurred because they were able to draw on their knowledge of technology. For example, at the first interview, one child

declared, "I have never been in one [a hot air balloon] before...I bet you cut around my Dad, sister, and me on the computer and just stuck it in the photo." Another said, "That's made up isn't it! I'm sure it is, I can't believe that. The edges [of the balloon] are just too sharp!" Of course, it was not the balloon that was doctored! In short, technology provided an explanation for the photos in front of some children and meant they had no difficulty monitoring the source of the information, and thus they did not go on to develop false memories.

Finally, in the third route, the child is able to avoid a source monitoring error because he/she always attribute the images they generate to the false photo. In other words, children could construct coherent, highly detailed images of the balloon ride, but correctly monitor the source (their imagination) of those images. As a result, children would never develop a false memory. Such a possibility is less likely when children do not see any personally meaningful detail included in the photo.

In short, if children rely on a more systematic form of source monitoring then it is likely that including personally meaningful detail in the false photo will lead to fewer false memories.

Summary of predictions

In summary, there are two equally plausible, yet contradictory predictions we can make concerning the role of personally meaningful details in the false photo. Both depend on what type of source monitoring children are more inclined to use. One prediction states that children who are given personally meaningful detail in the false photo would have a difficult time monitoring the source of their memories, making false

memories more likely. These children would have a much easier time generating images of the event, and would also be more likely to generate a coherent and detailed account of the false event by drawing on relevant self-knowledge. Both factors make source monitoring errors, and thus false memories, more likely. However, an alternative prediction is that children who are given personally meaningful detail in the false photo would have an easy means of rejecting the false events, and thus an easy source monitoring task, making false memories less likely. Faced with a photo and an event that they do not remember, children could engage in a more systematic evaluation of the memory. In doing so, children are more likely to correctly monitor the source of their memories, and therefore would be less likely to develop false memories. Study 2 was designed to determine which of these predictions would be supported.

Chapter 7

Study 2

The role of personally meaningful detail in the false photo.

The purpose of Study 2 was to determine how providing personally meaningful detail—including the child and other family members in the false photo—would affect the likelihood of false memories. To answer this question, children talked about four events, one of which was false. Half the children saw a doctored photo depicting them, their family members, and some unknown people going for a ride in a hot air balloon. The remaining children saw only the dummy photo, depicting the same unknown people in the same hot air balloon.

Method

Participants

Ninety-seven children from 13 elementary schools in Wellington, New Zealand were recruited to participate. Of those, 62 (or 64%) completed all phases of the study (36 girls; $M = 9.90$ years, $SD = .50$)[7] [8]. Children[9] came from diverse socio-economic backgrounds[10] and all children had written parental consent to participate.

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[7] Because of an equipment failure, 20 children were excluded. An additional 4 children were excluded when their parents discussed the deception with them before the final interview, and a further 11 children were excluded after one child informed the group that some of the photos were made using Photoshop®.

[8] Note that Studies 2 and 3 are with 10-year olds only. Six-year olds were difficult to recruit and were not necessary to answer the specific research questions.

[9] Note that the term "children," as used here, refers to the specific sample of children in this study.

[10] According to the New Zealand Ministry of Education's Decile classification system. Participating schools in this study covered the range from 1 – 10.

Design

The design was a 2 x 2 mixed design, with personally meaningful detail (Personalised Detail, Non-personalised Detail) as the between participants factor and interview (1, 3) as the within-participants factor.

Procedure & Materials

Figure 7.1 displays an example of the photos children saw. As in Study 1, the first photo depicted a recent event, a photo taken within the last 12 months. This event was a warm-up to help children get used to the task, and is not included in the analyses below. The remaining three photos were the target events, and each depicted the child at 6-years old. The photos in positions 2 and 4 were true photos. One depicted the child participating in a moderately significant event; the example in Figure 7.1 is a visit to the National Army Museum in Waiouru, and the photo depicts the subject and his sister. This photo is referred to as the True $_{\text{Present}}$ photo.

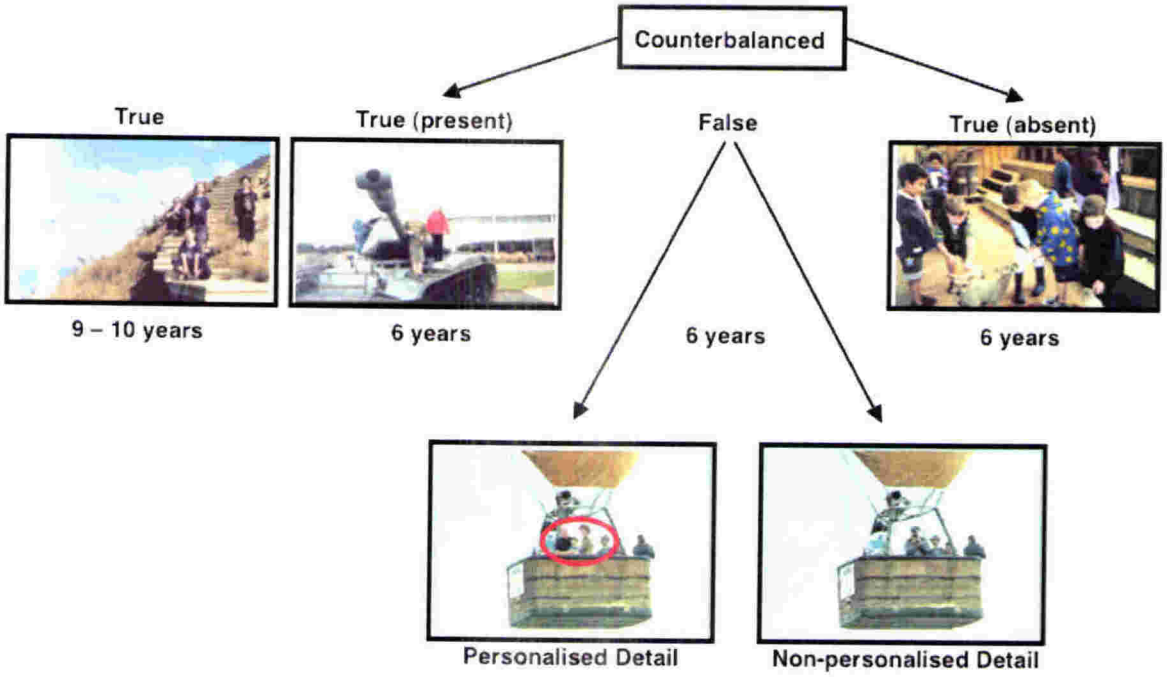

Figure 7.1 Experimental design and example photos.

The second true photo also depicted a moderately significant event; however, this time the child was not visible in the photo, but was present at the event. The example in Figure 7.1 is a visit to Sheepworld, and the photo depicts other children feeding the lambs, but not the subject. Thus, depending on the event, sometimes children saw other people that they would know in the photo, but they never saw any family members. This photo is referred to as the True $_{Absent}$ photo. These true events were counterbalanced so that they appeared in positions 2 and 4 (immediately before or after the false photo) equally often.

The third event was always the false event, and was the same hot air balloon event used in Study 1. As Figure 7.1 illustrates, half (N = 30) of the children saw a doctored photo, created following the same procedure as in Study 1. This group is referred to as the Personalised Detail group. The remaining children (N = 33) simply saw the dummy photo, which depicts an unknown man with a video camera in the centre of the balloon's basket. This group is referred to as the Non-Personalised Detail group. Each false photo was then sized 15cm x 10cm and printed by a commercial photo-processing lab so that they matched children's true photos.

Interviews

Just as in Study 1, children were interviewed individually, three times over one week by the same female interviewer. All interviews were audio and videotaped. The events to be recalled were presented to children one at a time in the following order: [1] Recent, [2] True $_{Present/Absent}$, [3] False, [4] True $_{Present/Absent}$. Children were given the photos to hold and look at while they told the interviewer all they could remember.

Each of the interviews followed the same procedure as Study 1 except that in interview 2 the interviewer only asked children to talk about the events that they had been unable to recall at interview 1. This change was made simply to streamline the interviews. "Unable to recall" was defined as children rating the amount that they could remember about an event below 4 (out of 5). However, the interviewer still asked children whether there was anything else they had remembered and wanted to tell her about "recalled" events.

Results and Discussion

As in Study 1, all parents confirmed that they had not discussed the true purpose of the study with their children and that their children enjoyed participating in the study.

True Events

As in Study 1, to determine the percentage of true memories children remembered, judges classified children's memory reports for true events as "remembered" or "not remembered." Judges agreed on 95% of classifications at interview 1 and 97% of classifications at interview 3, and were highly confident in those classifications (Int 1: $M = 2.62$ out of 3, $SD = .48$; Int 3: $M = 2.72$, $SD = .37$). By interview 3, children's recall of their true past events was nearly perfect. Judges classified 97% of Personalised Detail children as remembering their True $_{\text{Present}}$ memory and 100% as remembering their True $_{\text{Absent}}$ memory. By comparison, judges classified 100% of Non-Personalised Detail children as remembering both their True $_{\text{Present}}$ and True $_{\text{Absent}}$ memories.

To determine whether children were more confident, or could remember more about the true events when they were present in the photo, two 2 (group: Personalised or Non-Personalised) x 2 (event: True $_{Present}$ or True $_{Absent}$) mixed ANOVAs were run: one on the children's confidence ratings, and one on the children's remember ratings. As Table 7.1 shows, the children were just as confident and remembered just as much about both of their true events. In addition, children in the Personalised Detail group were no more confident and did not remember any more than children in the Non-personalised Detail group. In other words, there were no significant effects in either case (all $Fs < 1$).

Table 7.1. Means (standard deviations) for children's confidence and remember ratings by event and interview.

	True $_{Present}$		True $_{Absent}$	
	Interview 1	Interview 3	Interview 1	Interview 3
Personalised				
Confidence	4.69 (.72)	4.83 (.47)	4.67 (.85)	4.83 (.47)
Remember	3.33 (1.20)	4.05 (.92)	3.33 (1.06)	3.64 (.95)
Non-personalised				
Confidence	4.61 (.91)	4.68 (.66)	2.60 (.83)	4.68 (.66)
Remember	3.48 (1.00)	3.58 (.94)	3.24 (.99)	3.70 (.82)

False Event

The primary goal of this study was to determine how providing personally meaningful detail in the false photo would affect the likelihood of false memories. If the personalized detail in the false photo encourages children to use a more heuristic form of source monitoring, then they should be more confident about the balloon ride, and ultimately develop more memories of the event because they will consider their detailed images of the balloon ride to be memories of a childhood event. Thus, we

should also see higher remember ratings and better quality reports from children who have that personalised detail. However, if instead children are more systematic in their source monitoring, then they should be less confident about the balloon ride, develop fewer memories, and be more likely to reject the balloon ride as false.

