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IMPLANTED MEMORIES IN CHILDREN

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For my husband, Brett Duke—
who continues to support me in all of my endeavors.
I could not have done this without you.

THE EFFECT OF THE RECIPROCITY NORM AND GUIDED IMAGERY ON THE DEVELOPMENT OF IMPLANTED MEMORIES IN CHILDREN

By

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Introduction

In 2007, seven people were arrested in Mineola, Texas for child sexual abuse. Specifically, they were accused of forcing young children to perform erotic dances for audiences and have sex with each other on the stage of a swingers' club (Hall, 2009). The prosecution's case in the so-called "Mineola's Swingers' Case" depended almost entirely on the accusations and subsequent testimony of five young children. However, the interviewing techniques used to elicit these allegations were often highly suggestive.

For the past century, psychologists have been interested in the suggestibility of children, particularly in regard to their ability to serve as accurate witnesses in a legal context (Ceci & Bruck, 1993). Children's reports can be as accurate as adults' when they are provided with unbiased cues and allowed to use free recall to retrieve information (Cassel & Bjorklund, 1995). However, under certain circumstances, children can be highly suggestible. One method for studying suggestibility, the misinformation paradigm, has illustrated how post-event misinformation and subsequent suggestive questioning can lead to false reports (e.g., Ackil & Zaragoza, 1995; White, Leichtman, & Ceci, 1997). Most of the developmental studies on this topic have found a decrease in suggestibility as children age (Blandón-Gitlin & Pezdek, 2009; see also Ceci, Loftus, Leichtman, Bruck, 1994), with preschool children being particularly vulnerable to suggestive interviewing practices.

Much of the research on child suggestibility has focused on cognitive causal factors, specifically memory (see Ceci et al., 1993, for a review). In order to examine whether or not children's false reports about an event actually reflect a false memory of the event, some researchers have utilized the false memory, or implanted memory, paradigm (e.g., Ceci, Huffman, Smith, Loftus, 1994; Ceci, Loftus, et al., 1994; Otgaar, Candel, Merckelbach, & Wade,

2008). In studies utilizing this paradigm, children are asked to remember true events, which are obtained from the children's parents. Interspersed among the true events are some false events, which are generated by the researchers and presented to the children as if they were true. Children are typically led through guided imagery about the events and asked to speculate about the perceptual context of the events. Children are interviewed several times to determine whether or not they develop memories for the false events. These studies have consistently demonstrated that a small percentage of children develop memories and/or beliefs about false events during the first interview, that this percentage increases across interviews, and that the percentage of false memories is greater for younger children than for older children.

A number of theories have been posited regarding the mechanisms involved in the development of these false or "implanted" memories (Steffens & Mecklenbrauker, 2007), including fuzzy trace theory (Brainerd & Reyna, 1998), the fluency-misattribution perspective (Jacoby & Whitehouse, 1989), the constructive memory framework (Schacter, Norman, Koutstaal, 1998), and the source-monitoring framework (Johnson, Hashtroudi, Lindsay, 1993; Johnson, 2006).

Source-monitoring framework

According to the source-monitoring framework, implanted memories can be created because information and the source of that information are stored separately in memory. When information traces are activated during retrieval, decisions must be made about the source of the information; these are referred to as source attributions. Source monitoring refers to the process by which people make these source attributions. Most of the time, these decisions are made automatically, without much cognitive effort. Under other circumstances, such as when knowledge of the source is important, the source is ambiguous, or the person is under stress or

pressure to determine the source, systematic processes are used to make decisions about the source. When using systematic processes, the person may consider the perceptual detail of the memory, the cognitive processes associated with the memory, self-knowledge, the likelihood of the source to have generated the information, and relevant related memories.

Source errors can occur when a person is unable to determine the source of the information (source failure) or when a person attributes the source of the information to an incorrect source (source misattribution). An example of a source failure is when someone recognizes a person, but is unable to remember how he or she met that person or the nature of the relationship.

Sources of information can be internal or external. Internal sources of information include something that one imagines doing, seeing, or saying and something that one actually does or says. External sources of information include something that one sees others doing or hears others saying. Source misattributions can take three forms: confusion between internal and external sources, (imagining that you heard someone tell you something versus actually hearing them tell you), between two internal sources (imagining that you fed your dog versus actually feeding your dog), or between two external sources (thinking that you saw someone committing a crime versus hearing someone commit a crime) (Johnson et al., 1993). Reality monitoring is a particular type of source monitoring in which one has to differentiate between an imagined event (internal source) and an actual event (external source).

Children tend to make more source misattributions than adults, with the most significant improvements in source monitoring ability taking place between ages three and eight (see Quas, Schaaf, Alexander, & Goodman, 2000, and Roberts, 2002 for reviews). These developmental differences in source monitoring may be due to developments in theory of mind (Bright-Paul,

Jarrold, & Wright, 2008; Welch-Ross, 2000) or to neuronal maturation processes (Johnson, 2006). Children with better source monitoring skills are less suggestible in response to misleading questions (Giles, Gopnik, & Heyman, 2002; Leichtman, Morse, Dixon, & Spiegal, 2000). In addition, studies have shown that increasing source awareness can decrease children's suggestibility (Lindsay, Gonzales, & Eso, 1995; Theirry, Spence, & Memon, 2001). For example, children who are instructed to attend to the source of the information are less suggestible in response to later misleading questions about the information.

Children's difficulties in source monitoring could account for their susceptibility to false memories in implanted memory studies. When children are told by an interviewer that they experienced an event and then are later asked about it, they must distinguish between what was heard from the interviewer and what was actually experienced. The difficulty of this task increases if the child has earlier been encouraged to visualize various aspects of the false event or concentrate on the event, a practice used in several implanted memory studies with children (e.g., Ceci, Huffman et al., 1994; Otgaar et al., 2008). When asked about the false event in subsequent interviews, children must determine the source of their imagery regarding the false event; specifically, they must determine if the information about the event was imagined or actually experienced.

The effect of imagery on memory

Ceci, Huffman et al. (1994) were the first to examine how cognitive attention to false events by encouraging children to "think real hard" about the events could increase the likelihood of source misattributions, leading to the development of false memories. These researchers asked children about a false event 7-10 times. The authors speculated that the production of a false assent in response to a request to "think real hard" about the event would

reinforce the event in memory. In fact, they found that the likelihood of children producing false assents in later interviews depended on their production of false assents in earlier interviews. However, the authors did not use a control sample of children; i.e., one that did not receive the instruction to "think real hard".

Garry, Manning, Loftus, and Sherman (1996) studied the effect of imagery on memory with adults, calling it "imagination inflation". In their study, participants were given a list of events called a Life Events Inventory (LEI) and were asked to rate their confidence that each of the events happened. Half of them participated in a guided imagery exercise in which they were instructed to imagine the events from the LEI, which the participants initially gave low confidence ratings. All of the participants then completed the LEI a second time. Confidence scores increased more for the participants who imagined the events than for those who did not. Garry et al. speculated that imagination produces "event information" in memory which makes it easily accessible for later recall even if the source of the information is forgotten. The results of this study have been replicated many times (see Garry & Polaschek, 2000, for a review).

Henkel, Franklin, and Johnson (2000) found that, among adults, imagining seeing an event, in combination with being told about the event, led to more source misattributions than other modalities of presentation; the participants in this condition believed they actually saw the event. The effect of imagery on source misattributions may be even greater for children. Foley and Johnson (1985) found that the greatest discrepancy between children and adults in source monitoring errors occurred when they were asked to distinguish between something they did and something they imagined doing, as compared to distinguishing between something they did and something they watched or between actions they watched two different people performing.

These results are particularly relevant to the findings from implanted memory studies, which also involve a participant being told about a false event and then encouraged to imagine the event. In fact, Hyman and Pentland (1996) conducted an implanted memory study in which they compared the false memory development for adults in a guided imagery condition, who were asked to visualize various aspects of the event, and adults in a control condition, who were asked to simply think about the event. They found that adults in the guided imagery condition developed more false memories than adults in the control condition.

Imagery also seems to affect reality monitoring in children. Strange, Sutherland, and Garry (2006) and Strange, Hayne, and Garry (2008) conducted studies examining the effects of photographs on false memory development in children. In the Strange, et al. (2006) study, children were shown doctored photographs of themselves riding in a hot air balloon (plausible condition) and having tea with Prince Charles (implausible condition). There was no statistically significant difference between the amount of false memories developed for the hot air balloon (49% for six year olds) and the amount of false memories developed for tea with the prince (31% for six year olds) by the third interview. In the Strange et al. (2008) study, children were either shown a doctored photograph of themselves riding in a hot air balloon or they were shown a picture of other people riding in a hot air balloon. They were then asked about the event. Although children who were shown the doctored photograph were more likely to develop false memories, 18% of children shown the non-doctored photograph also developed false memories for riding in a hot air balloon. Evidently, photographs can lead to the development of false memories; one mechanism for this effect may be through the creation of imagery for a false event.

Drawing a false event may also create imagery for a false event, leading to false memories. Strange, Garry, and Sutherland (2003) conducted a study similar to the "imagination inflation" studies, except that, instead of imagining the false events, children drew the events while talking about them with an interviewer. The researchers found that, for the children who drew the false events, confidence ratings increased for all of the false events, even the ones that were not drawn. The authors suggested that the act of drawing may stimulate a child's imagination, leading them to add details about false events that later become incorporated in memory.

According to the source monitoring framework, when one is attempting to determine whether an event in memory was imagined or experienced, one must examine the perceptual, semantic, and contextual detail of the memory; imagined events should have less detail than experienced events (Johnson, Foley, Suengas, Raye, 1988; Johnson et al., 1993). However, it is possible to increase the detail of an imagined event, making it less distinguishable from an experienced event. In fact, adults provided with guided imagery that utilized more elaborative imagining about a false event felt more confident that the false event had occurred than adults provided with less elaborative imaging (Thomas, Bulevich, & Loftus, 2003). The elaborative imagining incorporated more sensory and perceptual detail about the event. Additionally, people with better ability to create mental imagery are more likely to assent to misleading suggestions regarding an event (Hyman & Billings, 1995). Therefore, practices that increase the perceptual, contextual, and semantic details of an event, such as guided imagery and cues to context that often accompany guided imagery, can make an imagined event less distinguishable from an experienced event, thereby increasing the likelihood that it is accepted as a genuine memory.

