THE INFLUENCE OF SUGGESTIVE PARENT-CHILD CONVERSATIONS AND INTERVIEWS ON CHILDREN'S MEMORY REPORTS

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ABSTRACT

Taylor Evan Thomas: The Influence of Suggestive Parent-Child Conversations and Interviews on Children's Memory Reports
(Under the Direction of Peter A. Ornstein)

Within investigations of child sexual abuse and other forms of child maltreatment, interviews with children are often the only sources of information about alleged events. The critical implications of children's memory reports for the outcome of cases have led researchers to consider the extent to which children can be trusted to provide reliable accounts of events. Empirical work on this topic has demonstrated that under certain circumstances, even young children can accurately remember and report past events; yet, there are numerous factors that can drastically reduce the accuracy of children's recollections. For example, a substantial amount of research has demonstrated the deleterious effect of suggestive interviewing on children's memory reports. However, what is less clear are factors outside of the interview context that may also compromise the accuracy of children's reports of events that they have experienced. One such factor concerns the information that is imparted to children in the course of conversations with their parents.

This study was designed to examine one way in which parents' conversations may undermine children's memory for a salient experience. This aim was accomplished by exposing some parents to false information about a staged event (an archeological dig) that their children had independently experienced. The parents were then asked to talk about this event with their children, and the children's memory for the event was elicited within either suggestive or neutral

interviews after delays of 1- and 2-week delays, as well as during a final neutral interview three weeks after the dig.

Analyses of the parent-child conversation revealed that parents' incorporated suggestions into their conversations with children, which led children to report false information within both the parent-child conversations and final interview. Interviewers' suggestions also interfered with children's remembering across interviews. Contrary to expectation, however, interviewers' suggestions did not amplify the effect of parents' suggestions on children's remembering. The accuracy of children's reports in the final interview was also not influenced by how parents structured conversations about the archeological dig with their children. The ways in which these findings can contribute to an understanding of children's cognition and guidelines for forensic interviewing are discussed.

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INTRODUCTION

Children are involved with the legal system for a variety of reasons, the most common being maltreatment. As reported by the National Child Abuse and Neglect Data System, 3.5 million child protective service referrals were documented in 2017. Of these referrals for abuse or neglect, approximately 570,000 were substantiated and an estimated 29% of these child maltreatment cases reached court (US Department of Health & Human Services, Administration for Children and Families, 2017). Although it is unclear how many of these legal proceedings involved children as witnesses, it is estimated that substantially more than 100,000 children provide testimony each year (Ceci & Bruck 1993). The frequent involvement of children in the legal system and the critical implications of children's accounts of alleged events that they have experienced or witnessed have raised an important issue concerning the credibility of children's memory reports. Namely, to what extent can children of different ages provide complete and accurate accounts of events, particularly in situations in which their testimony provides the primary or sole source of evidence?

Addressing these issues requires a consideration of two separate, but linked literatures. First, it is necessary to examine empirical work on the development of children's memory for events because children cannot accurately report what they do not remember (Ornstein, Larus, & Clubb, 1991). Research in this domain includes children's memory that is revealed within the context of parent-child interactions (Fivush & Fromhoff, 1988), as well as children's memory for staged (Murachver, Pipe, Gordon, Owens, & Fivush, 1996) or natural events (Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993; Ornstein, Merritt, Baker-Ward, Furtado, Gordon, &

Principe, 1998). Second, it is important to consider the rich literature on child suggestibility that indicates that even though children's recall can be accurate for many events, their reports can nonetheless be greatly compromised when they are obtained under suggestive interview conditions. Research in this area focuses on the influence of suggestive interviews that are carried out in formal contexts by forensic practitioners (e.g., police officers, social workers, and lawyers) (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). It also extends beyond formal contexts to include informal conversations between children and their peers (Principe & Ceci, 2002), as well as their parents (Principe, DiPuppo, & Gammel, 2013; Principe, Trumbull, Garder, Horn, & Dean, 2017; Klemfuss, Rush, & Quas, 2016).

The current study stems from an integration of these two literatures (i.e., research on children's memory for events, as well as work on child suggestibility). Specifically, this study is designed to examine the extent to which children's memory for an event is influenced by suggestions encountered across formal and "informal" (i.e., conversations between parents and children) interview contexts. To date, there is no research that considers the impact of both interviewers and parents' suggestions on children's remembering. It is proposed that encountering false information across settings will cause children to accept the beliefs of both parents and interviewers, even when those beliefs are inconsistent with children's experiences. This may inadvertently lead children to align their memory reports with the biased information, such that the accuracy of children's remembering will be the most compromised when they are exposed to suggestions by both interviewers and parents.