Children's Confidence

The first question was whether children would be more confident about the balloon ride when they saw personalised detail in the false photo. To answer this question, like Study 1, children's mean confidence that they went for a balloon ride was calculated for both interview 1 and interview 3. These means are plotted in Figure 7.2. The left panel of Figure 7.2 shows the confidence ratings at interview 1 and 3 for children who had the personalised detail in the false photo; the right panel shows the confidence ratings at interview 1 and 3 for children who did not have the personalised detail in the false photo.

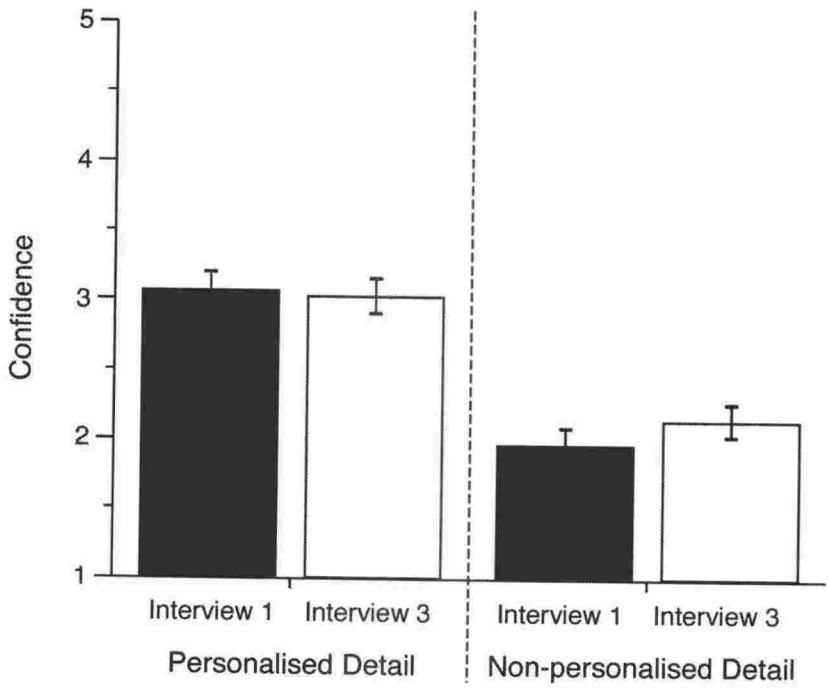

Figure 7.2 Children's confidence by group and interview.

As Figure 7.2 shows, children who did have the personalised detail in the false photo were more confident about the balloon ride at both interview 1 and interview 3 than those who did not. A 2 (group: Personalised, Non-personalised detail) x 2 (interview: 1, 3) mixed ANOVA revealed a main effect for group, F (1, 60) = 8.19, $p < .01$. As Figure 7.2 also illustrates, children did not become more confident over time ($F < 1$). Finally, there was no interaction between whether or not children had the personalised detail and the interview ($F < 1$).

Children's False Memories

If children who had the personalised detail were more confident about the balloon ride, would they also develop more false memories of the balloon ride? To answer this question judges classified children's reports using the coding scheme from Study 1. Judges agreed on 79% of interview 1 classifications and 89% of interview 3 classifications. They were also confident in those classifications (Int 1: M = 2.38 out of 3, SD = .67; Int 3: M = 2.45, SD = .58). In cases where judges disagreed, they adopted the more conservative category.

The left panel of Figure 7.3 shows the percentage of memories and images at interview 1 and 3 for children who saw personalised detail in the false photo; the right panel shows the percentage of memories and images at interview 1 and 3 for children who did not see personalised detail. The black portion of the bar represents the rate of memories, while the white portion of the bar represents the rate of images.

As Figure 7.3 shows, children who saw the personalised detail in the false photo were more likely to develop both memories and images of the balloon ride at both interview 1 and interview 3. In fact, by interview 3,

47% of Personalised Detail children developed memories or images of the balloon ride, compared with 18% of Non-personalised Detail children. A 2 (group) x 2 (interview) Logistic Regression collapsing across both memories and images revealed two important results. First, children who saw personalised detail were significantly more likely to develop memories and images then children who did not, χ^2 (1, N = 123) = 6.77, $p < .01$. In fact, children who saw the personalised detail were also significantly more likely to develop memories of the balloon ride. In other words, when a second analysis was run using the more stringent criterion of memories only, children who saw personalised detail in the false photo were still more likely to have developed false memories than those who did not, [Int 1: $\chi^2 < 1$; Int 3: $\chi^2(1, N = 62) = 3.70$, $p = .05$].

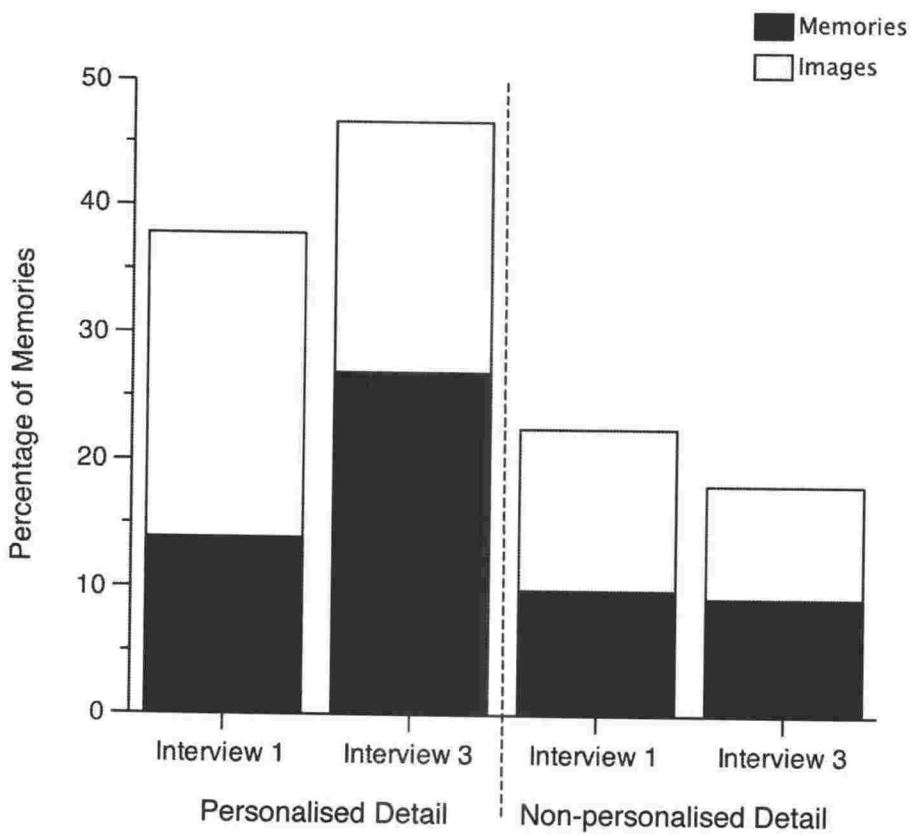

Figure 7.3 Percentage of false memories and images children developed by group and interview.

A Cramer's V calculation revealed a moderate effect size for the difference in the rate of false memories and images between children who did and did not see personalised detail in the false photo ($V = .34$). In addition, the power of the logistic regression to detect an effect was high ($w = .76$).

Taken together, these results indicate that the personalised detail children saw in the false photo had a significant impact on the likelihood that they would go on to develop false memories.

The second important result was that children did not develop more memories over time. In other words, there was no main effect for interview ($\chi^2 < 1$). In addition, there was no interaction between whether or not children saw personalised detail in the false photo and interview, ($\chi^2 < 1$).

Reasons for rejection: Overall, children who had the personalised detail in the false photo rejected the balloon ride in 18% of cases. Children who did not have the personalised detail in the photo rejected the balloon ride in 20% of cases. Across both groups, the predominant reason children provided for rejecting the balloon ride was that they would be able to remember it if it really happened (12%). Only one child who saw the personalised detail claimed the photo had been created in Photoshop® (3%, no child in the non-personalised group questioned the validity of the photo).

While the differences in the methodology and participants between Studies 1 and 2 make a direct comparison of the rejection rates unwise, it is informative. In Study 1, children in the $10_{\text{recall at 6}}$ group rejected the false events in 38% of cases compared to an average of 19% of cases in Study 2. One possible explanation for this difference is that children are driven to

use the more systematic source monitoring strategy only when the false event strikes them as implausible.

Recall that children in Study 1 became less confident about the hot air balloon ride only after having seen the tea with the Prince event. In other words, after seeing the tea with the Prince photo, children were more likely to evaluate the false photos, and their memories, and consider reasons for their lack of memory. Perhaps, without the less plausible event to make them suspicious, children in Study 2 simply didn't have a reason to question the validity of the photo or of the images they were generating. Further research is necessary to examine this issue.

In summary, children were more confident and developed both more memories and more images of the balloon ride when they saw a false photo that included personally meaningful information.

Correspondence between adult and child ratings

Remember ratings: Children's mean ratings of how much they claimed to be able to remember about the balloon ride were calculated for both interview 1 and 3, and appear in Figure 7.4. The left panel of Figure 7.4 shows ratings for children who saw personalised detail; the right panel shows the ratings for children who did not see personalised detail. As Figure 7.4 shows, the two groups remember ratings were the same at interview 1. However, by interview 3, children who saw personalised detail in the false photo claimed to remember more about the balloon ride than those who did not see personalised detail. In other words, a 2 (group) x 2 (interview) mixed ANOVA revealed a significant interaction, F (1,60) = 3.99, p = .05 [Int 1: t (60) = 1.60, p = .12; Int 3: t (60) = 2.89, $p < .01$]. Note, however, that while these ratings were comparable to those of the same

age group in Study 1, they were quite low. The reason the ratings appear low is because the data collapse across the few children who did develop a false memory and the majority of those that did not. Thus, the data are skewed towards the "I remember nothing" end of the scale.

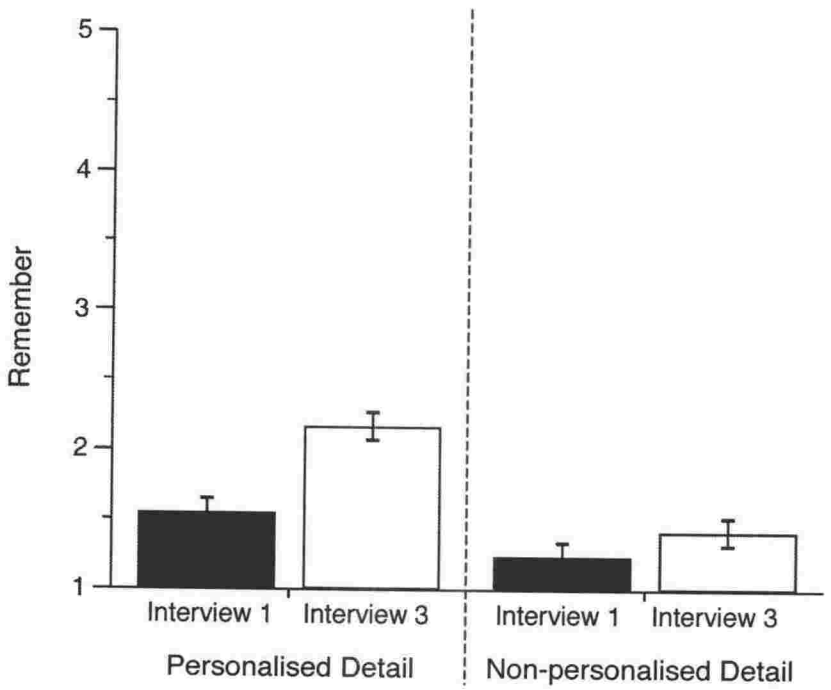

Figure 7.4 Children's remember ratings by group and interview.