The issue of imagery in false memory development has practical relevance because it is sometimes used by therapists and interviewers during forensic interviews with children (Ceci, Huffman et al., 1994; Ceci, Loftus et al., 1994; Ceci & Friedman, 2000; Quas et al., 2000). Even if interviewers do not use imagery, they may repeatedly ask a child about possible abuse, leading the child to develop imagery for the abuse, which could be confused with memory for an experienced event. If guided imagery and similar techniques increase the likelihood of children developing false memories about abuse, then use of these techniques in cases of suspected abuse can have disastrous effects, particularly since these false reports can be difficult for others to distinguish from reality, even for clinicians and scholars in the field of child suggestibility (Ceci, Loftus et al., 1994).

Social influence

Another important factor in children's suggestibility is social influence. Several scholars have speculated about the interaction between the social demands of an interview and the cognitive processes that can produce children's false reports (Ceci et al., 1993; Quas et al., 2002; Shapiro & Purdy, 2005). The nature of interviews between a child and adult is such that children often want to please adults and may alter the answers to their questions based on adults' reactions to their answers (Ceci et al., 1993; Siegal, Waters, & Dinwiddy, 1988). White et al. (1997) found that inaccurate interviewer knowledge about an event determined the types of questions that interviewers asked of children, which in turn affected the answers children gave to those questions, leading to false reports, particularly among younger children.

The issue of social influence on children's reporting is especially important because forensic interviewers usually begin an interview having only partial information, much of which can be inaccurate. In the late 1980's and early 1990's a wave of panic overtook the nation as

stories of ritual satanic abuse in daycares became widespread in different locales throughout the United States (Nathan, 2001; Wood, Nathan, Nezworski, & Uhl, 2009). Many people were arrested on child abuse charges; some were later released and others acquitted as it became apparent that the charges were unfounded. One of the earliest and most notorious cases was centered on the McMartin Preschool in Manhattan Beach, California, where dozens of children accused their teachers of ritualistic, bizarre sexual abuse. This and other similar cases propelled researchers to examine the interviewing techniques used with the alleged victims in order to determine how ordinary children could generate such horrific false reports.

Garven, Wood, Malpass, and Shaw (1998), identified several social influence techniques used by interviewers in the McMartin case, including telling children that someone else had already provided the information, positively reinforcing children for agreeing that the abuse happened ("positive consequences") and expressing disappointment in children for denying that the abuse happened ("negative consequences"). Garven et al. interviewed two groups about a staged event; one group was interviewed with suggestive questions, as in other misinformation studies, whereas the other group was interviewed with a combination of the techniques from the McMartin case. The latter group of children responded affirmatively to three times as many misleading questions as the children in the suggestive group. A second study by Garven, Wood, and Malpass (2000) found that reinforcement (positive and negative consequences) in particular was driving the false reports, with children in this reinforcement condition assenting to mundane misleading questions almost three times as often as those in the control group and to fantastical misleading questions ten times as often.

Clearly, reinforcement can contribute to false reports in children. Perhaps additional forms of social influence can also lead children to make false reports.

The norm of reciprocity as a form of social influence

The norm of reciprocity involves a transaction between two individuals, in which one person reciprocates the help, services, concessions, or gifts of another person (Gouldner, 1960). This norm aids in the functioning of society, in that individuals are willing to help others because they expect to be helped in return at a later time. When used as a means of social influence among adults, this norm can be powerful, with the effect of compelling individuals to reciprocate even unwanted help or gifts from others (Cialdini, 1993).

The norm of reciprocity is also practiced and understood by young children. Preschool children engage in social reciprocity. For example, children who agree to interact with friendly peers are reciprocated at a later time. When compared with children who agree less often, children who agree more often receive more friendly initiations for social interaction from peers. Additionally, other children agree to more of these children's initiations for social interaction (Leiter, 1977). Additionally, Fujisawa, Kutsukake, and Hasegawa (2008) found that Japanese preschool children spontaneously reciprocated prosocial behavior, such as object offering and help given, and that this reciprocity was observed even after controlling for affiliation among children. Furthermore, young children can understand the norm of reciprocity in that they can attribute others' prosocial behavior to the norm (Berndt, 1977).

In several highly publicized cases involving the sexual abuse of children, the norm of reciprocity has been used with alleged child victims as a tool of social influence to encourage compliance with the interviewer. For example, in a number of interviews regarding the McMartin Preschool case, children were told that one of the primary suspects would go to jail if the children would help the interviewers by revealing details of the abuse. Therefore, these interviewers were creating a reciprocal transaction, in which the child's revelation of abuse

would be reciprocated by the interviewers and police ensuring that the alleged perpetrator would go to jail.

> Interviewer: . . . do you think that Ray should be teaching little kids anymore?
>
> Child: No, I think he should be in jail.
>
> Interviewer: . . . thanks for telling us that. And guess what? Maybe if the kids can help us figure it all out that's just what'll happen. (Interview Number MC109, p. 15-16; Quote obtained from an unpublished transcript-2/2/84).

In another famous case, the owners of Country Walk Babysitting Service, in Miami, Florida, were accused of abusing the children in their care. The interviewers used similar methods to those used in the McMartin case. In several interviews, they also alluded to the importance of the children telling about the abuse in order to keep the alleged perpetrators from hurting them again or from hurting others. The transaction in this case was such that the child's revelation of abuse would be reciprocated by others, thus ensuring the safety of the child and his family. "In fact, you know, it's so smart that . . . [you] did tell . . . [your] mom, and in telling us because by telling us, you . . . have protected yourself and your mom against anyone hurting you" (Interview Number 082884C1, p. 3; Quote obtained from an unpublished transcript-8/28/84).

Finally, in the Mineola Swingers case mentioned at the beginning of this thesis, one of the main interviewers, a Texas Ranger, repeatedly utilized the norm of reciprocity as a tool of social influence, telling one of the children that he would help her parents if she would help him by telling how they had abused her. At one point in the interview, when the child was not supplying the information the Ranger was seeking, he used the reciprocity norm to enlist her

"help" for her cousin Trilby, who had already alleged abuse [children's names are changed for privacy reasons].

> Interviewer: Nothing I can help you with? . . . Trilby is your . . .
>
> Child: Cousin.
>
> Interviewer: Cousin, okay. And you think a lot of her, don't you? Would you want to help her out?
>
> Child: (Nodding.)
>
> Interviewer: Just like she would want to help you out. Is there anything you know that somebody has done to Trilby that you could help me with, so that I could help her? Because if you can tell me something that someone did bad to her, then I can go and find out what happened and make sure that it doesn't happen again. It will help Trilby out.
>
> Child: Something bad happened to me and Trilby. (p. 24; Quote obtained from an unpublished transcript-GS-8/18/06).

When the norm of reciprocity is utilized in forensic interviews with children, can it contribute to the creation of false memories in children through the facilitation of source misattributions? Johnson et al. (1993) concluded that "because source monitoring depends on ongoing goals or agendas, it should be affected by the sorts of motivational and social factors that influence any goal-directed activity" (p. 5). As an example of the role of motivational factors in source monitoring, Gordon, Franklin, and Beck (2005) found that wishful thinking can lead to source monitoring failures. When participants were exposed to desirable and undesirable predictions made by reliable and unreliable sources, participants made more source errors in attributing reliable sources to desirable predictions and unreliable sources to undesirable

predictions than vice versa. The participants were motivated to believe that a desirable prediction came from a reliable source because if the source of the prediction was reliable, then it was more likely to come true. Gordon et al., also found that these source errors seem to be generated at the retrieval, or decision-making, stage of the memory process, rather than the encoding stage. Therefore, when participants had to make decisions about the source of the information, their motivation influenced their source attribution. Perhaps, then, in forensic interviews with children, methods of social influence can motivate children to misattribute their "memories" of the abuse to a genuine experience, rather than to imagery that was created in previous interviews.

Overview of the present study

The present study sought to examine whether the use of imagery, in combination with reciprocity, in interviews with children can increase the likelihood that the children will develop memories for a false event. Children participated in a series of two interviews in which they were asked to remember both true and false events. Half of the children were appealed to through the norm of reciprocity to comply with the interviewer in agreeing to remember the events (reciprocity condition); whereas the other half of the children did not receive the appeal (no reciprocity condition). In addition, half of the children were led through a guided imagery exercise (guided imagery condition), whereas the other half did not participate in the exercise (no guided imagery condition).

We expected to find a main effect for reciprocity, in that children in the reciprocity condition would develop more memories for the false event than those in the no reciprocity condition by the second interview. We also expected to find a main effect for guided imagery, in that children in the guided imagery condition would develop more memories for the false event

than those in the no guided imagery condition by the second interview. Furthermore, because it is possible that social influence can increase a child's motivation to engage in guided imagery in order to provide the interviewer with the information he desires, we also expected to find an interaction between reciprocity and guided imagery. Specifically, we expected that there would be a greater increase in false memories among children who received a combination of the reciprocity and guided imagery interventions than could be accounted for by the combined additive effects of the reciprocity intervention and the guided imagery intervention.

Method

Participants

Participants were first and second grade children recruited from private elementary schools in the El Paso area. Informed consent was obtained from parents and verbal assent from children. In addition, the researcher obtained the written permission of the children's teachers to tell the children that the teachers were actively working with the experimenter and wanted the children to help the experimenter by remembering past experiences.

The parents of 130 children gave consent for their children to participate in the study. However, one of these 130 children chose not to participate and an additional two did not participate because they were absent during all attempts to schedule an interview. Thus, the total number of children who participated in Interview 1 of the study was 127.

Of the 127 children who participated in Interview 1, six did not complete Interview 2. Specifically, four children could not be scheduled for Interview 2 within two weeks of Interview 1, one child was deemed to have insufficient English fluency to complete Interview 2, and one child was unable to complete Interview 2 because it was disrupted by circumstances outside the control of the experimenter. Thus, only 121 children completed both interviews during the study.

Loss of data from either Interview 1 or Interview 2 occurred for five of these 121 children. Specifically, data was lost for four children due to equipment malfunction and for one child due to experimenter error. The analyses reported in this thesis are therefore based on the 116 children who had complete data for both interviews.

Of the 116 children in the data analyses, 60% were female and 53% were Hispanic. Twenty-four percent were Non-Hispanic White, 3% were Asian, and the remaining children

belonged to other ethnicities. Fifty-three percent of participants were in the first grade, with the remainder in the second grade. The mean age of participants was 6.85 years (SD =.794). Thirty-six percent of participants were six years old, 41% were seven years old, and 22% were eight years old. One child was five years old and one child was nine years old.

Measures

The Peabody Picture Vocabulary Test, Fourth Edition (PPVT) was administered to all participants to screen for children who were not proficient enough in speaking the English language to be able to participate in the study. The PPVT is widely accepted as a measure of receptive vocabulary for children and adults. A series of items is presented to the examinee, with each item consisting of four stimulus pictures. The examiner speaks a word to the examinee who must then choose which of the four pictures best represents the word's meaning.