To set the stage for an examination of these issues, this document begins with a focused review of empirical work on children's event memory and child suggestibility. Next, a description of the experimental manipulation used to examine the additive impact of

interviewers' and parents' suggestions on the accuracy of children's memory reports is provided. Although this study is a laboratory-type investigation, its design is strongly influenced by a consideration of forensic issues. Material from well-known cases in which children serve as witnesses will therefore be interspersed throughout the presentation of relevant literature. By contextualizing this study (as well as those carried out by other psychologists in the field) within this historical framework, I aim to highlight the importance of continued work on matters related to child suggestibility.

CHILDREN'S MEMORY

The emergence of children's abilities to remember past events occurs in early childhood. Research involving nonverbal measures of memory highlights the remarkable abilities of infants to encode, store, and retrieve information about their previous experiences over long periods of time (DeCasper & Spence, 1986; Rovee-Collier, 1997; Bauer, 1996). As children develop the ability to verbally reference the past, their memory abilities show dramatic changes. These changes have been primarily revealed in two contexts; namely, studies of children's memory within naturally occurring parent-child conversations (Fivush & Fromhoff, 1988), as well as more formalized explorations of children's memory for salient events (Baker-Ward, et al., 1993; Ornstein et al., 1998; Murachver et al., 1996). The section that follows is devoted to a discussion of children's memory displayed in these situations (for an extended treatment, see Ornstein, Haden, & San Souci, 2008; Ornstein, Haden, & Elischberger, 2006).

Children's Memory within Parent-Child Conversations

Memory Development. Investigations of naturally occurring conversations document the rapid development of children's abilities to remember and report past experiences across the preschool years. Soon after children begin speaking around 18 months of age, they are able to

reference everyday routines (e.g., lunch at daycare; reading stories before bed) and recently completed actions (e.g., "All gone" and "Bye bye") in a fleeting and fragmented manner (Nelson, 1986). Although still infrequent and fragmented, children's narratives of previous experiences become lengthier by the age of 2 and extend to the more distant past by the time that children are 3 years old (Fivush, Gray, & Fromhoff, 1987). Children's memory reports continue to become more complex and organized with increases in age; however, it is clear that their early reports are limited in content as well as structure and are almost always structured or interpretatively framed by their parents (e.g., a child says "dinosaur" and a parent responds, "Yes, you and daddy played with your toy dinosaurs after breakfast this morning, didn't you? That was fun!") (Fivush & Fromhoff, 1988).

Social-Cultural Theory of Memory Development. Early parent-child conversations such as these not only support children's memory for specific experience, but also serve to facilitate children's memory remembering in general. For example, scholars have used Vygotsky's social-cultural theory of development (Vygotsky, 1978) to argue that children first learn the form and function of remembering, as well as the relevance of personal memories, through talking about the past with their parents. Parents initially provide most of the structure and content during these conversations about past events, allowing children to practice their skills with the support of a proficient conversational partner. Children, in turn, increasingly internalize these skills so that they are eventually able to remember and report information about their personal past with little help from their parents (Fivush, 1991; Fivush, Haden, & Reese, 1996; Nelson & Fivush, 2004).

Parents' Conversational Style. A primary focus of research on naturally occurring conversations has been on the striking differences in the ways in which parents work to structure

past event conversations for their children. Consider, for example, the two contrasting conversational styles that parents use to provide information for and elicit details from their children within reminiscing conversations (i.e., high elaborative vs. low elaborative). Parents classified as high-elaborative scaffold conversations in a story story-like manner through their use of open-ended questions (e.g., "What did we do at the zoo?"), close-ended elaborative questions (e.g., "Did you pet the turtle at the zoo?"), elaborative statements (e.g., "We took a break and had a picnic at lunchtime by the bears."), and evaluations (e.g., "You're right! The flamingos were pink"). Parents classified as low-elaborative, in comparison, structure dialogues in a test-like manner through their use of close-ended, repeated questioning aimed at eliciting specific responses (Fivush & Fromhoff, 1988). These differences in parents' conversational style are consistent over time and (Reese, Haden, & Fivush, 1993; Farrant & Reese, 2000) not simply an artifact of "talkativeness," as revealed by the lack of association between parental conversational style and volume of speech during free play and shared book-reading activities (Haden & Fivush, 1996; Liable, 2004a, Liable, 2004b).