Judges' quality-of-memory ratings: As in Study 1, two independent judges assessed children's reports for the overall quality of the memory. Recall that this measure is assessed on a 5-point scale, where 1 is equal to "nothing like a real memory," and 5 is equal to "as detailed and complete as a real memory." Judges were confident in their ratings, (Int 1: $M = 2.30$ out of 3, $SD = .40$; Int 1: $M = 2.30$, $SD = .50$). The mean of the two judge's ratings was calculated for each group at each interview, and they appear in Figure 7.5. The left panel of Figure 7.5 shows judges' quality-of-memory ratings for Personalised Detail children at interview 1 and 3; the right panel

shows the judges' quality-of-memory ratings for Non-personalised Detail children.

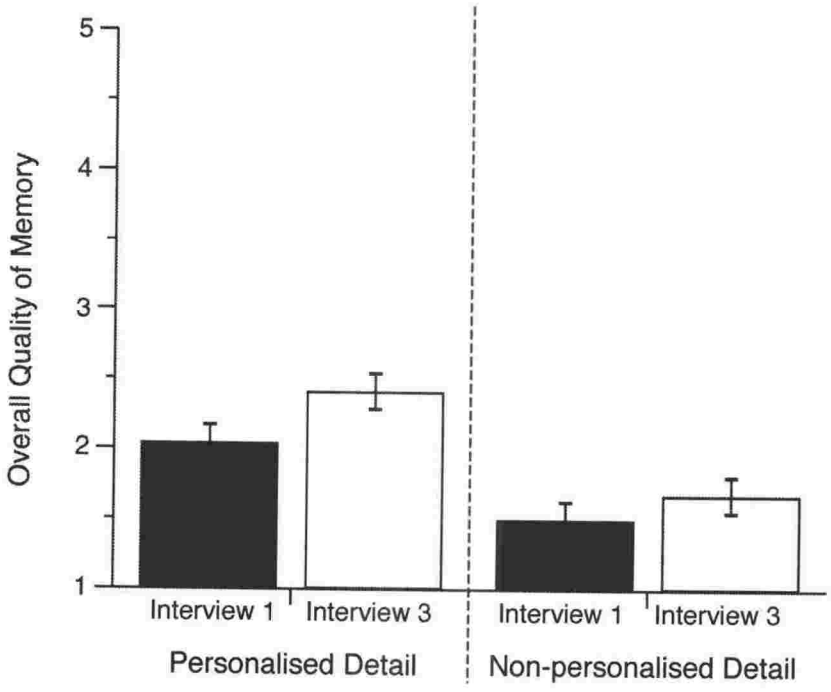

Figure 7.5 Judge's ratings of the quality of children's reports by group and interview.

A 2 (group) by 2 (interview) mixed ANOVA revealed two important results. First, as Figure 7.5 shows, the reports from children who saw the personalised detail were judged to be of better quality than the reports from children who did not, F (1, 57) = 9.07, $p < .01$. More specifically, follow up t-tests revealed that judges thought the reports from children who had the personalised detail were better than those from children who did not have the personalised detail at both interview 1 and 3 (Int 1: t (60) = 2.9, $p < .01$; Int 3: t (60) = 2.8, $p < .01$). Second, judges did not think the quality of children's reports changed over time. In other words, there was no main effect for interview ($F < 1$). In addition, there was no interaction between whether or not children saw personalised detail and the interview ($F < 1$).

Correlation analyses: Children's remember ratings and the judges' quality-of-memory ratings were highly correlated at both interview 1 and 3, [Int 1: $r = .67$, $p < .01$; Int 3: $r = .77$, $p < .01$]. These results suggest that the way children felt about the quality of their reports was reflected in the content and delivery of those reports and detectable to an adult judge.

Finally, as in Study 1, judges also considered the number of details children reported that went beyond the detail available in the photo. Judges concurred on 82% of interview 1 classifications and 90% of interview 3 classifications. Children's claims of remembering were significantly correlated with the number of specific details they reported (Int 1: $r = .64$, $p < .01$; Int 3: $r = .62$, $p < .01$). This result suggests that children based their remember ratings on the content of their reports.

Summary of findings

Taken together, the results of Study 2 present a consistent picture. Children who saw personalised detail in the false photo were more confident that they had the balloon ride and claimed to remember more about it by the third interview. Moreover, judges thought children provided better quality reports of the balloon ride at both interview 1 and 3. In addition, children who saw the personalised detail developed more images and more memories of the false event. In fact, nearly half of the children who saw the personalised detail in the false photo (47%) reported images or memories of the balloon ride, compared to 18% of children who did not have the personalised detail.

Accordingly, the results of Study 2 suggest that children who saw personalised detail in the false photo were more likely to rely on the more

heuristic form of source monitoring. In other words, these results suggest that children who saw personalised detail were more likely then children who did not see the personalised detail to develop coherent and detailed images that resembled the quality they expected of their true memories. In addition, these results suggest that children who saw the personalised detail were less inclined to systematically analyse the source of those images. As a result, children who saw the personalised detail were more likely to make source monitoring errors, and thus were more likely to develop false memories than children who did not see the personalised detail.

Returning to the model proposed by Mazzoni et al. (2001), the results of Study 2 suggest that providing personally relevant detail in the false photo is a more effective form of suggestion than a photo that does not contain that detail. In other words, we can infer that the personally relevant detail, while also enhancing other aspects of the model, provided a great deal of information for children to use as a spring-board to help them construct images and memories of what the event would have been like. In short, based on the results of Study 2 we might be tempted to conclude that the more information children are given about the false event the more likely they will be to develop a false memory.

However, recent research suggests that all forms of event detail may not be equally useful in helping to create false memories. In an implantation study with adults, Lindsay et al. (2004) found a very high rate of false memories when participants were given a true photo (their class photo) depicting the potential protagonists in a school-based false event combined with a narrative describing that false event. In other words,

unlike the children in Studies 1 and 2, Lindsay et al.'s participants did not see a photo that contained any event information. Therefore, an interesting question remains: how important is event information in the development of children's false memories? To put it another way, if all children see a photo depicting the potential protagonists in a false event (a photo of their family members), does a photo of the false event help or hinder the development of children's false memories? Study 3 was designed to answer this question.

Chapter 8

How important is event information?

Taken together, the results of Study 2 showed that providing personalised detail in the false photo increases children's false memories. Children who saw a photo depicting them and other family members in a hot air balloon were not only more confident that the false event had really happened, they developed more memories and more images of the balloon ride than children who saw only the dummy photo. In addition, children who saw personalised detail also remembered more over time, provided more details about the balloon ride, and were judged to have given better quality reports of the false event. However, if we take the personalised detail out of the photo, we do not know what type of detail becomes more important in helping children to develop false memories. More specifically, the question asked in Study 3 is: does event information help or hinder the development of children's false memories? Thus, Study 3 also targets the Memory Construction aspect of Mazzoni et al.'s (2001) model.

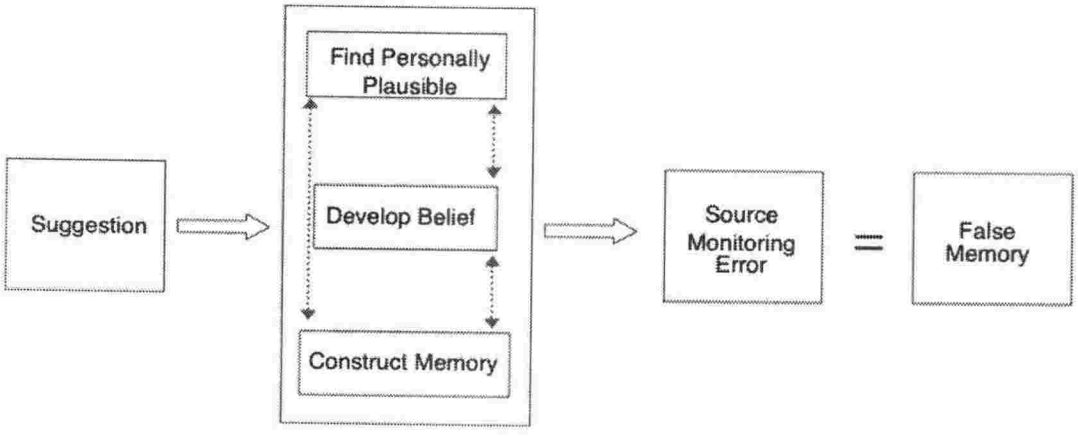

Figure 8.1 Mazzoni et al.'s (2001) model for how a false memory develops.

Rationale for Study 3

Recent research by Lindsay et al. (2004) suggests that event information may play a surprisingly unimportant role in the development of false memories. Lindsay et al. (2004) were interested in whether true photos combined with a false suggestion could produce false memories in adults. To this end, they asked adult participants to remember three school-related events: two true events from grades 5-6 and 3-4, and a false event from grade 1-2. The false event they suggested was that participants had got in trouble for putting Slime (the gooey green child's toy) into their teacher's desk drawer.

Lindsay et al. (2004) gave all their participants a narrative describing each of the three events. However, half of the participants were also given a copy of their class photo from the relevant age to help cue their memories of each event. By the end of the second session, 48% of those who read the narrative describing the Slime event were judged to have developed images or complete memories of putting slime in their teacher's desk. By contrast, when participants had their class photo as well as the narrative, 75% were judged to have developed memories and images.

Considering the results of Study 2, Lindsay et al.'s (2004) study poses an interesting question. In the studies reported in this thesis so far, children have seen either a combination of event and protagonist information (Study 1 and 2: the false photos) or event information only (Study 2: the dummy photo). However, Lindsay et al. have shown that showing participants a photo of the people who might have participated in the false event, with no photo of the event itself, increases false memories substantially. Thus, the purpose of Study 3 was to examine the importance

of event information in the development of children's false memories. More specifically, the question asked is this: if all children see a photo depicting their family members, and are told that they and some members of their family went for a balloon ride, does a photo of the balloon help or hinder the development of children's false memories?