The psychometric properties of the PPVT are described in its manual by Dunn and Dunn (2007). According to the manual, the PPVT has internal consistency reliability ranging from α=0.95 to 0.97 for children within the age range of the present study. Split-half reliability ranges from 0.93 to 0.95. The PPVT correlates highly with other instruments measuring expressive vocabulary, language ability, and reading achievement (ranging from 0.67 to 0.84 for the children within the age range of this study). The PPVT has also demonstrated predictive validity with special populations of children; for example, gifted children score higher on the PPVT than the general population.

When administering the PPVT, the examiner begins with a specific set of items that depend on the child's age. For instance, a 6-year-old begins testing with Set 5 but a 7-year-old begins with Set 6 (Dunn & Dunn, 2007). If a child makes 0 or 1 errors on this initial set of items, then this set is referred to as the child's "basal set". According to the test's manual, 85%

of children in the PPVT normative sample made 0 or 1 errors on the set that corresponded with their age. For example, 85% of 6 year-olds made 0 or 1 errors on Set 5 (Dunn & Dunn, 2007).

In the current study, the entire PPVT was not administered to all children. Rather, each child was first administered the initial set of items corresponding to his or her age. If the child made 0 or 1 error on this set of items, no further testing was necessary and the child was considered to have normal proficiency in the English language compared to the norms for his or her age level. However, if the child's performance was below norms for his or her age (i.e., he or she made more than one error on the initial set of items) then he or she was administered the full PPVT to provide a more accurate reflection of the child's English proficiency.

Design

The study followed a 2 (guided imagery vs. no guided imagery) x 2 (reciprocity vs. no reciprocity) between-subjects design. Children were randomly assigned to the four conditions. Twenty-five percent of the children were assigned to the control condition, 25% to the guided imagery condition, 26% to the reciprocity condition, and 24% to the reciprocity plus guided imagery condition. However, due to attrition of participants as already described, 27% percent of the 116 children who actually participated in the study were in the control condition, 26% were in the guided imagery condition, 29% were in the reciprocity condition, and 18% were in the reciprocity plus guided imagery condition.

Procedure

Before the children were interviewed, the researcher obtained information from their parents about three events that their children experienced when they were two to three years old. A questionnaire sent home to parents listed six common childhood events that the child might have experienced. Parents were asked to check off at least three events experienced by their

child and then add one to two relevant details about each event. Parents could also write in events that the child experienced that were not included on the questionnaire. If a parent checked off exactly three events on the questionnaire, then these events were used in the experiment, as will be described. If a parent checked off more than three events, then three of those checked events were chosen based on their distinctiveness (the event would more likely be chosen when it occurred only once versus when it occurred many times) and the age when the event occurred (the event would be more likely to be chosen when it occurred between two and four years of age than when it occurred at a later age).

Children were interviewed individually in a private room within their school by a single interviewer who followed a highly structured script. The interviewing procedures for each experimental group are described in the following subsections. These procedures were adapted from an implanted memory study conducted by Strange et al. (2006).

Procedure for the control group. Figure 1 provides a flow-chart that illustrates the procedure for the first interview of children in all groups. In the control condition (no reciprocity, no guided imagery) the interviewer first developed rapport with the child participant by asking questions about the child's preferences for toys, games, and television and about the child's friends and school. The interviewer regularly smiled at the child and maintained eye contact and an open body posture with the child throughout the interview.

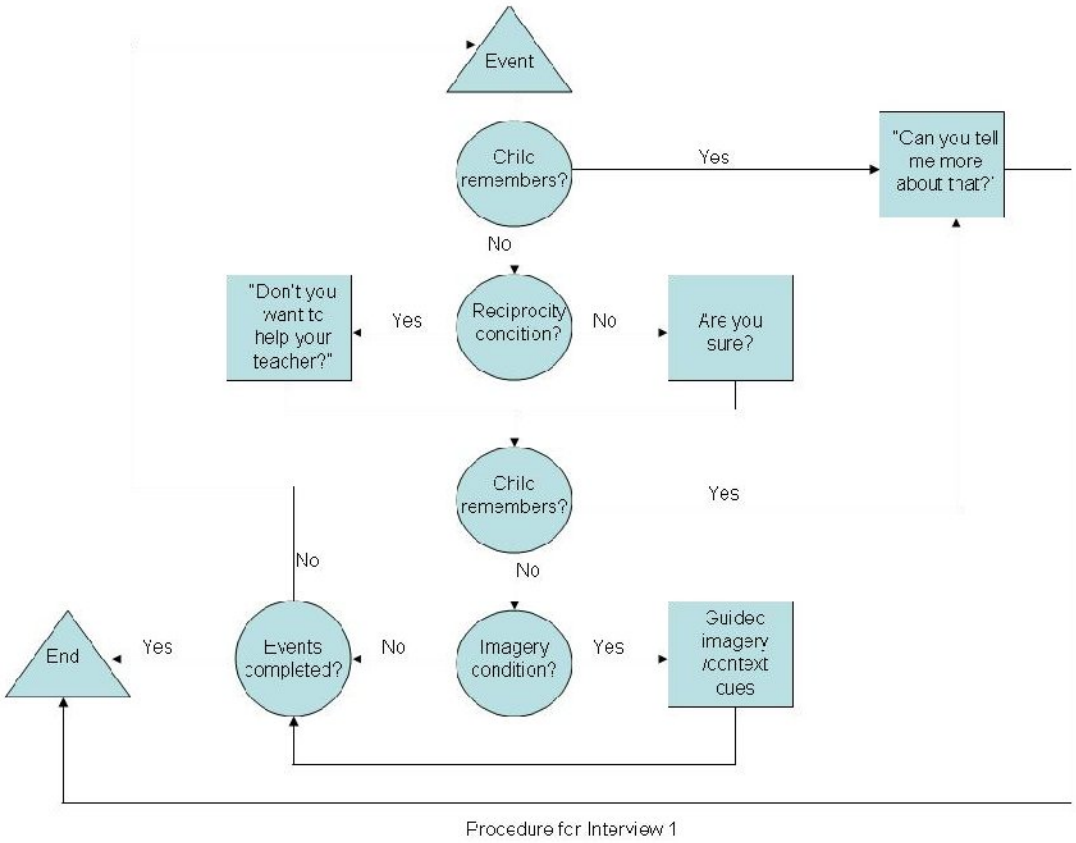

Figure 1. Procedure for the first interview.

After approximately three minutes of rapport-building, the interviewer told the children, "I am doing a special project about what children remember from when they were little." The child was then asked to recall the three true events that were provided by his or her parents. For example, the interviewer might have said, "I heard about a time when you were three years old and you went to Disneyland with your family. Tell me everything you remember about that." If the child did not remember the event, the interviewer would ask, "Is there anything at all you can remember about what happened?" If the child still did not remember, the interviewer would proceed to the next true event.

After all three true events were presented, the interviewer then presented the false event to the child. The interviewer said, "I heard about a time when you were three years old and you

got dressed up in a bear costume and went on a helicopter ride with the teachers at school. Tell me everything you remember about that." This false suggested scenario was designed to be positive, cheerful, and wholesome, but contained elements similar to those alleged by the children in the McMartin Preschool case.

There were at least three possible responses that a child might have given in response to the suggested false helicopter scenario. The first possible response was for the child to ask about the source of the (false) information. In this case, the interviewer would feign ignorance by saying, "Let me look in my papers. Hmm. . . it doesn't say who told me that." The interviewer would then redirect the child to the question. Prior studies have shown that having other people (i.e., peers or parents) confirm that an event occurred can increase children's suggestibility (Ceci, Huffman et al., 1994; Garven et al., 2000). Therefore, to avoid increasing suggestibility, children in the present study were not told the source of the (false) information they were given.

A second possible response to the suggested scenario was for the child to state that (a) he or she did not remember the false event or (b) he or she could picture the event but was unsure that it actually took place. In this case, the interviewer would first ask the child "Is there anything at all you can remember about what happened?" If he or she responded negatively, the interview would end.

A third possible response was for the child to state that he or she remembered the event. In this case, the child would be asked, "Is there anything else you can tell me about that?" Once the child told the interviewer everything that he or she could remember about the event, the interview ended.

At the end of the interview, the interviewer said to the child, "We are done for today. Next week I'll come back and talk to you again. If you remember something this week, be sure

to tell me about it next time. Please don't talk to your parents, teacher, or the other kids about this. We are interested in what you remember, not what everyone else remembers. Your parents and teacher know they're not supposed to talk to you about this."

The second interview took place approximately one week after the date of the first interview. Figure 2 illustrates the procedure for the second interview. Every attempt was made to conduct the second interview on the same day of the week and at the same time as the first interview. Both interviews typically took place in the same room and the same interviewer interviewed the child both times. After rapport-building with the child, the interviewer said, "Remember the last time I was here? I told you that I am doing a special project about what children remember from when they were little." The interviewer then asked the child about the same true and false events from the previous interviews.

Whether or not the child remembered the event, he or she was then asked to give two ratings. The first rating was for Amount Remembered, that is, how much he or she could remember about each event. The child was presented with a Likert scale constructed of laminated paper, on which were drawn five stars ranging in size from smallest to largest. He or she was asked to use a dry-erase marker to indicate where his or her response lay on the scale, with the smallest star representing "I remember nothing" and the largest star representing "I remember a whole lot."

The second rating was for Confidence, that is, how confident the child was that the event occurred. A similar Likert scale was used for this rating, except the smallest star represented "I know it never happened" and the largest star represented "I'm completely sure that it happened".

In a practice procedure, the child was first asked questions about events unrelated to the experimental manipulation, such as what he or she had for breakfast that morning or what

present he or she got for Christmas, and then was asked to rate his or her memory for the event using the stars on the Likert scale. These questions were intended to help the child practice and demonstrate competence using the scale. After this practice, the child was then asked to make ratings for Amount Remembered and Confidence for each of the true and false events.