Furthermore, a great deal of data clearly indicates that parents' conversational style is associated with differences in children's memory for events. That is, high-elaborative parents provide children with more memory cues during their conversations that aid children in accessing and retrieving event details from memory. As a result, children of high-elaborative parents report more unique, comprehensive information within memory conversations than children with low-elaborative parents (Fivush & Fromhoff, 1988). The ways in which parents structure and children participate in reminiscing conversations also set the stage for children's later independent remembering, such that high-elaborative parents have children who report more novel information in their conversations with other adults (Farrant & Reese, 2000).

Longitudinal studies demonstrate that variations in parents' conversational style are similarly associated with later differences in children's abilities to remember and report information about past experiences within conversations with parents. Consider, for example, empirical work by Reese and colleagues (1993). In their investigation, parents who were highly elaborative when children were 40 months old had children who reported more unique information 1 ½ and 2 ½ years later within memory sharing conversations, as compared to children of low-elaborative parents. Over time, the direction of effect was greatest from parent to child, suggesting that parents' scaffolding of reminiscing conversations, rather than children's own earlier skills at remembering, drive the development of children's memory for past events (Reese, Haden, & Fivush, 1993).

The causal role of parents' conversational style in predicting children's memory for events is further revealed in numerous experimental studies (e.g., Peterson, Jesso, & McCabe, 1999; Reese & Newcombe, 2007; Valentino, Comas, Nuttall, & Thomas, 2013). To illustrate, Reese and Newcombe (2007) provided parents of 21- to 29-month-old children with training in the use of an elaborative conversational style. These parents received an instructional sheet that listed elaborative techniques (e.g., open-ended questions, close-ended elaborative questions, elaborative statements) and were encouraged to talk with their children more often about past events. Another group of parents did not receive this training and therefore served as a comparison for evaluating the effects of the training program. On two separate occasions – 2 ½ and 15 months after completing the training – parents discussed past events with their young children, and, in both the short- and long-term, parents who received the training were more elaborative than parents who did not receive guidance in employing an elaborative conversational style. Similarly, the children of trained parents reported more unique memory

information within their conversations than children of untrained parents, regardless of the delay interval (Reese & Newcombe, 2007).

Summary. The research summarized here highlights the rapid changes in children's abilities to remember and report the past that occurs across the preschool years (Nelson, 1986; Fivush, Gray, & Fromhoff, 1987), as well as the important causal role that parents' play in cultivating children's memory skills (Fivush & Fromhoff, 1988; Reese, Haden, & Fivush, 1993; Reese & Newcombe, 2007). However, the methodologies employed in studies of naturally occurring conversations between parents and children do not enable researchers to objectively assess the content of children's reports. That is, the past events under investigation are typically undocumented occurrences that have been selected for discussion by parents. Because these events do not permit an independent verification of the facts, little can be known about children's retention of event-relevant information or the accuracy of their claims. In order to characterize children's memory in this way, research on children's memory for salient events is reviewed below.

Children's Memory for Salient Events

To better understand children's abilities to produce accurate memory reports over extended periods of time, researchers have examined children's recollections of specially constructed events (Murachver et al., 1996; McGuigan, & Salmon, 2004). For example, Murachver and colleagues (1996) staged a "Visiting the Pirate" activity for 5- and 6-year-olds to directly experience, observe, or read about. Children were exposed to the event either a single or multiple times and were asked to verbally recall and reenact their experiences approximately 3 days later. In general, children's reports of their experiences were quite impressive; however, the accuracy of children's reports varied as a function of exposure and interview type. That is,

children's reports were generally more accurate when they directly experienced the staged event (versus observed or read about it) and when their reports were elicited through verbal recall rather than reenactment (Murachver et al., 1996). These results indicate that, despite being quite good, the accuracy of children's remembering can be influenced by the nature of their experiences and the manner of their retrieval.

Other researchers have examined children's memory for routine visits to the doctor (Baker-Ward et al., 1993; Follmer & Furtado, 1997; Ornstein et al., 1998) and other medical procedures (Merritt, Ornstein, & Spicker, 1994) in order to better understand the accuracy of children's remembering. Investigations such as these provide a unique platform for characterizing children's memory, as the events under consideration (i.e., medical visits involving an adults' physical touch of a child's body) are somewhat similar to events about which children are asked to testify (i.e., sexual abuse). Furthermore, the verifiable knowledge of what occurs during each physical examination permits researchers to directly assess children's retention of event-related information over time, as well as the accuracy of children's reports (Ornstein, Baker-Ward, Gordon, & Merritt, 1997).