Reasons why false memories might be more likely with event information

We know from the SMF (see Chapter 6), and the results of Study 2, that children should be more likely to construct detailed and coherent memories when they are provided with more detailed information about the false event (Hashtroudi et al., 1990; Johnson et al., 1988; Johnson et al., 1982; Johnson et al., 1993; Mitchell & Johnson, 2000; Schooler et al., 1986; Suengas & Johnson, 1988). In addition, we also know that images that seem to be generated easily are more likely to be accepted as genuine experiences (Foley et al., 1991; Finke et al., 1988). Taken together, these two lines of evidence suggest that children who see a photo of the balloon they supposedly went for a ride in would have more information to use as a spring-board to develop vivid images of the false event then children who do not.

Indeed, Lindsay et al. (2004) drew on the SMF to explain their results. Lindsay et al. reasoned that participants who saw their class photo were more likely to develop vivid images of the event because details from the photo (such as, the facial features of their class-mates) could easily merge with imagined details. As a result, the source monitoring task became extremely difficult, making errors, and thus false memories, more likely for participants who saw the class photo. In a similar vein, children who see a

photo of the balloon in Study 3 should be more likely to develop vivid images because details of the balloon could easily merge with imagined details.

In addition, children who see a photo of the balloon should be more likely to speculate about details of the balloon ride. Drawing on research by Hyman and colleagues (Hyman et al., 1995; Hyman et al., 1998; Hyman & Pentland, 1996) Lindsay et al. (2004) proposed that the class photo helped their participants to speculate about details of the Slime event, leading to a higher rate of false memories. Participants who saw their class photo were reminded of the people who were in their class and as a result, Lindsay et al. suggested that those participants were encouraged to speculate about who was most likely to get involved in the Slime event. Using similar logic, it would make sense to suggest that children who see a photo of the balloon in Study 3 should find it easier to speculate about details of the balloon ride then children who do not.

In summary, Lindsay et al.'s (2004) results, combined with research on source monitoring, (Hashtroudi et al., 1990; Johnson et al., 1988; Johnson et al., 1982; Schooler et al., 1986; Suengas & Johnson, 1988) and the role of speculation (Hyman et al., 1995; Hyman et al., 1998; Hyman & Pentland, 1996), suggest that children who see a photo of the balloon should develop more false memories then children who do not. Children who see a photo of the balloon will have more information to use as a spring-board to generate vivid images and speculate about details of the balloon ride. As a result, as in Study 2, if these children rely on a more heuristic approach to monitoring the source of their memories, they will be more likely to make

source monitoring errors, and therefore will develop more false memories than children who do not see a photo of the balloon.

Reasons why false memories might be less likely with event information

There is also evidence to suggest that providing children with a photo of the balloon may actually prevent children from developing false memories. Once again, drawing on the SMF (Johnson et al., 1993; Mitchell & Johnson, 2000), children who see a photo of the balloon they supposedly went for a ride in will have a source to attribute any images they generate. Thus, if children rely on a more systematic approach to source monitoring, children who see a photo of the balloon will be less likely to make source monitoring errors, and therefore will be less likely to develop false memories.

Indeed, research by Garry and Wade (in press) provides support for this line of thinking. Garry and Wade were interested in whether providing a false photo or a false narrative is a more powerful means of suggesting a false event. To this end, they gave half their participants a narrative describing the time they went for a balloon ride and gave the remaining participants a doctored photo depicting the subject and other family members in a hot air balloon. After three face-to-face interviews, including guided imagery, 50% of participants who saw the false photo reported images or memories of the balloon ride. By contrast, 82% of participants who read a narrative describing the false balloon event reported images or memories.

It may seem counterintuitive that participants were more likely to develop a false memory when they read a narrative describing the false

event as opposed to seeing a photo of the false event. Indeed, Garry and Wade asked 30 people to predict which medium (photo or narrative) would be a more effective aid to recalling a childhood event. Not surprisingly, all 30 participants chose photos. Clearly, we consider photos to be a highly credible source that is capable of conveying a great deal of information. However, it is for this very reason that Garry and Wade reasoned photos led to fewer false memories. Garry and Wade proposed that photos actually constrain imagination. In other words, photos can allow little, if any, room for the images participants generate to differ from those depicted in the photo. By contrast, narratives allow participants to imagine the specific details of an event or object's appearance in any way they choose.

Applying Garry and Wade's (in press) hypothesis to Study 3, it is possible that children who see a photo of the balloon may be less likely to develop false memories of the balloon ride. Children who see only a photo of their family members will have free reign to imagine the balloon in any way they wish. The balloon could be of any colour or any shape. It could have a basket with room for lots of people or only a few, and it could be a clear or a cloudy day. By contrast, children who see a photo depicting the balloon will be constrained by that image. Put another way, any images these children generate will be restricted by what the balloon looks like in the photo. Thus, children who see a photo of the balloon should have a much easier source monitoring task because seeing the photo will be a reminder of where their images originated. Ultimately, therefore, seeing a photo of the balloon may prevent children from developing false memories.

Summary of predictions

In summary, like Study 2 there are two equally plausible, yet contradictory predictions. One prediction states that children who see event information (a photo of the balloon) in addition to protagonist information (a photo of their family members) will be *more* likely to develop false memories. These children should have a much easier time generating images of the balloon ride because they are given more information about the balloon. The easier children find it to generate detailed images of the balloon ride, the more likely children will be to make source monitoring errors, and thus develop false memories. On the other hand, however, the second prediction states that children who see event information in addition to protagonist information will be *less* likely to develop false memories. These children should find it easier to monitor the source of their balloon images, attributing them to the photo of the balloon rather than their own memories. Study 3 was designed to determine which of these predictions would be supported.

Chapter 9

Study 3

The role of Event and Protagonist information

The purpose of Study 3 was to determine whether providing event information in addition to protagonist information helps or hinders the development of false memories. To answer this question, children talked about four events, one of which was false. Half the children saw a family photo for each event, and were asked to recall a particular event. The remaining children saw both a family photo and a photo depicting an aspect of the event to be recalled. Thus, for the false event, half of the children simply saw a family snapshot, while the other half saw a family snapshot and the dummy hot air balloon photo used in Study 2.

Method

Participants

Fifty-eight children from 6 elementary schools in Wellington, New Zealand were recruited to participate in the study. Of those, 43 (or 74%) completed all phases of the study (20 girls; $M = 9.80$ years, $SD = .60$)[11]. The children[12] came from diverse socio-economic backgrounds[13] and all children had written parental consent to participate.

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[11] Ten children were excluded when they were unable to complete their second interview within the specified time frame. A further five children were excluded because they were sick on the day of the final interview.

[12] Note that the term "children," as used here, refers to the specific sample of children in this study.

[13] According to the New Zealand Ministry of Education's Decile classification system. Participating schools in this study ranged from Decile 2 – 8.

Design

The design was a 2 x 2 mixed design, with event information (Protagonist, Protagonist + Event) as the between participants factor and interview (1, 3) as the within participants factor.

Procedure & Materials

Figure 9.1 displays an example of the photos children saw. As in Studies 1 and 2, the first event was a warm-up task, a recent event from within the last 12 months, and is not considered in the analyses below. The remaining three events were the target events, and each depicted the child at 6-years old. In each of the two conditions, children saw four different photos of their family members from the relevant time period, one for each event, and were asked to recall a specific event. In addition, half of the children (N = 20) also saw a photo depicting an aspect of each event to be recalled. As Figure 9.1 shows, these event photos were photos of objects or places associated with the event that did not include any family members. If necessary, photos were cropped using Photoshop® 7.0 to meet these specifications. Therefore, for the false event (which appeared in position 3), half of the children saw a photo of their family members and were asked to tell the experimenter about the time they went for a ride in a hot air balloon. The remaining children saw a photo of their family members, as well as a photo of the balloon they had supposedly gone for a ride in, and were asked to tell the experimenter about the time they went for a ride in a hot air balloon.

Event statement: "tell me about the time you"	...had "Harry Potter Day" at school.	...went to Paris	...went for a ride in a hot air balloon	...went to Dreamworld
Age at Event	9 – 10 years	6 years	6 years	6 years
Protagonist				
Protagonist + Event	 	 	 	 

Figure 9.1 Example of photos children saw.

Interviews

As in Studies 1 and 2, children were interviewed individually, three times over 7 days by the same female interviewer. All interviews were audio and video taped. The events to be recalled were presented to children one at a time, in the same order: [1] recent [2] true past [3] false [4] true past. Children were given the photos to hold and look at while they told the interviewer all they could remember. The procedure for each interview was exactly the same as Study 2.

Results and Discussion

All parents confirmed that they had not discussed the true purpose of the study with their children, and that their children had enjoyed participating in the study.

True Events

Recall that children were asked to recall two true events from when they were 6 years old. As in Studies 1 and 2, to determine the percentage of those true events that children remembered, judges' classified children's true memory reports in to two groups: "remembered" or "not remembered." Judges agreed on 90% of classifications at interview 1 and 93% of classifications at interview 3, and were confident in those classifications (Int 1: $M = 2.50$ out of 3, $SD = .50$; Int 3: $M = 2.60$, $SD = .46$). By interview 3, collapsing across the two true events, 90% of children who saw only a family photo, and 96% of children who saw both a family and an event photo, were judged as remembering their true past events. This difference in the rate of recall between the two groups was not significantly different, $\chi^2(1, N = 43) = 4.35$, $p = .11$.

Confidence

To determine whether children were more confident about their true events when they had an event photo, children's mean confidence was calculated for each event. Then, a mean confidence score for the true events was calculated by averaging across the two true events. As the means in Table 9.1 illustrate, children across both groups were confident about their true events. However, children who saw only a photo of their family members were marginally more confident about their true events then children who saw both a photo of their family members and a photo of the event.

A 2 (group) x 2 (interview) mixed ANOVA revealed a marginal main effect for group, $F(1, 82) = 3.64$, $p = .06$. This tendency suggests that, rather than having a positive effect on children's confidence that the event

happened, a photo depicting an aspect of the event may make children slightly less confident that the event happened. In addition, Children's confidence did not change over time, there was no main effect for interview, F (1, 82) = 1.15, p = .29. Finally, there was no interaction between whether or not children saw an event photo and the interview, $F < 1$.

Table 9.1 Means (standard deviations) for children's confidence and remember ratings by event and interview for children's two true events.

	Interview 1	Interview 3
Protagonist		
Confidence	4.71 (.51)	4.82 (.44)
Remember	3.35 (.91)	3.95 (.84)
Protagonist + Event		
Confidence	4.46 (.65)	4.61 (.65)
Remember	3.36 (.80)	3.58 (.88)

Remember

To determine whether children would claim to remember more about their true events when they had a photo depicting an aspect of the event, children's mean remember ratings were calculated for both of their true events at interviews 1 and 3. Then, just like children's confidence, a mean remember score was calculated for the true events by averaging across the two true events. As the means in Table 9.1 illustrate, children claimed to be able to remember as much when they had an event photo as when they did not. A 2 (group) x 2 (interview) mixed ANOVA, showed no effect for group ($F < 1$). However, children did claim to be able to remember more over time, as shown by a main effect for interview, F (1, 82) = 5.01, p = .03. Once again, there was no interaction between whether or not children saw an event photo and the interview, $F < 1$.