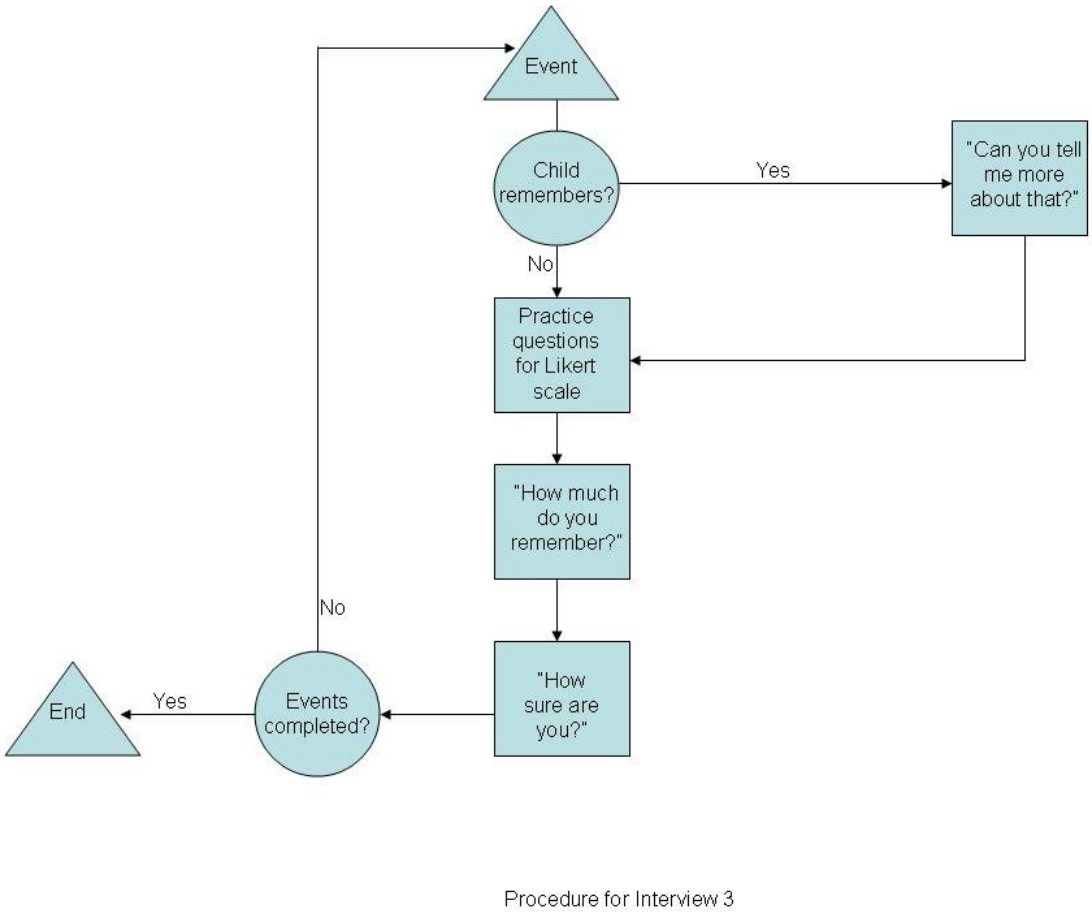

Figure 2. Procedure for the second interview.

After making ratings for Amount Remembered and Confidence, children were administered the PPVT. Immediately after the administration of the PPVT, children were debriefed in a manner consistent with recommendations made by Goodman, Quas, and Redlich (1998). Specifically, at the end of the interview the interviewer looked through his/her papers in a confused manner and then said to the child, "You know, I think that I've made a mistake. This

thing about going on a helicopter ride didn't really happen to you; it happened to a different child. What do you think about that?" If the child contended that the false event did, in fact, occur, the interviewer said, "Sometimes we think we remember things that didn't really happen. I know that you think you remember this happening, but it didn't really happen to you." The interviewer then thanked the child for his or her participation and gave him or her a sticker.

Procedure for the guided imagery group. Children in the guided imagery condition followed the same procedures as those in the control group, except for a few differences. If a child reported that he or she did not remember a true or false event, he or she would be led through a guided imagery exercise and asked questions to cue him or her to the context of the event. The guided imagery was intended to facilitate the perceptual detail of the event. The child was asked to close his or her eyes and try to imagine the event happening. The interviewer followed the procedure for elaborative imaging instructions described by Thomas et al. (2003). For the false event, the interviewer said "I want you to close your eyes and imagine that what I have told you actually happened to you. Imagine what color the bear costume might have been and how might have felt to wear it. Imagine what you might have seen from the helicopter and what it might have sounded like. Think about where you might have gone in the helicopter." The interviewer encouraged the child to imagine for about thirty seconds.

The interviewer then asked the child a series of questions which were intended to encourage speculation about the event and facilitate mental visualization of contextual details for the event. For example, for the false event, the interviewer asked, "Who else do you think was with you? What did you do right beforehand? Who else did you talk to about it?"

At the end of the interview, the interviewer added a few sentences to the closing statement to encourage the child to think about and imagine the event between interviews. The

interviewer said, “We are done for today. Next week I’ll come back and talk to you again. Please think about these things some more this week and try to remember what happened. Try to imagine the event like we did earlier. If you do remember something this week, be sure to tell me about it next time. Please don’t talk to your parents, teacher, or the other kids about this. We are interested in what you remember, not what everyone else remembers. Your parents and teacher know they’re not supposed to talk to you about this.”

Procedure for the reciprocity group. Children in the reciprocity condition followed the same procedures as the control group except for a few differences. When introducing the project, the interviewer asked children to list a few ways in which their teacher helped them or had helped them in the past. The interviewer then said, “Your teacher and I are doing a special project about what children remember from when they were three years old. You could really help us out if you could try hard to remember the things I’m going to ask you about. I know how much you would like to help your teacher.” The teacher was used as the main target of reciprocity because the teacher would have previously provided the child with help. Therefore, in accordance with the norm of reciprocity, the child was encouraged to repay the teacher with "help" in the form of “remembering” the false event. As mentioned previously, the researcher obtained the teachers' consent to be involved in the study in this manner.

If a child was unable to remember a true or false event, the interviewer said, “It would really help your teacher and I if you were able to remember. Remember when your teacher helped you with _____? I bet you would like to return the favor. Now, is there anything at all you can remember about what happened?”

At the beginning of the second interview, the interviewer said, “Remember the last time I was here? I told you that your teacher and I are doing a special project about what children

remember from when they were little. Remember, last time, you told me that your teacher helped you with _____? Well, you could help your teacher and I if you could try hard to remember the things I'm going to ask you about."

Procedure for the reciprocity plus guided imagery group. Children in the reciprocity plus guided imagery group followed the procedures already described and were given both the guided imagery/context cues provided to the imagery group and the reciprocity statements and questions provided to the reciprocity group.

Judges' scoring of children's memories

Scoring of children's false memories. All interviews were video recorded. Two independent judges blinded to the hypotheses of the study coded all of the recordings for children's false memories using the form given in the appendix, following a scoring procedure developed by Strange et al. (2006). Before they were scored by the judges, the recordings were edited to eliminate information concerning children's assigned treatment conditions and their Likert ratings.

For the false event, the judges determined if children developed a memory for the event, developed images of the event but no memory, or did not develop any images or memory for the event. In order for a child to be categorized as having developed a false memory, he or she must describe the event in his or her own words, appear to be clearly remembering the event, and appear to believe that the event happened to him or her. Children were categorized as having images, but no memory, of the event if they provided speculative information, but didn't acknowledge that the event actually occurred, or if they appeared unsure and/or unclear in their description of the memory. For example, a child in this category may have used words or phrases, such as "maybe" or "it could have happened". Children were categorized as having no

memory or images of the event when they denied that the event occurred and did not provide information about the event.

These judges were extensively trained in the procedure and were given the opportunity to practice before coding the videos for data collection purposes. In cases in which there was disagreement between the two versions of the coding, a third judge was asked to code the video, as well. The code which was given by two out of the three judges was used in the analyses.

Therefore, the judges assigned each child's report into one of the following three mutually exclusive categories: (1) child developed a memory for the event; (b) child developed mental images of the event but no memory; or (c) child developed neither a memory nor images for the event. These ratings were then used to create two separate dependent variables.

The first dependent variable was entitled Full False Memory. A child was assigned a score of "Yes" for Full False Memory if he or she developed a memory for the false event. Otherwise the child was assigned a score of "No." The second dependent variable was entitled False Memory or Images. A child was assigned a score of "Yes" for False Memory or Images if (a) if he or she developed a memory for the false event or (b) he or she developed mental images of the event but no images. Otherwise the child was assigned a score of "No."

Scoring of other aspects of children's memories. Additionally, the judges rated other aspects of children's memories of true and false events. For each of these ratings, (a) an individual rating was made by each of two judges and then (b) an average rating was calculated based on these two individual ratings.

First, the judges rated the variable called Details, which reflected the variety of details that were included in children's narrative descriptions of their true or false memories. For this variable, the judges rated how many types of details (i.e., location, who was present, descriptive

and sensory details) were included in each child's memory report for each event. For the false event, the sum of all details reported was included in the analysis, ranging from a minimum of zero to a maximum of five. For the true events, the sum of all details reported was calculated for each of the three events and these sums were then averaged.

Second, the judges were asked to rate the Memory Quality of both the true and false memory reports. These ratings were made on a 5-point Likert scale, from 1 ("Nothing like real") to 5 ("As complete and detailed as a memory could be").

Finally, the judges rated Acceptance of False Memory, which reflected the extent to which the child appeared to accept that the false event actually occurred. These ratings were measured on a 5-point Likert scale ranging from 1 ("outright rejection") to 5 ("strong belief").

Results

Interrater reliability of false memory variables based on judges' ratings

As already discussed in the Method section, ratings by two judges were used to create two variables that indicated whether children had formed a false memory of the helicopter event. These two variables were called (1) Full False Memory and (2) False Memory or Images. The inter-rater reliability (Cohen's Kappa) of judges' ratings for these two variables was calculated for Interview 1 and Interview 2 ($N = 116$ for both interviews). Kappa for Full False Memory was 0.668, $p<.01$, for Interview 1 and 0.784, $p<.01$, for Interview 2. Kappa for False Memory or Images was 0.879, $p<.01$, for Interview 1 and 0.878, $p<.01$, for Interview 2.

As mentioned above, in cases in which there was disagreement between the two versions of the coding, a third judge was asked to code the video, as well. The code which was given by two out of the three judges was used in the analyses.

Effect of reciprocity and guided imagery on children's false memory reports: Ratings by judges

The first hypothesis of the study was that children in the reciprocity and imagery conditions would be more likely than controls to develop false memories as measured by judges' ratings of (a) Full False Memory and (b) False Memory or Images. Four multiple logistic regression analyses were performed to test this hypothesis. The predictors in all four of the logistic regressions were Reciprocity condition (yes = .5; no = -.5), Guided Imagery condition (yes = .5; no = -.5), and their interaction (the product of Reciprocity condition and Guided Imagery condition). The dependent variables of the four logistic regressions were (1) Full False Memory in Interview 1, (2) Full False Memory in Interview 2, (3) False Memory or Images in Interview 1, or (4) False Memory or Images in Interview 2.