In this series of programmatic studies on children's memory for medical experiences, young children are interviewed at various points after their visit to the doctor, ranging from immediately to 6 months after their physical examinations. Children are typically interviewed on two occasions in a hierarchical manner (i.e., first with open-ended, then with specific yes/no questions) about the particular features of their physical examinations (e.g., measure height, measure weight, check eyes, check knees, listen to chest). Because physical examinations vary from child to child, the specific components of each child's examination are identified in checklists completed by medical practitioners and parents. All interviews are recorded,

transcribed, and coded for the particular features recalled and the type of probe required for children to retrieve the information (i.e., open-ended vs. specific yes/no questions).

Memory Retention. Results of studies involving this approach are similar to those involving children's memory for staged events (Murachver et al., 1996) in that they demonstrate the impressive abilities of young children to remember and report their past experiences; however, work in this domain also documents age-related differences in children's retention of event-related information over time. Consider the work of Baker-Ward and colleagues (1993) as an illustration. As part of this study, 3- to 7-year-old children were questioned with open-ended ("Tell me what happened during your check-up.") and close-ended ("Did the doctor check any parts of your face?") probes about their physical examination, both immediately after their visit to the doctor and after a delay of 1, 3, or 6 weeks. In response to questioning, children of all ages reported the bulk of their check-ups; however, older children recalled a greater amount of information and depended less on specific yes/no (versus open-ended) probes than younger children. Moreover, older children were also better than younger children at retaining event-related information in memory over time, such that the amount of forgetting was significant among 3- and 5-year-olds, but not 7-year-olds (Baker-Ward et al., 1993). This developmental trend is further revealed when data are pooled across studies of this type in order to establish retention functions (Follmer & Furtado, 1997).

Accuracy of Memory Reports. Paralleling age-related differences in the retention of event-related information over time are variations in children's ability to accurately recount their experiences. For example, Baker-Ward and colleagues (1993) also asked children about extra activities that did not occur during the physical examination (e.g., "Did the doctor cut your hair?" and "Did the nurse sit on top of you?"), as well features of typical physical examinations that

were not included in children's individual experiences. In response to questions about the extra activities, children's correct denial rates were impressive (.87, .96, and .99 for 3-, 5-, and 7-year-olds, respectively at the initial interview). Children's correct denial rates in response to questions about the absent features were diminished but still quite good (.72, .93, and .88 for 3-, 5-, and 7-year-olds, respectively at the initial interview). As can be inferred from the denial rates referenced above, children's responses revealed age-related differences in accuracy. That is, in their initial interview, 3-year-old children were more likely than the 5- and 7-year-old children to incorrectly assert that the extra activities and absent features had indeed occurred (Baker-Ward et al., 1993).

Furthermore, research by Ornstein and colleagues demonstrates that under certain conditions the accuracy of older children's memory can be similarly undermined. Specifically, children can be led provide incorrect information about an event when their experiences conflict with preexisting knowledge and expectations. Consider an experiment by Ornstein and colleagues (1998) as an illustration. In this experiment, 4- and 6-year-old children took part in a mock physical examination that included some typical features (e.g., listening to the lungs), while omitting other typical features of an examination (e.g., looking in ears, listening the heart, checking knees), and incorporated other atypical, unexpected activities (e.g., measuring head circumference, wrapping bandage on leg, asking child to touch nose). Using a hierarchically structured interview protocol, children were questioned about the typical and atypical features that had been either included or omitted from their physical examination that occurred 12 weeks prior (Ornstein et al., 1998).

Children's responses to these questions revealed striking age-related differences in performance. Consistent with previous research by Baker-Ward and colleagues (1993), older

children outperformed younger children in their accurate recall of typical features and denial of the atypical, unexpected activities. Nevertheless, older children were simultaneously more likely than younger children to inaccurately include the typical, but omitted features of an examination in their reports. That is, 42% of the 4-year-olds referenced at least one typical but omitted component, whereas 72% of 6-year-olds made this same error (Ornstein et al., 1998). The presence of such intrusions in older children's reports 12 weeks after their experience demonstrate the impact of expectations on children's remembering and call attention to the constructive nature of memory.

Summary. Empirical investigations involving children's memory for salient events provide a unique and ecologically valid platform for characterizing the development of children's remembering (Ornstein et al., 1997). For example, a series of programmatic studies on children's memory for medical experiences allows for the examination of children's abilities to retain and accurately report their experiences as a function of age. This work convincingly shows that older children recall a greater amount of information, depend less on specific probes during questioning, and evidence less forgetting over time (Baker-Ward et al., 1993; Follmer & Furtado, 1997). Nonetheless, children of all ages are susceptible to including false information in their reports, particularly when their experiences are inconsistent with their expectations (Ornstein et al., 1998).