Taken together the results for children's true reports present an interesting picture. Children claimed to remember just as much about their true events, regardless of whether or not they saw a photo of the event. However, children who saw only a photo of their family members were marginally more confident that their true events had really happened then children who saw both a photo of their family members, and a photo of the event. Perhaps children who saw a photo of the event found it difficult to recall the specific details depicted in the event photo. As a result, these children may have become less confident in the event. Note, however, that all children were highly confident about the true events thus the overall impact of the event photo on children's confidence was minimal. In summary, as far as children's true event reports are concerned, having a photo of the event did not help, nor did it hinder, children's recall or how they felt about their true events.

False events

The primary goal in this study was to determine whether providing children with event information, in addition to protagonist information, helps or hinders children from developing false memories. If event information helps children to develop false memories then children who see a photo of the balloon should become more confident about the balloon ride, and develop more memories of the balloon ride then children who see only a photo of their family members. However, if event information hinders children from developing false memories, then children who see a photo of the balloon should be less confident about the balloon ride and

develop fewer false memories then children who see only a photo of their family members.

Children's confidence

The first question concerning the false event was whether or not children would be more confident about the balloon ride when they had a photo of the balloon. To answer this question, children's mean confidence that they went for a balloon ride was calculated for both interview 1 and interview 3. These means are plotted in Figure 9.2. The left panel of Figure 9.2 shows the confidence ratings at interview 1 and 3 for children who only saw a photo of the protagonists; the right panel shows the confidence ratings at interview 1 and 3 for children who saw both a photo of the protagonists as well as a photo of the event.

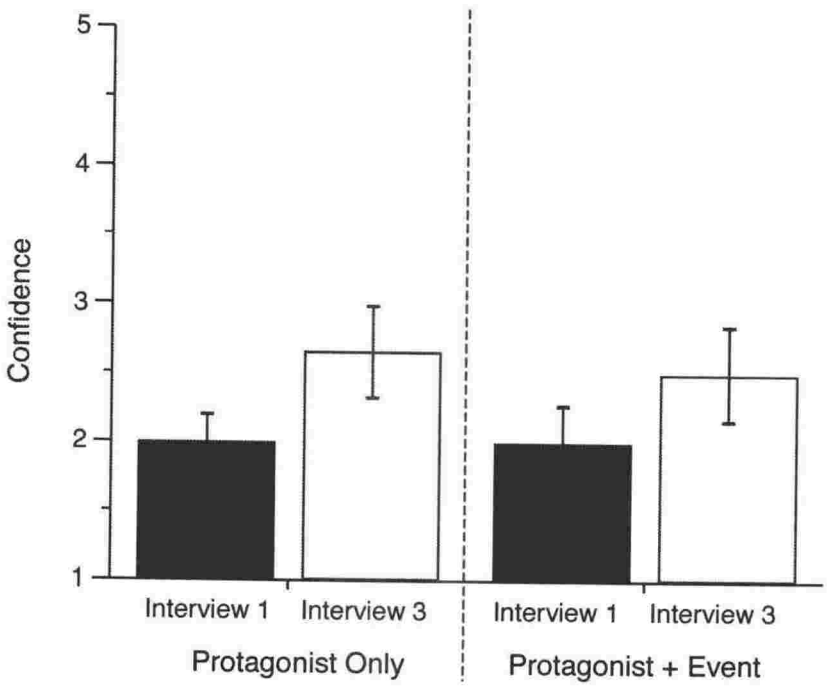

Figure 9.2 Children's confidence ratings by group and interview.

As Figure 9.2 shows, while children did become more confident in the balloon ride over time, there was no difference in confidence between the two groups. More specifically, a 2 (group) by 2 (interview) mixed ANOVA

on children's confidence ratings revealed a main effect for interview, F (1, 82) = 3.85, p = .05, but no main effect for group ($F < 1$), and no interaction between whether or not children saw an event photo and the interview, $F <$ 1.

Children's false memories

To determine whether children would be more or less likely to develop memories of the balloon ride when they had a photo of the balloon judges classified children's reports using the same coding scheme as in Studies 1 and 2. Judges agreed on 98% of interview 1 classifications and 91% of interview 3 classifications, and were confident in those classifications (Int 1: M = 2.80 out of 3, SD = .43; Int 3: M = 2.70, SD = .43). In cases where judges disagreed, they adopted the more conservative category.

The left panel of Figure 9.3 shows the percentage of memories and images at interview 1 and 3 for children who saw only a photo of the protagonists in the event; the right panel shows the percentage of memories and images at interview 1 and 3 for children who saw both a photo of the protagonists and a photo of the event. The black portion of the bar represents the rate of memories, while the white portion of the bar represents the rate of images.

Collapsing across memories and images, Figure 9.3 suggests that children who saw only a photo of their family members were more than twice as likely to develop memories and images of the balloon ride (35% versus 15%). However, a 2 (group) x 2 (interview) Logistic Regression revealed no difference in the rate of memories and images between the two groups, $\chi^2(1, N = 43) = 2.85$, p = .09. In fact, children were only more likely to develop images and memories over time, $\chi^2(1, N = 43) = 3.80$, p = .05. In

other words, there was also no interaction between whether or not children saw an event photo and the interview, ($\chi^2 < 1$). In addition, there was no difference in the rate of false memories only between children who did and did not see a photo of the balloon ($\chi^2 < 1$).

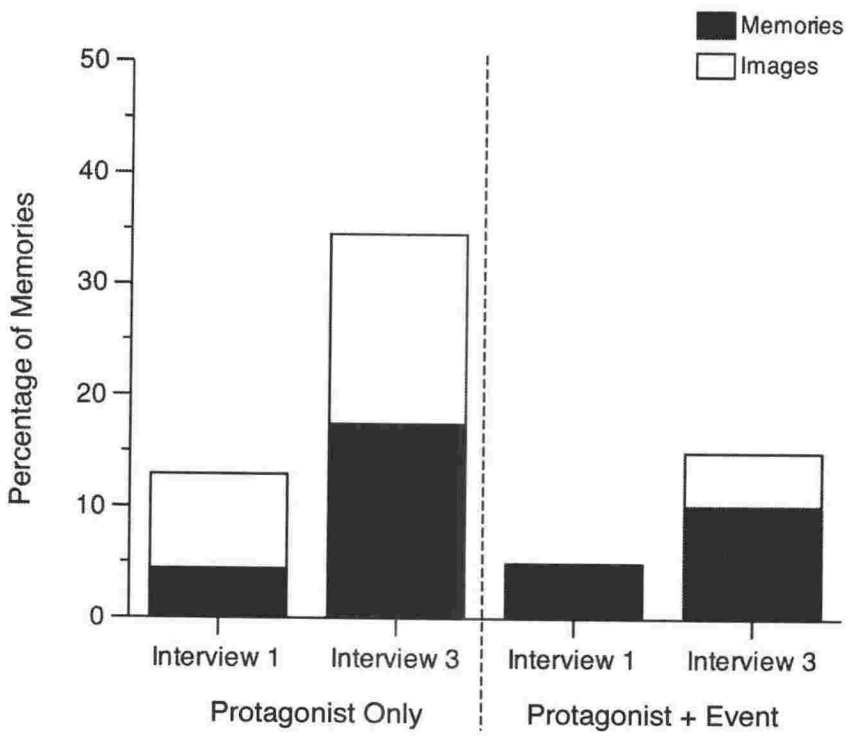

Figure 9.3 Percentage of false memories and images by group and interview.

Follow up analyses revealed that the reason the difference in the rate of false memories is not significant is because the difference between the groups is statistically quite small and there were simply not enough children in the study to detect that difference. An effect size calculation using Cramer's V revealed that the size of the effect was quite small, V = .26. In addition, the power of the test was low, w = .40. In fact, analyses showed that to detect a significant difference with an effect size of .26, at least 59 children would have been required in each group. Put another way, because there is such a small number of children in each group, the

apparent difference in the rate of false memories in Figure 9.4 is driven by a very small number of children.

Reasons for rejection: Thirty-five percent of children rejected the balloon event, claiming it never happened. This figure was the same regardless of whether or not children saw a photo of the balloon. All of those children claimed that their lack of memory was the reason they believed the event did not happen. For example, one child said, "I'm sure I would remember something like that if it really happened."

Correspondence between adult & child ratings

Remember ratings: Children's mean ratings of how much they claimed to be able to remember about the balloon ride were calculated for both interview 1 and 3. These means are plotted in Figure 9.4. The left panel of Figure 9.4 shows the mean remember ratings at interview 1 and 3 for children who only saw a photo of the potential protagonists in the false event; the right panel shows the mean remember ratings at interview 1 and 3 for children who saw both a photo of the potential protagonists and a photo of the event.

As Figure 9.4 shows, children who saw a photo of the balloon did not claim to be able to remember any more or any less than children who did not see a photo of the balloon. A 2 (group) by 2 (interview) mixed ANOVA on children's remember ratings, revealed no effect for children's group ($F < 1$). However, both groups claimed to remember more over time. In other words, there was a significant main effect for interview, $F\ (1, 82) = 5.20$, $p = .03$. There was no interaction between whether or not children saw a photo of the balloon and the interview ($F < 1$).

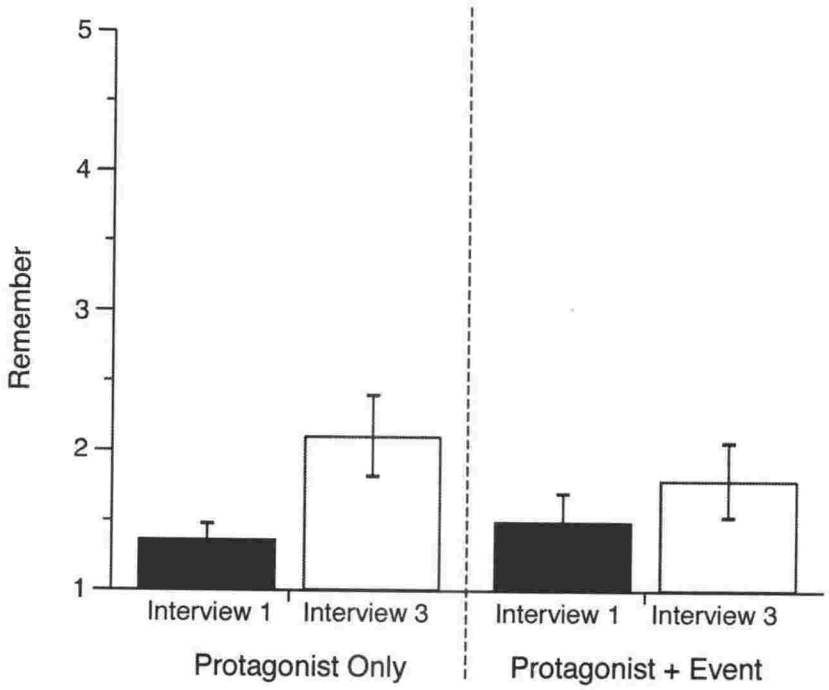

Figure 9.4 Children's remember ratings by group and interview

Judges' quality-of-memory ratings: As in Studies 1 and 2, two independent judges assessed children's reports for the overall quality of the memory. Recall that this measure is assessed on a 5-point scale, where 1 is equal to "nothing like a real memory," and 5 is equal to "as detailed and complete as a real memory." Judges were confident in their ratings, (Int 1: $M = 2.80$ out of 3, $SD = .41$; Int 1: $M = 2.70$, $SD = .53$). The mean of the two judges' ratings was calculated for each group at each interview, and those ratings appear in Figure 9.5. The left panel of Figure 9.5 shows judges' quality-of-memory ratings for the children who saw only a photo of the potential protagonists in the false event; the right panel shows the judges quality-of-memory ratings for children who saw both a photo of the potential protagonists and a photo of the event.