Table 1 shows the number and percentages of children who reported Full False Memories or False Memory or Images for Interview 1 and Interview 2 by experimental condition. The results of the logistic regressions are summarized in Tables 2 through 5. As can be seen, none of the results from the four logistic regressions supported the first hypothesis of the study. That is, contrary to what had been predicted, neither reciprocity, guided imagery, nor their interaction, had a significant impact on any of the four dependent variables.

Table 1

Frequencies and Percentages of Children in each Experimental Condition Who Developed False Memories

	Full False Memory		False Memory or Images	
Condition	Interview 1	Interview 2	Interview 1	Interview 2
Control	8/31 26%	9/31 29%	13/31 42%	14/31 45%
Reciprocity	5/34 15%	12/34 35%	11/34 32%	18/34 53%
Imagery	6/30 20%	6/30 20%	13/30 43%	9/30 30%
Reciprocity plus Imagery	1/21 5%	5/21 24%	8/21 38%	10/21 48%
Total	20/116 17%	32/116 28%	45/116 39%	51/116 44%

Table 2

Logistic Regression Analysis Testing Effect of Reciprocity and Guided Imagery on Full False Memory in Interview 1

Predictor	β	SE β	Wald's χ^2	*df*	*p*	e^{β}
Constant	-1.799	0.322	31.169	1	0.000	0.165
Imagery (-0.5=no, 0.5=yes)	-0.784	0.644	1.480	1	0.224	0.457
Reciprocity (-0.5=no, 0.5=yes)	-1.156	0.644	3.215	1	0.073	0.315
Interaction (Imagery * Reciprocity)	-0.908	1.289	0.496	1	0.484	0.403

Test	χ^2	*df*	*p*
Overall model evaluation	4.786	3	0.188

Table 3

Logistic Regression Analysis Testing Effect of Reciprocity and Guided Imagery on Full False Memory in Interview 2

Predictor	β	SE β	Wald's χ^2	*df*	*p*	e^{β}
Constant	-1.012	0.217	21.685	1	0.000	0.363
Imagery (-0.5=no, 0.5=yes)	-0.525	0.435	1.457	1	0.227	0.592
Reciprocity (-0.5=no, 0.5=yes)	0.255	0.435	0.345	1	0.557	1.291
Interaction (Imagery * Reciprocity)	-0.065	0.870	0.006	1	0.941	0.937

Test	χ^2	*df*	*p*
Overall model evaluation	2.072	3	0.558

Table 4

Logistic Regression Analysis Testing Effect of Reciprocity and Guided Imagery on False Memory or Images in Interview 1

Predictor	β	SE β	Wald's χ^2	*df*	*p*	e^{β}
Constant	-0.454	0.194	5.460	1	0.019	0.635
Imagery (-0.5=no, 0.5=yes)	0.155	0.389	0.158	1	0.691	1.167
Reciprocity (-0.5=no, 0.5=yes)	-0.315	0.389	0.655	1	0.418	0.730
Interaction (Imagery * Reciprocity)	0.195	0.778	0.063	1	0.802	1.215

Test	χ^2	*df*	*p*
Overall model evaluation	0.997	3	0.802

Table 5

Logistic Regression Analysis Testing Effect of Reciprocity and Guided Imagery on False Memory or Images in Interview 2

Predictor	β	SE β	Wald's χ^2	*df*	*p*	e^{β}
Constant	-0.255	0.193	1.736	1	0.188	0.775
Imagery (-0.5=no, 0.5=yes)	-0.433	0.387	1.255	1	0.263	0.648
Reciprocity (-0.5=no, 0.5=yes)	0.532	0.387	1.893	1	0.169	1.702
Interaction (Imagery * Reciprocity)	0.440	0.773	0.324	1	0.569	1.553

Test	χ^2	*df*	*p*
Overall model evaluation	3.699	3	0.296

Effect of reciprocity and guided imagery on children's false memory reports: Children's self-ratings

The second hypothesis of the study was that children in the imagery and reciprocity conditions would have more false memories than controls, as indicated by children's self ratings of (a) their confidence that the false event occurred (Confidence) and (b) how much they remembered about the event (Amount Remembered). Children's mean ratings for these two dependent variables, which were collected only during Interview 2, are presented in Table 6 by experimental condition. Group differences on these ratings were tested using a MANOVA, with Reciprocity Condition and Guided Imagery Condition as the independent variables and the children's ratings of Confidence and Amount Remembered as the dependent variables. As can be seen, the results did not support the second hypothesis of the study. That is, contrary to what had been predicted, no significant main effect was found for either Reciprocity or Guided Imagery, Wilks' Lambda=0.973, $F(2, 109)=1.53$, $p=0.221$ and Wilks' Lambda=0.983, $F(2, 109)=0.917$, $p=0.403$, respectively, nor was their interaction significant, Wilks' Lambda=0.999, $F(2, 109)=0.064$, $p=0.938$.

Table 6

Children's Mean Self-Ratings for (a) Confidence That False Event Occurred and (b) Amount They Remembered About the False Event

Condition	Confidence	Amount Remembered
Control	*M*=2.58 *SD*=1.587	*M*=2.16 *SD*=1.59
Reciprocity	*M*=2.47 *SD*=1.60	*M*=2.56 *SD*=1.54
Imagery	*M*=2.46 *SD*=1.75	*M*=1.86 *SD*=1.33
Reciprocity plus Imagery	*M*=2.48 *SD*=1.69	*M*=2.56 *SD*=1.66
Total	*M*=2.48 *SD*=1.62	*M*=2.21 *SD*=1.53

Correlations of judges' and children ratings of false memories

An underlying assumption of the study was that children's ratings of Confidence and Amount Remembered for Interview 2 and judges' ratings of Full False Memory for the same interview were all measuring aspects of the same underlying construct, i.e. the strength of children's false memories. To test this assumption, correlations among these three variables were calculated. As expected, children's ratings for Confidence and Amount Remembered for Interview 2 correlated significantly with each other and with judges' coding of Full False Memory for the same interview (all *r*s > .50). Table 7 displays the correlations among these three measures.

Table 7

Correlations Among Children's Confidence and Amount Remembered Ratings and Judges' Coding of Full False Memory in Interview 2

	1	2	3
1. Full False Memory	--		
2. Confidence Rating	0.520	--	
3. Amount Remembered Rating	0.580	0.624	--

Note: N=116. All correlations are statistically significant, $p<0.001$

Exploratory analyses

False memory change between Interviews 1 and 2. Exploratory analyses examined how many children who did not have a false memory in Interview 1 developed a false memory in Interview 2. The data were collapsed across all conditions for these analyses because the prior analyses did not indicate any significant between-group differences with respect to false memories. Figure 3 displays these results for judges' ratings of false memories. The McNemar test for related samples showed that the proportion of children with Full False Memory according to judges' ratings was significantly higher in Interview 2 (28%) than in Interview 1 (17%), $\chi^2(1)=7.579$, $p=0.017$. Another McNemar test was done comparing the proportion of children who had a False Memory or Images in Interview 1 (39%) and Interview 2 (44%) according to judges' ratings; the results of this test indicated that these proportions were not significantly different, $\chi^2(1)=1.20$, $p=0.361$.

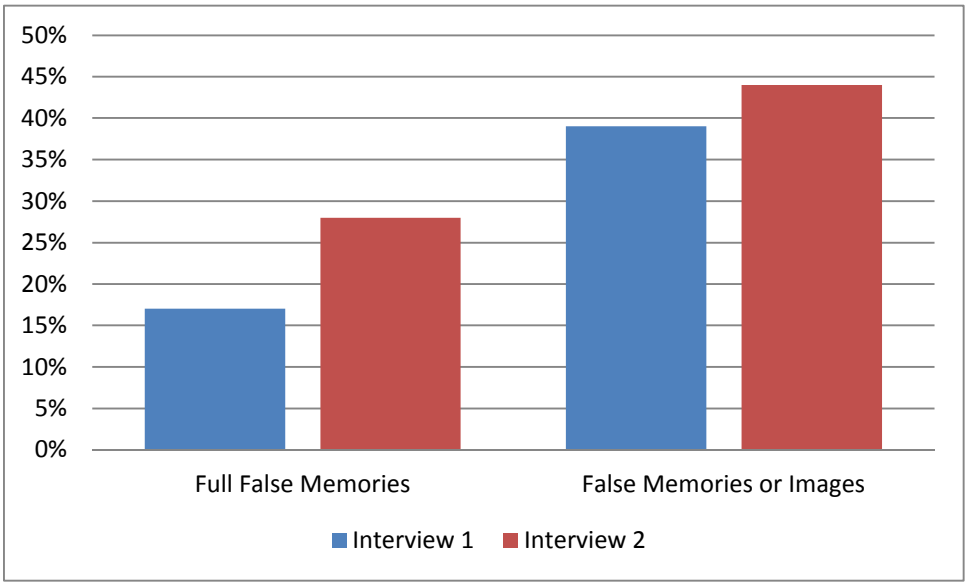

Figure 3. Percentage of children who developed a false memory in the first and second interview.

Children's self-ratings of Confidence and Amount Remembered were gathered at Interview 2 but not Interview 1. Therefore changes in these two variables between the two interviews could not be analyzed. However, additional analyses examined the change from Interview 1 to Interview 2 for other ratings. For each of these ratings, (a) an individual rating was made by each of two judges and then (b) an average rating was calculated based on these two individual ratings.

First, analyses were done on judges' average rating of Memory Quality for the children's false memory reports (i.e., the quality of the report, such as how real and complete it is). The mean Memory Quality of children's false memory reports are summarized by experimental condition in Table 8 and Figure 4 (the true event ratings will be discussed later in this section). Group differences on this rating for the false event were tested using an ANOVA, with Reciprocity Condition and Guided Imagery Condition as the independent variables and Memory Quality as the dependent variable. The ANOVA revealed no significant main effect for either Guided Imagery, $F(3, 112)=0.561$, $p=0.456$, or for Reciprocity, $F(3, 112)=.023$, $p=0.881$, and no

significant interaction between Guided Imagery and Reciprocity, $F(3, 112)=0.008$, $p=0.929$. Across conditions, there was a non-significant difference between the mean Memory Quality for the false event in the first interview and for the false event in the second interview, $t(115) = 1.696$, $p=0.093$, with a higher rating for the Memory Quality in the second interview.