As Figure 9.5 shows, judges detected no difference between children's reports based on whether or not children saw a photo of the balloon. A 2 (group) by 2 (interview) mixed ANOVA revealed no main effect for group,

F (1, 82) = 1.24, p = .27. However, just like children's remember ratings, judges thought that the quality of children's reports improved over time. In other words, there was a main effect for interview, F (1, 82) = 4.66, p = .03. Once again, there was no interaction between whether or not children saw a photo of the balloon and the interview ($F < 1$).

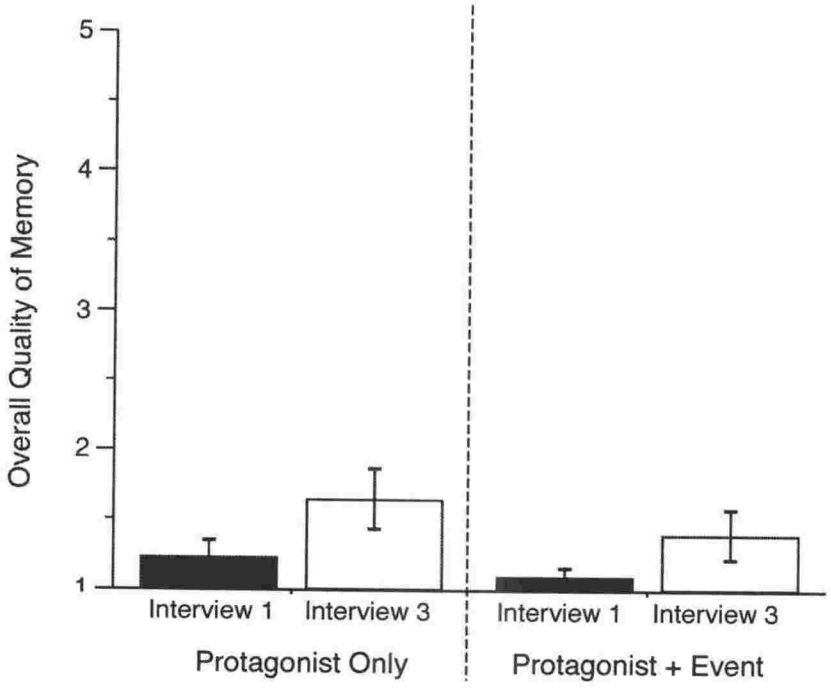

Figure 9.5 Judges ratings of the quality of children's reports by group and interview.

Correlation Analyses: As in Studies 1 and 2, children's remember ratings and judges' quality-of-memory ratings were highly correlated and increased marginally over time [Int 1: r = .44, $p < .01$; Int 3: r = .71, $p < .01$; Z = 1.86, p = .06]. These results suggest that the way children felt about the quality of their reports was reflected in the content and delivery of those reports and detectable to an adult judge.

Finally, as in Studies 1 and 2, judges also considered the number of details children reported that went beyond the detail available in the photo. Judges concurred on 89% of interview 1 classifications and 91% of interview 3 classifications. Children's claims of remembering were

significantly correlated with the number of specific details they reported, and increased over time. However, this increase was not statistically significant (Int 1: $r = .35$, $p = .03$; Int 3: $r = .51$, $p < .01$; $Z = .93$, $p = .35$). This result suggests that children based their remember ratings on the content of their reports.

Summary of findings

Taken together, while the fact there was no difference in the rate of false memories and images between the two groups can be put down to a lack of power, the pattern of results observed for children's confidence, children's remember ratings, and judges' quality-of-memory ratings, do present a consistent picture. Seeing a photo of the event—the hot air balloon—did not help children to develop false memories. Children were just as confident, remembered just as much, and the quality of their reports was judged to be the same, regardless of whether or not they saw a photo of the balloon.

In Study 2, children were more confident, remembered more about the false event, were judged to have better quality reports, and finally developed more false memories when they saw personalised detail in the photo. In other words, the results of Study 2 revealed a consistent pattern of results: every analysis showed that children who saw personalised detail had an advantage over children who did not. Therefore, because all of the continuous measures in Study 3 present a consistent pattern or results, a tentative conclusion seems warranted. While further research is clearly necessary, the results of Study 3 provide preliminary evidence to suggest that rather than helping children develop false memories, if anything, in

the absence of a doctored photo, event information may hinder the development of false memories.

Chapter 10

General Discussion

The primary aim of this thesis was to investigate whether Mazzoni et al.'s (2001) model for how false memories develop in adults also accounts for how false memories develop in children. To address this issue, three experiments were conducted targeting different aspects of Mazzoni et al.'s model. In short, the results of those three studies suggest that the model does explain how children's false memories develop. Overall, the three studies suggest that the level of detail children are provided with, as well as the type of detail, are critically important in whether children will construct a false memory.

Summary of Findings

Study 1 investigated whether children could not only become equally confident, but also develop just as many memories of a plausible event as of a less plausible event. To this end, 6- and 10-year old children saw a mix of true and doctored photos of past events at three interviews, and told the interviewer everything they could remember about each event. One event, taking a hot air balloon ride with other family members, was a higher plausibility event, and the other event, having a cup of tea with a Prince, was a lower plausibility event. Finally, children also rated how confident they were that each event really happened, as well as how much they could remember about it.

The results of Study 1 showed that, similar to the outcome of Mazzoni et al.'s (2001) study with adults, by the end of the three interviews children

were just as confident that they had experienced the plausible event, as they were that they had experienced the less plausible event. Moreover, children were just as likely to develop coherent and detailed memories of the plausible event, as they were to develop coherent and detailed memories of the less plausible event.

In addition, Study 1 also investigated whether the recency of the false event affected the development of false memories. Thus, one group of 10-year olds were asked to recall events from their distant past (age 2), while another group were asked to recall events from their recent past (age 6), roughly before or after the offset of childhood amnesia. The two groups of 10-year olds were equally likely to develop memories of the false events. However, the reasons why children did not develop false memories were different. In fact, as far as the reasons for rejection were concerned, there was evidence to suggest that recency does matter.

While both groups of 10-year olds were more likely to reject the false events over time, 10-year olds remembering back to when they were 2 were less likely to draw on a self-relevant knowledge explanation. Instead, these children were more willing to accept that they simply could not remember the false events. The most likely explanation for such a result is that the experience of not remembering events from this time period was fairly normal for these children. By contrast, 10-year olds remembering back to age 6 were unfamiliar with not being able to remember events from that time period, and were thus more driven to come up with a rational explanation for why they could not remember the events.

Considering the results of Study 1, Study 2 was designed to determine what it is about the false photo that helps children to develop false

memories. Specifically, the purpose of Study 2 was to determine how providing personally meaningful detail in the false photo would affect the likelihood of false memories. To answer this question, children were asked to talk about four events, one of which was false. Half the children saw a doctored photo depicting them, their family members, and some unknown people going for a ride in a hot air balloon. However, the remaining children simply saw the dummy balloon photo, depicting the same unknown people in the same hot air balloon. Thus, the only difference between the two groups was whether or not they saw any personalised detail in the false photo.

Children who saw the personalised detail in the false photo were not only more confident that the false event had really happened, they also developed more memories and more images of the balloon ride than children who did not see the personalised detail. In addition, children who saw the personalised detail also remembered more over time, provided more details about the balloon ride, and were judged to have given better quality reports of the false event.

Thus, the results of Study 2 suggest that the personalised detail helped children to develop coherent and detailed images that resembled the quality they expected of their true memories. Moreover, these results suggest that children who saw the personalised detail were less inclined to systematically analyse the source of the images they generated. As a result, children who saw the personalised detail were more likely to make source monitoring errors, and thus were more likely to develop false memories then children who did not see the personalised detail.

Following on from the results of Study 2, Study 3 investigated whether all forms of detail are equally helpful in helping children create false memories. More specifically, Study 3 investigated whether providing event information in addition to potential protagonist information helps or hinders the development of false memories. Thus, once again children were asked to talk about four events, one of which was false. Half the children saw a family photo for each event, and were asked to recall a specific childhood event. The remaining children saw both a family photo and a photo depicting an aspect of the event to be recalled. Thus, for the false event, half of the children simply saw a family snapshot, while the remaining children saw a family snapshot and the dummy hot air balloon photo used in Study 2.

Children were equally confident, remembered just as much, and were judged to have provided the same quality reports, regardless of whether or not they saw a photo of the balloon. In addition, while not significant, children who saw only a photo of the potential protagonists developed twice as many memories as children who saw both a photo of the event and a photo of the potential protagonists. Therefore, the results of Study 3 provide preliminary evidence to suggest that when children are given information about the potential protagonists, information about the event does not help children to construct memories or images of a false event. If anything, event information may actually hinder false memory development. Thus, while further research is necessary, the results of Study 3 do provide preliminary evidence to suggest that in the absence of a doctored photo, event information does not play a large role in the development of children's false memories.

Taken together, the results of Studies 1 – 3 show that the amount and type of detail children see affects the likelihood that they will develop false memories, in line with a SMF explanation (Johnson et al., 1993; Johnson & Mitchell, 2000). Of course, there are other frameworks that could be drawn upon to account for the results in this thesis. For example, according to fuzzy-trace theory (FTT; Brainerd & Reyna, 1990; 1993; Reyna, 1992; 1995; Reyna & Brainerd, 1991) people extract and store (in memory) both verbatim and gist representations of any experience. Verbatim representations are defined as coherent, detailed, and accurate records of an experience. By contrast, gist representations, as the name suggests, simply extract the general meaning of the experience. As a result, they are neither detailed nor comprehensive representations, but are less subject to forgetting. Thus, errors are likely to arise when people rely more on gist representations compared to verbatim representations. In this sense, gist representations map on to the heuristic form of source monitoring, while verbatim representations map on to the systematic form of source monitoring.

However, as Reyna and Lloyd (1997) point out, verbatim and gist representations are, thought to be, encoded at the same time, but stored separately. As a result, gist and verbatim representations can, theoretically, both be elicited depending on the cues available. However, there are two reasons why FTT is not as useful as the SMF in explaining children's false memories. First, FTT posits that both gist and verbatim representations increase with age. As a result, FTT does not appear to allow for the age-related effects seen in Study 1 as cleanly as the SMF does. Second, while

FTT is effective in explaining errors based on gist, it does not explain how participants could develop entirely false memories (Schooler, 1998).

In addition, according to Yonelinas (2002) review of the literature there are at least six distinct classes of dual-process models (Atkinson's Model, Neuroanatomical Models, Mandler's Model, Jacoby's Model, Tulving's Model, and Yonelinas' Model) that could be employed to account for the results in this thesis. Each of these models make a distinction between recollection and familiarity, however, within those distinctions there are a number of differences between the six models. Nevertheless, in all cases, a misplaced sense of familiarity is said to be responsible for errors. As shall be discussed, it is possible that such a misattribution of familiarity is the mediating mechanism responsible for the source monitoring errors that Mazzoni et al.'s (2001) model shows lead to false memories.

In summary, as Schooler (1998; c.f Watkins, 1984) so eloquently stated, "theoretical memory distinctions are a bit like toothbrushes. Everyone seems to have one, but no one wants to use anyone else's" (p. 132). There are clearly many similarities and considerable differences between the multitudes of available theories. The evidence has accumulated over the last 30 years in favour of a dual-process theory, whatever those two processes are to be called (Yonelinas, 2002). However, considerable research will be required to determine whether the various perspectives can be unified.

Connections with other research

The results of this thesis are consistent with research on children's suggestibility and the use of cues and props in clinical and experimental contexts.

Children's Suggestibility

Recall that 6-year olds in Study 1 were more likely than both groups of 10-year olds to develop false memories of both the balloon ride and having tea with the Prince. These results fit with the suggestibility literature demonstrating developmental differences in the likelihood of children succumbing to suggestion (Ackil & Zaragoza, 1995; Cohen & Harnick, 1980; Pezdek & Roe, 1995; Sutherland & Hayne, 2001). Moreover, these results fit with research demonstrating age-related changes in children's source monitoring abilities. Younger children typically have greater difficulty distinguishing between events that they actually experienced and events that they only imagined (Ceci, 1995; Lindsay, Gonzales, & Eso, 1995; Lindsay, Johnson, & Kwon, 1991). Indeed, research shows that the more complex the images are, and the more similar they become to real memories, the greater the likelihood that children will make source monitoring errors (Finke et al., 1988). The results of Study 1 suggest that false photos can be used to induce children's false memories by taking advantage of the deficits in children's source monitoring abilities. In other words, the false photos appear to be an effective means of promoting the generation of images, especially for 6-year olds.

However, it is interesting to note that if we consider the conditions where 10-year olds saw a doctored photo across the three studies, the rate of children's false memories is lower than that of adults. The weighted

mean percent of false recall from 10-year olds who saw a doctored photo was 33%, compared to 44% in the adult implantation studies (Garry & Wade, in press; Hyman & Billings, 1998; Hyman et al, 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek et al., 1997; Porter et al., 1999). Such a result suggests that there may not be age differences in false memories between older children and adults in situations where children have some sort of source monitoring advantage.

For example, in Study 1 the doctored photos provided an easy means by which children could reject the false events. In fact, 18% of the 10-year olds had enough expertise to dismiss the false events immediately for technological reasons, something Wade and colleagues do not report their adults ever saying (Garry & Wade, in press; Wade et al., 2002). Thus, the increasing computer literacy of children showed that what adults think is a credible and authoritative source may not be so for children.

Use of external cues and props in research and therapy

Much research has investigated a variety of different cues and props in an effort to discover a recall aid that could help children report more information about an event without increasing the number of errors children make. While research shows that using photos of specific objects or places does enhance recall and reduces errors compared to when children are invited to play or interact with props (Aschermann et al., 1998; Hudson & Fivush, 1991; Patterson, 1995), the studies in this thesis suggest that photos can also lead to false memories. Like asking children to draw and talk about an event (Strange et al., 2003), using photos to help children remember an event that never happened to them can lead a significant proportion of children to claim that they have had an entirely false

experience. Thus, the results of this thesis suggest that the hunt for the perfect recall aid does not end with photos. Instead, these results suggest that while photos can enhance memory in some circumstances, in others photos can hurt memory.

Implications for the Model

The results of the studies in this thesis also have implications for the model proposed by Mazzoni et al. (2001). These results suggest that Mazzoni et al.'s model for how false memories develop in adults also explains how false memories develop in children. In other words, just like adults, children must also find the suggested event personally plausible, develop an autobiographical belief that the event occurred, construct a detailed memory of what the event would have been like, and ultimately, mistakenly attribute that memory to an actual experience, rather than their own imagination.

However, while Mazzoni et al.'s (2001) model adequately explains the development of false memories in general, it could still benefit from revision. The model suggests that participants will develop false memories if they make source monitoring errors. However, it does not explain the mechanism by which those source monitoring errors are likely to occur. Instead we are left with a rather circular argument where if participants find an event sufficiently plausible, develop a belief, and create sufficiently detailed memories, they will go on to make a source monitoring error. However, if participants do not make a source monitoring error we infer that participants did not find the event sufficiently plausible, develop a belief, or create sufficiently detailed memories.

Recent research by Loftus and Bernstein (2005) suggests that the missing link in Mazzoni et al.'s (2001) model may be fluency: the ease with which images come to mind. Experience teaches us that vivid recollection fades over time leaving us with a sense of familiarity (Gardiner & Java, 1991). As a result, when we do not specifically remember an event, we learn to rely on ease with which that event comes to mind to decide whether it actually happened (Jacoby & Dallas, 1981; Jacoby, 1983; 1991; Jacoby & Kelley, 1992; Jacoby & Witherspoon, 1982; Whittlesea, Jacoby, & Girard, 1990). However, studies have shown that the fluency with which an item or event is processed can be manipulated in very simple ways.

Known as the *revelation effect,* research shows that participants are more likely to report an item as "old" if that item is presented in a way that requires some effort to solve at test (such as, gradual revelation of a word or pictures, or solving anagrams or general knowledge questions: Landau, 2001; Luo, 1993; Peynircioglu & Tekcan, 1993; Watkins & Peynircioglu, 1990). Bernstein and colleagues (Bernstein, Whittlesea, & Loftus, 2002; Bernstein, Godfrey, Davison & Loftus, 2004; Loftus & Bernstein, 2005; Whittlesea, 1993) suggest that participants who experience an "aha" sensation, or a surprising sense of fluency in solving an item at test, misattribute that sensation as being a result of prior experience, rather than due to the way the item was presented. Bernstein and colleagues refer to this explanation as the "misattribution of familiarity" model.

Thus, the reason participants make a source monitoring error, according to Loftus and Bernstein (2005), is because images of the event in question come to mind much more fluently then participants would expect of a false event. While further research is certainly necessary to test Loftus

and Bernstein's hypothesis with false autobiographical memories, Figure 10.1 proposes what the modified version of the model might look like.

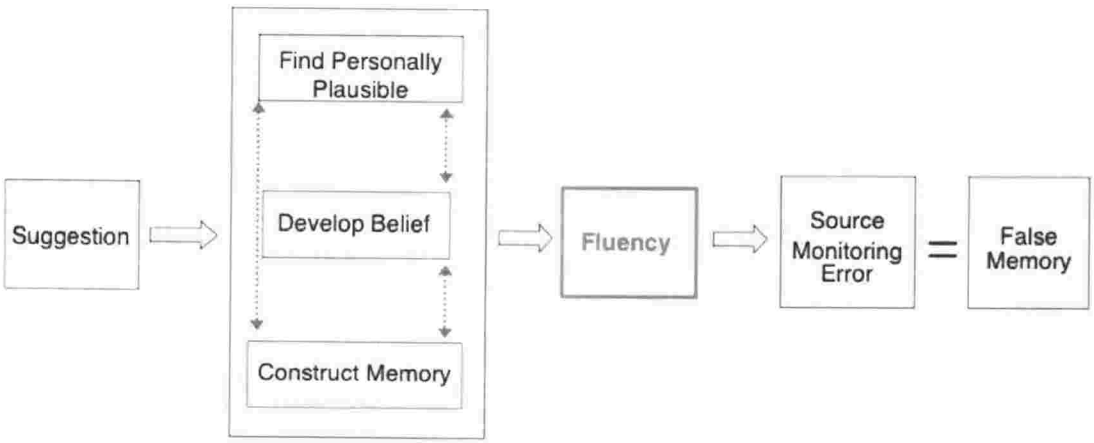

Figure 10.1 Modified version of Mazzoni et al.'s (2001) model.

Practical Implications

The results of the studies in this thesis also have significant practical implications. We know that in clinical contexts photos are used more like spring-boards to help clients talk about the events that trouble them, rather than as specific event cues like they are in experimental contexts (e. g., Aschermann et al., 1998; Hudson & Fivush, 1991; Patterson, 1995). The results, of this thesis suggest that the outcome of the more speculative therapeutic approach, may be that clients will be led to remember a slightly, perhaps even substantially different, past.

Note that while the highest false memory rate was found in response to the doctored photo (Studies 1 and 2), in Study 3 a substantial proportion of children developed false memories and images in response to very little suggestion. In fact, in Study 3, by interview 3 more than a third (35%) of participants had developed images and memories of the balloon ride after hearing a simple suggestion and seeing a non-descript family photo, the sort of photo everyone has in their photo albums. Thus, the results of the studies in this thesis should act as a warning of the danger in suggesting events to clients in therapy that may never have happened. Moreover, recall that Weiser (2001) implied that in the not-too-distant future, therapists and counselors would rely less on original photos and more on digitally enhanced or perhaps even entirely doctored photos. The results of the studies in this thesis suggest that such a move would be, at best, unwise.

Directions for Future Research

The results of this thesis provide some insight in to how children's memory works: how children's false memories develop, and the factors that influence the ease with which those false memories can develop. However, there are still substantial gaps in our understanding. For example, there are at least three directions for future study.

First, research is necessary to determine if the mechanism mediating the construction of a coherent memory and the source monitoring error in Mazzoni et al.'s (2001) model is indeed fluency. One potential way of answering this question would be to take pairs of participants and show them a true photo (from their own childhood) and a false photo (a photo from their pair's childhood), and then, after three interviews, ask those participants to rate the clarity of their images, and the ease with which those images come to mind. In matching the true and false photos across pairs some degree of control would be ensured. If participants rate the ease with which their images came to mind higher when they are classified as developing false memories than when they do not, we would have some evidence to suggest that fluency is indeed the mediating mechanism behind the source monitoring error in the development of false memories. If such a pattern of results is found we would have evidence to suggest that the modified version of Mazzoni et al.'s model presented in Figure 10.1 is a more appropriate description of how false memories develop.