Table 8

Judges' Mean Memory Quality Ratings for True and False Events

	Interview 1		Interview 2	
Condition	True Events	False Event	True Events	False Event
Control	*M*=2.78 *SD*=1.09	*M*=1.82 *SD*=1.23	*M*=2.71 *SD*=1.02	*M*=2.00 *SD*=1.28
Reciprocity	*M*=2.84 *SD*=1.05	*M*=1.68 *SD*=1.19	*M*=2.82 *SD*=1.13	*M*=2.01 *SD*=1.26
Imagery	*M*=2.60 *SD*=0.887	*M*=1.80 *SD*=1.06	*M*=2.80 *SD*=0.970	*M*=1.80 *SD*=1.30
Reciprocity plus Imagery	*M*=2.96 *SD*=0.886	*M*=1.76 *SD*=1.14	*M*=2.82 *SD*=0.937	*M*=1.86 *SD*=1.18
Total	*M*=2.78 *SD*=1.99	*M*=1.76 *SD*=1.15	*M*=2.78 *SD*=1.02	*M*=1.93 *SD*=1.25

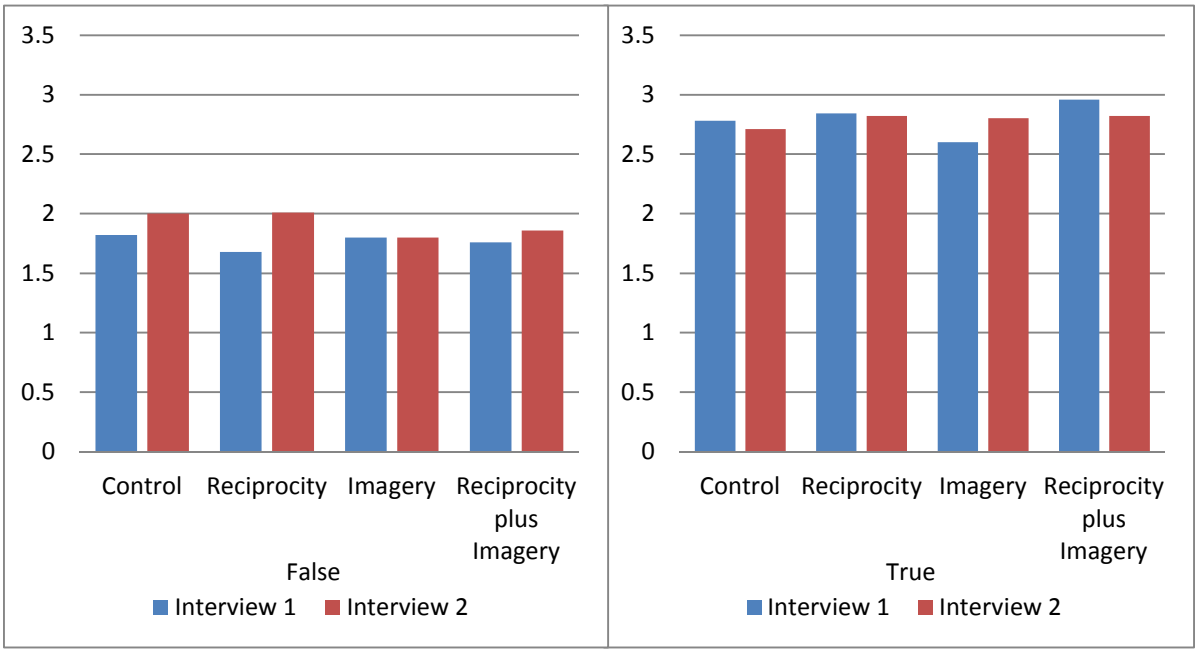

Figure 4. Judges' mean coding of Memory Quality across interviews for both false and true events.

Second, analyses were conducted examining changes between Interviews 1 and 2 on the judges' mean rating of children's Acceptance of the False Memory (i.e., how much the child appeared to accept that the event actually occurred). The mean ratings are reported in Table 9. An ANOVA showed no significant between-group differences on this measure for Guided Imagery, $F(3, 112)=0.531$, $p=0.468$, Reciprocity, $F(3, 112)=0.037$, $p=0.847$, or for the interaction between Reciprocity and Guided Imagery $F(3, 112)=0.083$, $p=0.774$. However, there was a significant difference across all groups between Interviews 1 and 2, $t(115)=3.050$, $p=.003$, $d=0.25$, with a higher rating for Acceptance of the False Memory for the second interview.

Table 9

Judges' Mean Ratings of Children's Acceptance of the False Memory

Condition	Interview 1	Interview 2
Control	*M*=2.16 *SD*=1.63	*M*=2.50 *SD*=1.62
Reciprocity	*M*=1.85 *SD*=1.37	*M*=2.47 *SD*=1.61
Imagery	*M*=1.98 *SD*=1.27	*M*=2.18 *SD*=1.78
Reciprocity plus Imagery	*M*=2.02 *SD*=1.17	*M*=2.33 *SD*=1.55
Total	*M*=2.00 *SD*=1.38	*M*=2.38 *SD*=1.63

Finally, analyses were conducted on the judges' rating of Details in the children's true and false memory reports (i.e., how many types of details the child incorporated into their narrative). For the true events, the mean number of Details for the three true events was used in the analyses. Table 10 shows the mean number of Details for each group (the true event ratings will be discussed later in this section). This analysis was done on the Details for the false event only. An ANOVA showed no significant main effect of Guided Imagery, $F(3, 112)=0.027$, $p=0.869$, or Reciprocity, $F(3, 112)=0.262$, $p=0.610$, on Details, and no significant interaction, $F(3, 112)=0.618$, $p=0.433$. The difference between the two interviews with regard to the number of Details reported for the false event was also non-significant, $t(115)=1.169$, $p=0.245$.

Table 10

Number of Types of Details Provided During True and False Event Narratives as Determined by Judges

	Interview 1		Interview 2	
Condition	True Events	False Event	True Events	False Event
Control	*M*=2.14 *SD*=1.41	*M*=0.71 *SD*=1.32	*M*=2.10 *SD*=1.39	*M*=0.86 *SD*=1.23
Reciprocity	*M*=1.85 *SD*=0.846	*M*=0.51 *SD*=0.84	*M*=1.76 *SD*=1.00	*M*=0.80 *SD*=1.01
Imagery	*M*=1.88 *SD*=0.885	*M*=0.65 *SD*=0.90	*M*=1.92 *SD*=1.17	*M*=0.65 *SD*=1.26
Reciprocity plus Imagery	*M*=2.39 *SD*=1.41	*M*=1.02 *SD*=1.68	*M*=2.27 *SD*=1.34	*M*=0.94 *SD*=1.27
Total	*M*=2.03 *SD*=1.15	*M*=0.69 *SD*=1.18	*M*=1.99 *SD*=1.22	*M*=0.80 *SD*=1.17

Relationship between ratings of true and false events. Next a series of exploratory analyses were performed to examine the relationship between the quality of children's memory for true versus false events. Children exhibited individual differences in respect to the quality of their memories and in the quantity of details they provided in their narrative reports. The follow-up analyses examined whether or not these individual differences were consistent across children's reports of true and false events. In other words, were children who remembered the true events also likely to remember the false event? Did talkative children share as much information for true events as they did for false events?

In the first analyses of true and false events, children's memory of the three true events was measured as a binary item, with judges giving a rating of "yes" or "no" when asked if the

child remembered the event. These responses were coded with "1" for "yes" and "0" for "no" and were averaged across all three true events.

Correlational analyses revealed that the average memory ratings for true events in the second interview was positively and significantly correlated with the Full Memory rating for the false event in the second interview (r=0.243, p=0.008). However, the average memory ratings for true events in the first interview were not significantly correlated with the Full Memory rating for the false event in the first interview (r=0.133, p=0.155). In other words, (a) in the second interview, children who remembered the true events were more likely to also have a memory for the false event, but (b) a similar pattern was not observed in the first interview.

A second set of analyses of true and false events compared the number of Details reported for true and false events. It would be expected that children would incorporate more details in their narratives of an event that they remember than in their narratives of an event that they do not remember. In other words, it would be expected that the number of details reported for true events would be significantly greater than the number of details reported for the false event. However, a proportion of the children did "remember" the false event. Would there be a significant difference between the number of details included in these children's narratives for true and false events? In other words, when a child has developed a memory for a false event, is the memory report for that event distinguishable from a report for a true event based on how detailed the report is? The following analyses were used to answer this question.

A mixed within- and between-subjects ANOVA was used to analyze the data, with type of event (true or false) as a within-subjects factor, Full False Memory rating ("yes" or "no") as a between-subjects factor, and Details as the dependent variable. The mean number of true event details is displayed in Table 10. The sum of details for each true event was averaged across the

three events. In order to ensure that the error variances of both variables (average sum of true event details and sum of false event details) were equal, the square root of both variables was taken. The transformed variables were used in the analysis. Two ANOVA's were done, the first using data from Interview 1 and the second using data from Interview 2.

The first ANOVA revealed an interaction between Full Memory and type of event, $F(1, 114)=53.485$, $p<.001$, partial $\eta^2=0.319$, for Interview 1. For Interview 1, there was only a significant difference between Details for the true events ($M=1.917$) and false event ($M=0.353$) when children did not develop a false memory, $t(95)=18.466$, $p<0.001$, $d=1.73$; when they did develop a false memory, this difference in Details was not statistically significant, $t(19)=1.811$, $p=0.086$, $d=0.19$; $M=2.625$ for true events; $M=2.350$ for false events. Even though the low sample size for the group of children who developed false memories may mean the power of the test is too low to detect an effect that does exist, an examination of the differences in effect sizes between the two tests ($d=1.73$ when children did not develop a false memory and $d=0.19$ when children did develop a false memory) suggests that there is a meaningful difference in the relationship between true and false event Details for the two groups of children.

The second ANOVA also revealed an interaction between Full Memory and type of event, $F(1, 114)=59.125$, $p<.001$, partial $\eta^2=0.342$. However, pair-wise comparisons showed that, for Interview 2, there were significant differences between the number of Details for the true events ($M=1.72$) and the false event ($M=0.298$) when children did not develop a false memory, $t(95)=16.177$, $p<.001$, $d=1.53$, and when they did develop a false memory, $t(19)=4.964$, $p<.001$, $d=0.46$; $M=2.669$ for true events; $M=2.098$ for false events. However, the effect size for the comparison in the no false memory group ($d = 1.53$) was, again, much greater than that for the comparison in the false memory group ($d = .046$).