Second, to determine the amount of detail most likely to induce children's false memories it would be useful to conduct a single study comparing the rate of false memories in response to 1) a doctored photo; 2) a narrative describing the false event; 3) a family photo, an event photo, and an event statement; 4) a family photo and an event statement. Based on

the results of the studies in this thesis we can perhaps predict the rates of false memories likely to arise in each condition. However, it would be unwise to draw conclusions comparing across those studies. In addition, the studies in this thesis did not examine the rate of children's false memories in response to a narrative compared to a photo. If like the adults in Garry and Wade's (in press) study, narratives are a more effective means of suggesting a false event we could infer that one of the most crucial aspects in developing a false memory is generating one's own images.

Finally, a significant body of research has examined the personality traits that are most likely to induce false memories in adults, such as, dissociation, imageability, introversion versus extroversion, and self-monitoring (Hyman & Billings, 1998; Hyman et al., 1995; Porter et al., 2000; Ost, Foster, Costall, & Bull, 2005). In addition, a significant body of research has examined the internal factors (e.g., age, gender, linguistic competence) and interview factors (e.g., question type, question format, authority, repetition, sterotype induction) that influence children's suggestibility (see for a review Ceci & Bruck, 1993; Bruck & Ceci, 1995). While Study 1 showed that children's age is an important factor in the likelihood that children will develop false memories, we know little about the personality types or traits that make some children more prone than others to develop false memories in response to a suggestion.

For example, are those children who are more prone to distraction, or fantasy more likely to develop false memories? The logical response would be "yes," however recent research by Sharon and Woolley (2004) suggests that in fact the answer may be "no." Sharon and Woolley (2004) found that children who scored high on a scale of fantasy orientation were actually

better than children who scored low on that scale at categorizing fantasy characters and real people as real or imaginary. Such a result suggests that children who spend more time in an "imaginary world" actually learn more about the boundaries of imagination and learn to monitor fantasy and reality more effectively. If these results extend to the likelihood that children will develop false memories, then our assumptions about the role of imagination in the development of false memories would need to be revised.

Conclusion

In conclusion, photos are an extremely powerful source of suggestion and are clearly capable of inducing false memories even when they contain little detail about the suggested event. As such photos should join children's drawings, toys, props and AD Dolls on the list of external cues that need to be used by therapists and investigative interviewers with extreme care (Bruck et al., 2000; Gross, 2000; Strange et al., 2003).

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Appendix A: Interview Protocol

Interview 1

Phase 1: Rapport Building
Ask rapport building questions so that he/she gets used to talking in your presence. For example: Do you enjoy school? What's your favourite part of school? Do you have any brothers/sisters? What are their names? What's your favourite TV program? Do you play any sport?

Throughout the entire interview offer minimal encouragers to maintain the conversational flow. For example: Aha, mmm, wow, *but do not use* "really?" *because it may make the child question whether we believe them.*

Phase 2: Photos
Present child with photos in order (labeled on back of each photo

Ok – this is the first photo. Can you have a look at that and tell me who all the people are? *(If "no" tell them who each person is).* OK it looks like a lot of fun can you tell me everything you can remember about what is happening in the photo? Take your time

Possible prompts (after free recall): Where might it have happened? Who else might have been there at the time? Do you remember anything else about the day?

Once child has exhausted their recall: That's Ok, I'll be coming back to talk to you again soon, so you have a think about it some more in the meantime and see if you can remember anything else. If you do you can tell me the next time I see you."

Phase 3: Confidence/Belief Questions

Ok, now I'm going to ask you some questions about the photos that you have just looked at and I'm going to ask you to use this "smiley face ruler" to help you give me your answers. If you look at [it] you can see that it has some different size smiley faces stuck on the front. They go from zero – 'cos there isn't anything there, to really big – see the big face. I'm going to ask you some questions and what I want you to do is move this little round ball to where you want it to be for your answer.

REMEMBER
1=nothing
2=a little bit
3=quite a bit
4=lots
5=heaps and heaps

BELIEF
1=not sure at all

2=little bit sure
3=quite sure
4=pretty sure
5=really sure

First we're going to have a couple of practice questions so that you can get used to how it works.

So, if I asked you "**how many lollies are there in my jar**" where would you slide the ball to? Zero, or a couple, or heaps? – please demonstrate ☺

That's great! (or some other affirmative comment)

Ok, so if I asked you **were you born? What would you say?**

How well do you remember being born? Don't remember at all, or remember a little bit, or heaps?

How sure are you that you were born? Where would you slide the ball to? Not sure at all, a little bit sure, quite sure, pretty sure or really sure?

Ask as many of the following example questions as it takes to ensure that the children understand what we are asking them.

How much do you remember about your first day at school?
How sure are you that you went to school?

How much do you remember about what you had for tea last night?
How sure are you that you ate tea last night?

How much do you remember about when you were asleep last night?
How sure are you that you went to sleep last night?

How much do you remember about the first time you walked? How sure are you?

Move on to next photo.

Interview 2

Do you remember me coming to see you a couple of days ago? Do you remember what we were talking about? That's right, we were looking at some photos that your parents had given me, and I was asking you to tell me as much about them as you could. I'm here today to see if you have remembered anything else about those events.

Lets have a look at these photos again and I'm going to ask you the same questions again and I just want you to answer them again. Do you know who the people are? Great Ok (if not remind them) … can you tell me anything about what is happening?

If "no" say: That's Ok, I'll be coming back to talk to you again soon, so you have a think about it some more in the meantime and see if you can remember anything else. If you do you can tell me the next time I see you.

Confidence/Belief question "smiley face ruler"

Move on to next photo.

Interview 3

We've been talking about things that happened to you when you were only 2/6 years old. Your parents gave me some photos and I've been asking you to tell me all about what you remember about the different events. You've been doing very well – it can be hard some times to remember because these are things that happened such a long time ago. Today I'm going to ask you to look at all of the photos again and see what you can tell me about the events.

Alright, first photo. Can you tell me who the people are? What do you remember about what was happening in the photo?

If "no" say: "That's Ok, it is quite hard because these are things that happened so long ago, so don't worry."

Move on to next photo.

Confidence/Belief questions

Debriefing: Great! Ok, now I'm going to ask you some to do some different things. What I'd like you to do is put these four photos in order, from the least that you remember at this end (use the smiley face ruler to demonstrate) through to the most that you remember.

Can you tell me what the difference is between true and false?

Use example questions if it is not clear that they understand:
The sun green – False
You are 27 years old – False

Your name is _____ - True
You have a mum/dad/sister/brother – True

Alright, if you have a look at all of these photos, if I told you that some of them might not show events that really happened, what would you say?Are there any photos there that you think might show something that didn't really happen?

Can you tell me why you think they aren't real?

Well these two here are not real photos. You never really had a ride in a hot-air balloon/or tea with Prince Charles. We put you in to them using a special computer programme.

See this photo here, this is the photo that your parents gave us. We cut you out of here and put you into this picture using a special computer.

What do you think of that?

We need it to be a surprise for all of the other children so don't tell them OK.

Give child the parents debriefing form and get them to choose their gift.

Appendix B: Coding Form

1a. Which of the following best describes the subject's acceptance of the idea that s/he took a ride in a hot air balloon?

1	2	3	4	5
out right rejection				strong belief

1b. How confident are you that your rating is accurate? **Low** **Med** **High**

1c. If subject rejects the event, what reason do they give? _____

1d. If subject does not reject the event, do they provide a reason for their lack of memory?

_____

2a. Which of the following best describes the subject's reports of memories of taking the hot air balloon ride?

No Memories or Images | Images but No memories | Images and Memories

2b. How confident are you that your rating is accurate? **Low** **Med** **High**

3a. Which of the following best describes the level of detail the subject provides about the event?

No information | Photo Detail only | Detail beyond what's in photo

3b. How confident are you that your rating is accurate? **Low** **Med** **High**

If the subject did provide detail, what sort of detail was it?

a)	Location	yes	no	speculates
b)	Emotion	yes	no	speculates
c)	Who might have been present	yes	no	speculates
d)	What happened before	yes	no	speculates
e)	What happened after	yes	no	speculates
f)	Other _____			

4a. How prompted is the memory report?

1	2	3
does not volunteer any information	volunteers some information	not at all prompted

4b. How confident are you that your rating is accurate? **Low** **Med** **High**

5a. Please rate the overall memory report:

1	2	3	4	5
nothing like real memory				as complete & detailed as it could be

5b. How confident are you that your rating is accurate? **Low** **Med** **High**

Appendix C: Coding Notes

Question 1: Which of the following best describes the Ss acceptance of the idea that s/he took a ride in a hot air balloon? (1-5)

1. Outright rejection, child does not believe that they had the ride.
3. Neutral, child does not say anything specific.
5. Child has a strong belief that the event did actually occur.

Question 2: Which of the following best describes the Ss reports of memories of taking the hot air balloon ride? (Photos will be provided)

No Memories or Images	Child offers no detail at all.
Images but no Memories	Child describes images associated with the suggested event but does not appear to experience those images as memories. Child accepts what is happening in the photo as a real experience
Images & Memories	Child "remembers" the false event. Child describes detail surrounding the event. Child appears to believe that the event happened

Question 3: Which of the following best describes the level of detail the Ss provides about the event?

No Information	Child provides no detail of the event, e.g. "I don't remember anything"; "I don't think it happened"
Photo Detail Only	All information the child offers is visible in the photo (photos are supplied at the back of the transcripts). The child could be described as knowing that the event happened but not really remembering any detail about the actual event.
Detail Beyond Photo	The child offers information that could not be extracted from the photo. Perhaps include things like what the child was doing before/after the event, thoughts/feelings, identifying people who were present at the event but who are not in the photo. This category can be thought of as an indication that the child actually remembers the event.
Location	"yes": Child spontaneously provides a location for the event; "Speculates": a) child is not definite or b) child answers a question posed by interviewer.
Emotions	"yes": "I was scared," child provides

a spontaneous response;
"Speculates": a) "I think I was scared"; b) child answers a question posed by interviewer.

For all other options "speculates" equals: a) hedging, "I think"; "might"; "maybe" or b) child simply responds to a question asked by interviewer. "Yes" is reserved for spontaneous comments.

Question 4: How prompted is the memory report? (1-3).

1. Child does not volunteer any information at all. Everything the child says is
   in response to direct questioning.
2. Volunteers some information
3. Not at all prompted, child's memory report is spontaneous, all information the child provides is in response to free recall question.

Question 5: Please rate the overall memory report (1-5).

1. Nothing like a real memory
5. As complete and detailed as a memory could be.

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