For the last set of analyses, we wanted to answer a similar question to that posed with regard to the Details in the true and false memory reports. Is the Memory Quality for a false event similar to that for a true event when a child has developed a false memory? If so, then distinguishing between a true memory report and a false memory report on the basis of their Memory Quality would be difficult.

Memory Quality for each true event was averaged across all three events. The means of these averages are reported in Table 8. A mixed within- and between-subjects ANOVA examined these differences, again with type of event (true or false) and Full False Memory ("yes" or "no") as the independent variables and Memory Quality as the dependent variable. Again, the dependent variables in the analysis were transformed by taking the square root in order to achieve homogeneity of variances. Two ANOVA's were done, the first examining data from Interview 1 and the second examining data from Interview 2.

The results of these ANOVA's were similar to the results of the prior two ANOVA's. The first ANOVA revealed an interaction between type of event and Full Memory, $F(1,114)=45.540$, $p<.001$, partial $\eta^2=.281$, for Interview 1. Again, the Memory Quality ($M=2.655$) was significantly greater than that for the false event ($M=1.366$) only when children did not develop a false memory, $t(95)=13.517$, $p<.001$, $d=1.58$; the means were not significantly different when the child did develop a false memory, $t(19)=1.173$, $p=0.255$, $d=0.97$; $M=3.408$ for the true events and $M=3.675$ for the false event. In this case, the test would have had enough power to detect the larger effect size.

The second ANOVA also revealed an interaction between type of event and Full Memory, $F(1,114)=47.421$, $p<.001$, partial $\eta^2=.294$, in Interview 2. The mean true Memory Quality rating ($M=2.504$) was significantly greater than that for the false event ($M=1.29$) only

when children did not develop a false memory, $t(95)=11.886$, $p<.001$, $d=1.55$; the means were not significantly different when the child did develop a false memory, $t(19)=0.346$, $p=0.732$, $d=0.06$; $M=3.54$ for the true events and $M=3.59$ for the false event.

PPVT scores. As already discussed in the Method section, children were administered the PPVT to screen for low English-language proficiency, which might preclude their data from being included in the analyses. Children were initially administered the basal set that was consistent with the norms for their age. Only children whose basal set was below age level were administered the entire PPVT.

Ninety percent of participants performed at age level on the basal set, indicating that these children's English language proficiency was normal for their age. For two children, a basal set was not determined due to experimenter error. Of the remaining 9% of children who did not perform at age level on the basal set, four were administered the full PPVT. Of these four children, one scored within the normal range on the full PPVT (i.e., approximately at the mean). The remaining three children scored at least two standard deviations below the mean on the full PPVT. Six children who did not perform at age level on the basal set were not administered the full PPVT due to experimenter error.

A crucial issue is whether or not inclusion of the low-performing children (9% of the sample) in the analyses influenced the results. To test this issue, the central analyses of the study were carried out in two ways. In one variation of the analyses, all children ($N = 116$) were included, regardless of their performance on the PPVT. In the other variation of the analyses, the 9% of low-performing children were excluded. Results are shown in Table 11. As can be seen in the table, the percentages of children who developed a false memory did not differ appreciably between the total sample and the sub-sample of children who performed at age level on the basal

set. In other words, the decision to include the 9% of low-performing children in the data analyses for the present study does not appear to have had an appreciable impact on the study's substantive findings.

Table 11

Number and Percentage of Children With False Memories, by Experimental Condition. Comparison Between the Total Sample and the Sub-Sample of Children Whose PPVT Performance was at Age Level

Condition	Interview 1				Interview 2			
	Total Data		PPVT at Age Level		Total Data		PPVT at Age Level	
	FM*	FMI**	FM	FMI	FM	FMI	FM	FMI
Control	8/31 26%	13/31 42%	7/28 25%	11/28 39%	9/31 29%	14/31 45%	9/28 32%	14/28 50%
Reciprocity	5/34 15%	11/34 32%	5/32 16%	11/32 34%	12/34 35%	18/34 53%	12/32 38%	18/32 56%
Imagery	6/30 20%	13/30 43%	5/27 19%	11/27 41%	6/30 20%	9/30 30%	6/27 22%	8/27 30%
Reciprocity and Imagery	1/30 5%	8/30 38%	1/18 6%	8/18 44%	5/30 24%	10/30 48%	5/18 28%	8/18 44%
Total	20/116 17%	45/116 39%	18/105 17%	N=11 34%	32/116 28%	51/116 44%	32/105 30%	48/105 46%

*FM=Full False Memory
**FMI=False Memory or Images

Discussion

Three findings from the present study are particularly notable. First, contrary to prediction, neither guided imagery nor the use of the reciprocity norm significantly increased the likelihood of children developing a false memory. Second, judge's coding of children's false memories correlated with the children's own ratings of their memories. Third, the proportion of children who developed a false memory in the second interview was significantly higher than the proportion who developed a false memory in the first interview. Each of these three findings is discussed in detail in the following sections.

Lack of significant effect of guided imagery and reciprocity norm on false memory development

Contrary to what had been predicted, neither guided imagery nor use of the reciprocity norm increased the likelihood of children developing a false memory, whether false memory was operationalized as judges' ratings of "Full False Memory" or "False Memory or Images," or as children's ratings of their own false memories. The question arises why the present study failed to find an effect for either independent variable. Several explanations are possible.

First, perhaps the number of interviews was too small to produce an effect. Other similar studies using the false memory paradigm with children have sometimes used more than two interviews (Ceci, Loftus et al., 1994; Strange et al., 2008). Furthermore, it is likely that, when guided imagery or the reciprocity norm is utilized in actual forensic interviews with children, these techniques are applied during more than two interviews. It is known that children are often interviewed repeatedly (Ceci et al., 2000). Although repeated non-suggestive interviews can help improve the accuracy of children's reports, repeated suggestive interviews can negatively impact the accuracy of the reports (Blandon-Gitlin et al., 2009).

Second, perhaps neither the manipulation of reciprocity nor the manipulation of imagery was strong enough to produce an effect. Perhaps guided imagery is not effective in producing false memories even though other forms of imagery induction are effective. Although guided imagery did produce false memories among adults in other studies (Hyman et al., 1996; Thomas et al., 2003), this technique has not been previously tested with children using the current study design. Other forms of inducing imagery seem to be more effective with children, such as drawing the event (Strange et al., 2003) or "thinking real hard" about the event (Ceci, Huffman et al., 1994).

Additionally, it is possible that the manipulation of reciprocity was not strong enough to be effective. Invoking the norm of reciprocity, as we did in this study, is a form of social influence (Cialdini, 1993). In the studies conducted by Garven et al. (1998; 2000), social influence, particularly the use of social reinforcement, was extremely effective in producing false assents and, in some cases, false memories. What could explain the strong effect seen in these studies and the lack of effect in the current study? The Garven et al. studies could be referred to as Cued Recall Suggestibility studies because, in these studies, children had to respond to a series of questions about an experienced event. The current study could be referred as a Free Recall Suggestibility study because children must respond using free recall about a completely fabricated event. One possible explanation for the different results is that there were fewer "doses" of social influence given in the current study. The Cued Recall Suggestibility studies involve asking the child many questions about an actually experienced event; each question is an opportunity to give a "dose" of social influence. In the design of the current study, however, there were only six opportunities to invoke the norm of reciprocity: at the beginning of both interviews and after the child's response to each of the four events. Another possible explanation

is that reciprocity is not an effective form of social influence. The form of social influence used in the Garven et al. studies was reinforcement. Perhaps reinforcement would be effective in a Free Recall Suggestibility study even though reciprocity was not.

We have just considered the possibility that the manipulation of the independent variables in the present study was too weak to produce an effect. Another possibility is that the effect of these variables is non-existent with regard to false memory development in children. This possibility is unlikely to be true for the imagery manipulation, since other Free Recall Suggestibility studies have found effects for imagery. However, there have not been prior Free Recall Suggestibility studies that explicitly manipulated reciprocity, so there is little information about the existence of an effect for this variable.

Correlation between judges' coding of false event reports and children's ratings

The present study found that judges' coding of the presence of a Full False Memory report correlated moderately with children's ratings of Confidence ($r = 0.52$) and Amount Remembered ($r = 0.58$) for the same false memories. These numbers are very similar to those reported by Strange, Sutherland, and Garry (2006), who also found that judges' coding of false memories were significantly correlated with children's ratings of confidence ($r = 0.52$) and amount remembered ($r = 0.61$). The correlations among measures reported in the present study and in the study by Strange et al. are important because they provide firm evidence that children's memory ratings were validly related to their memory experience. It is reasonable to conclude that children at this age are able to evaluate the quality and strength of their own memory experiences. Furthermore, these correlations support the validity of the judges' coding of the children's false memory reports.

Change in false memories between first and second interviews

Across all conditions, the proportion of children with false memories significantly increased between Interviews 1 and 2. The number of children with a false memory increased from 17% at Interview 1 to 28% at Interview 2, an absolute change of 11%. There are a number of possible explanations for this increase in false memories. First, perhaps the children initially acquiesced to the interviewer's request for information without actually believing the event was real (and so their responses were coded as Images but no Memory). Only later, through reality monitoring errors, did the children come to believe that the event actually happened. This explanation is consistent with the results of a study by Ackil and Zaragoza (1998), who found that children who confabulated about an event in an initial interview showed a tendency to develop false memories in later interviews.

A second possible explanation for the increase in false memories from Interview 1 to Interview 2 is that children initially denied that the event occurred but, through thinking about it during the ensuing week, may have become unable to differentiate between their imagery of the event and an actual memory when they were re-questioned during the second interview. This explanation is consistent with source monitoring theory (Johnson et al., 1993), which asserts that source errors can occur when a person has difficulty distinguishing between information from an external source (being told about it by someone else) or from an internal source (imagined event) and information obtained through an actual experience.

Interestingly, five children had a false memory in the first but not the second interview. Perhaps these children felt pressured to comply in the first interview because of the manipulation. During the second interview, when there was no manipulation and they felt no pressure to acquiesce, they denied that the event occurred. Another possibility is that, despite

being asked not to do so, these children consulted with their parents about the event and their parents denied that the event occurred.

Additionally, we found a significant increase between the first and the second interviews for the judges' ratings of Acceptance. In other words, the children became more accepting that the false event occurred across interviews.

The finding that the proportion of children's false memories increases across interviews is a replication of findings from several previous Free Recall Suggestibility studies. For example, in a study by Otgaar et al. (2008), 21% of children ages seven to eight years old in a control condition developed a false memory of choking after one interview, whereas 40% did so after three interviews. In a study by Strange, Hayne, and Garry (2008), a significant increase in false memories between a first interview and a second interview was found for nine-year-old children in an experimental group, although not for children of the same age in a control group. Finally, in a study by Strange, Sutherland, and Garry (2006), the rate of false memories among six-year-old children in a control group increased from 10% in a first interview to 31% in a second interview.

What is particularly interesting is that in these studies, and in the current study, 10% to 20% of children developed a false memory during the first interview. This is even more remarkable in the current study, as we did not tell the children that the information about the false event came from their parents. There can be a strong effect on suggestibility of telling a child that information came from someone they know (Garven et al., 1998). The fact that we were able to get 17% of children to develop a false memory during the first interview without invoking this technique is noteworthy. If neither guided imagery nor reciprocity nor referring to a child's parents as the source of the information can account for this effect, we are left to

wonder what does cause a false memory after only a few minutes of questioning. Possibly, simply presenting an event to a child as if it occurred is compelling enough for some children to develop a false memory. If so, then how can source monitoring theory explain this development? According to source monitoring theory, it might be expected that a child needs time in order for the confusion between the external source of information (in this case, the interviewer telling the child about the event) and the internal source of information (an actual memory) to develop. Of course, it is possible that these children were able to confabulate about the event so well that they were believable. In any case, this might be a fruitful avenue for future research.

Additional exploratory findings

Exploratory analyses in the present study also compared Memory Quality ratings for true and false event reports. When children did not develop a false memory, the Memory Quality for true event reports was significantly higher than the Memory Quality of false event reports. However, when children did develop a false memory, the true and false reports were similar with regard to Memory Quality.

While there were more Details for true reports than for false reports, regardless of whether or not a child developed a false memory, the effect size for the difference was much greater when the child had not developed a false memory. In other words, the difference between Details for true and false memory reports, while significant, was much smaller when the child had developed a false memory.

An implication of these findings is that, in an actual forensic interview about abuse, an investigator may have difficulty differentiating a child's report about an event that has occurred

and a report about an event that has not occurred. This has serious implications for situations in which a child has been subjected to suggestible questioning, either by parents or investigators.

It also may be worthwhile to consider that some proportion of the children's memories for true events were not actual memories at all, but instead were created by the same processes that led to the false memories. Many children did not initially remember the true events and these events were treated in the exact same manner, with regard to manipulation of the independent variables, as the false events. The development of false memories for true events may be an interesting avenue for future research.

Limitations of the current study

The present study had several limitations that deserve mention. First, the manipulation of the independent variables may not have been strong enough for the effect to take place. With regard to the reciprocity effect, some of the children may not have felt beholden enough to their teachers in order to feel compelled to "help" them by "remembering" the false event. In fact, several students had difficulty generating ways that their teachers had helped them in the past. Perhaps invoking the norm of reciprocity with regard to the parents would have been more effective. Alternatively, the norm of reciprocity could have been invoked with regard to the interviewer. This would have required the interviewer to spend a lengthy period of time developing a relationship with the child. In actual forensic interviews the child often develops a strong rapport with the interviewer because the child is often interviewed for several hours on many occasions.

With regard to the imagery manipulation, additional methods for inducing imagery could have been used, such as drawing the event or telling a story about the event. Furthermore, having the child spend a longer period of time in guided imagery may have been more effective.

Second, due to scheduling difficulties, the two interviews did not always occur exactly one week apart. Occasionally, the second interview fell on a school holiday or a field trip or when a child was ill. In this case, the interview would be scheduled as soon as possible after the child returned to school. Less frequently, an interviewer was unable to attend the scheduled second interview because of personal issues; again, the interview would be scheduled as soon as possible afterwards. However, if the interviewer was unable to complete the second interview in two weeks, the child was excluded from the study. Furthermore, the length of time between the two interviews was not dependent on the child's assigned experimental condition.

Finally, there was some loss of data for five children due to issues with the electronic equipment. One way to prevent this in the future is to have a better system for transferring videos from the camera to the person editing the videos to the judges for coding. Another solution is to always include an extra memory card and power cord to prevent data loss from low battery or low storage space.

Implications for source monitoring theory

This study did not find an effect of the norm of reciprocity or of guided imagery on the development of false memories in children. As stated above, there are at least two possible explanations for these results. First, these two variables may sometimes exert a genuine effect on children's false memories, but this effect may have been masked in the current study due to weak manipulations. Second, it is possible that there is no genuine effect; that is, maybe these two variables simply do not affect the formation of false memories.

If the second possibility is true -- that is, there is no genuine effect -- then the present results have important implications for source monitoring theory. If creating imagery does not create a glitch in children's reality monitoring process, causing them to confuse imagery of an

event with memory of an event, then source monitoring theory can not adequately explain the development of false memories. It is commonly hypothesized that much of children's heighted suggestibility is due to their developmental vulnerability to source-monitoring errors (Shapiro & Purdy, 2005; Bright-Paul et al., 2008). However, the guided imagery in the present study did not increase children's formation of false memories, even though guided imagery is a manipulation that has been shown to increase source monitoring errors (Garry et al., 1996; Thomas et al., 2003). It may be that other theories mentioned in the introduction, such as fuzzy trace theory (Brainerd et al., 1998) or the constructive memory framework (Schacter et al., 1998), may provide a better explanation for why children are vulnerable to developing false memories.

It may be the case that mere exposure to the event accounts for the findings in this study. Sharman, Garry, & Beuke (2004) found that adults participating in an imagination inflation exercise were equally likely to increase their confidence that a false childhood event occurred when they imagined the event and when they merely paraphrased the event. This effect occurred only after one exposure; additional exposures did not increase the effect. The authors speculated that exposing someone to an event eases later processing about the event, which leads to a sense of familiarity, causing one to feel more confident that the event occurred. This is consistent with Jacoby et al.'s (1989) fluency-misattribution perspective. In the current study, all children were exposed to the event. Perhaps, due to individual differences in attending to, or processing, the event, some children came to feel more confident over time that the event occurred.

Implications for forensic interviewing with children

Even though the present study did not find that reciprocity or guided imagery increased the formation of false memories, the results showed that false memories could develop after one or two interviews, even in conditions of the experiment where false memories were not

facilitated through social influence or imagery. These findings indicate that some subset of children can develop false memories simply by being told that the interviewer heard that an event occurred. Knowing this, interviewers might want to initially avoid presenting an event to children in this manner. In fact, Garven et al. (1998) found that this technique of introducing information increased children's false assents. Because of this potential for influencing children's reports, some interviewing protocols discourage the interviewer from directly giving information to the child about the event in question until later in an interview (Lamb, Orbach, Hershkowitz, Esplin, & Horowitz, 2007). If interviewers do introduce information about an event, the protocols direct them to do so in a tentative manner, providing as little information as possible.

The present study also found that, when children developed a false memory, their narrative about the false event could contain a level of detail that was similar or only slightly lower than their narratives about true events. The similarity of true and false narratives can make it difficult for investigators to distinguish memories for events that did occur and events that did not occur but for which the child developed a false memory through suggestive questioning or some other means.

Future directions

More research should be done with children using the design of this study to determine which interviewing techniques increase the likelihood of false memory development. Studies could be done utilizing other forms of social influence, such as reinforcement, or with other means of creating imagery, such as drawing or storytelling. Additionally, more studies could be done examining the effect of reciprocity and guided imagery on false memory development to determine if stronger manipulations, or more interviews, create an effect. This type of study

could also be done with children of varying age levels. Would the norm of reciprocity and guided imagery be equally effective with a four year-old as with a ten-year old?

Another avenue for research in this area could be to develop more sophisticated measures of false memory development. Researchers could develop an observer scale with psychometric properties that might also be more powerful when used in significance testing.

In sum, although the norm of reciprocity and guided imagery had no effect on the likelihood of false memory development in this study, the field is ripe for future research. The false memory paradigm is a relatively understudied avenue for examining false memory development. Future research should continue to make use of this paradigm to examine how the convergence of social and cognitive factors can create rich false memories in children. Knowledge of the mechanisms involved in this process can help to prevent future miscarriages of justice similar to those that we have seen over the past three decades.

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Appendix

True Events

1. Does the participant remember the event? **Yes** **No**
2. How confident are you that your rating is accurate? **Low** **Medium** **High**
3. If the participant provided detail, what sort of detail was it?
   a. Location **yes** **no** **speculates**
   b. Who was present **yes** **no** **speculates**
   c. Emotion **yes** **no** **speculates**
   d. What happened before **yes** **no** **speculates**
   e. What happened after **yes** **no** **speculates**
   f. Other_____
4. Rate the overall memory report

1 **2** **3** **4** **5**

Nothing like real **As complete and detailed as a memory could be**

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

False events

1. Which of the following best describes the participant's acceptance of the idea that the event occurred?

1 **2** **3** **4** **5**

Outright rejection **Strong belief**

2. How confident are you that your rating is accurate? **Low** **Medium** **High**
3. If participant rejects the event, what reason do they give?

_____

4. Which of the following best describes the participant's reports of memories of the event?

No Memories or Images **Images but No memories** **Images and Memories**

5. How confident are you that your rating is accurate? **Low** **Medium** **High**
6. If the participant provided detail, what sort of detail was it?
   a. Location **yes** **no** **speculates**
   b. Who was present **yes** **no** **speculates**
   c. Emotion **yes** **no** **speculates**
   d. What happened before **yes** **no** **speculates**
   e. What happened after **yes** **no** **speculates**
   f. Other_____

7. How prompted is the memory report?

1 **2** **3**
Does not volunteer any information **Some prompted information** **Not at all**

8. How confident are you that your rating is accurate? **Low** **Medium** **High**

9. Please rate the overall memory report:

1 **2** **3** **4** **5**
Nothing like real **As complete and detailed as a memory could be**

10. How confident are you that your rating is accurate? **Low** **Medium** **High**

Curriculum Vita

Misty C. Duke was born in Houston, Texas. The first daughter of Kathryn Raymond and Paul Christopher Opryshek, she graduated from Bellaire High School in Houston in 1991. She graduated from the University of Texas at Austin in 1995 with a major in Psychology and a minor in Child Development. Misty graduated from Texas Woman's University in 1997 with a Masters of Arts degree in Counseling Psychology. She practiced psychotherapy for approximately ten years in both private practice and non-profit settings, working with children, families, and adults. She was a Licensed Professional Counselor-Supervisor and a Registered Play Therapist-Supervisor. Misty presented at local and state play therapy conferences and provided supervision for other counselors. She entered the Legal Psychology doctoral program at the University of Texas at El Paso in August, 2009. Misty has participated in research on juror decision-making, elicitation of information from detainees and witnesses, and child suggestibility.

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