Importantly, the research summarized here depicts children's memory performance under conditions that reflect ideal interviewing practices. Specifically, the questions concerning features and activities that did not occur in children's physical examinations are asked in a direct, straightforward manner rather than with the more coercive approaches documented in studies of child suggestibility (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). Because of this

contrast, it is believed that work on children's memory for salient events lies on the opposite end of the continuum of investigations that examine the influence of highly suggestive questioning procedures on children's remembering (Ornstein, et al., 1997). Therefore, a review of the complementary research literature on child suggestibility is provided next.

SUGGESTIBILITY OF CHILDREN'S MEMORY

Child suggestibility became a topic of general interest approximately 30 years ago after several infamous cases involving children as witnesses (e.g., the Kelly Michaels and McMartin Preschool daycare cases) raised concerns about problematic forensic interviewing practices and their impact on children's testimony (see Ceci & Bruck, 1993 for a historical review). Since then, researchers have used innovative methodologies to examine the accuracy of children's memory reports and the various factors that may serve to undermine it. This work convincingly demonstrates that even young children are able to provide detailed, accurate accounts of past events under some conditions; however, there are also several suggestive influences that can greatly reduce the veracity of children's recollections.

Initial research on child suggestibility involved exposing children to false information in between their experience and subsequent interview. For example, Ceci, Ross, and Tolgia (1987) examined this effect, otherwise known as the 'misinformation effect', by presenting 3- to 12-year-old children with short stories about Loren's first day of school and exposing some of the children to misleading information about aspects of the story (i.e., that Loren had a *headache* from eating her *cereal* too fast, when in reality Loren had a *stomachache* from eating her *eggs* too fast) one day later. Children were then presented with four pictures and asked to identify the two that actually appeared in the stories after a two-day delay. The accuracy of children's selections differed as a function of age and previous exposure to false information. That is,

misled preschoolers were more likely than older children who were similarly misled to select pictures that portrayed the false information (versus the pictures that detailed the original stories) (Ceci, Ross, & Tolgia, 1987). Young children, as such, appear to be particularly vulnerable to the effects of encountering false information about their experiences prior to being interviewed.

Researchers, including Ceci and colleagues, have since recognized the importance of the actual interview context for the accuracy of children's remembering. Therefore, research in this domain has shifted from examining the 'misinformation effect' to focus primarily on the ways in which children's memory reports are impacted by questioning in formal (e.g., interviews with police, social workers, and lawyers) and informal (e.g., conversations with peers and family members) contexts. These contexts and their influence on the quantity and quality of children's recollections are explored here. Specifically, a description of how specific features of formal interviews can undermine the accuracy of children's remembering is provided first. Each description is accompanied by a summary of the existing empirical support. Next, parallel consideration is given to informal conversations and their impact on children's narratives. To illustrate the relevance of this work to forensic settings, descriptions of each interview context are interspersed with material from well-known cases in which children have served as witnesses.

The Influence of Formal Interviews

A great deal of research including, case studies (Garven, Wood, Malpass, & Shaw, 1998), laboratory investigations (Poole & White, 1991), and field studies (Cederborg, Orbach, Sternberg, & Lamb, 2000) reveal that some modes of formal interviewing by forensic practitioners lead to fuller, more accurate recall, whereas other approaches lead to a greater number of inaccuracies, especially among younger children. Here, the organizational model of

Bruck and colleagues (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006) is adopted to review the modes of questioning that may contribute to children's recall of inaccurate information. These include, but are not limited to, interviewers' (a) reliance on close-ended versus open-ended questions, (b) repetition of close-ended questions within and across interviews, (c) use of guided imagery, (d) alteration of the emotional tone of the interview, (e) induction of stereotypes, and (f) use of multiple suggestive techniques.

Specific versus Open-Ended Questions. In addition to encountering false information between their experiences and later interviews, children can also be explicitly provided with inaccurate information through interviewers' use of specific, close-ended (e.g., "Did he take your clothes off") or force choice questions (e.g., "Did he leave your shirt on or take your shirt off?") rather than open-ended probes (e.g., "Tell me about what happened."). The detrimental impact of close-ended questions is likely due, in part, to the power imbalance that exists between children and interviewers. That is, children likely respect formal questioners and recognize them as truthful, credible sources of information. Children, as a result, may often produce answers that are consistent with the false information implied by interviewers' specific questions, rather providing answers that are reflective of their own understanding of an experienced event or indicating that they do not know.

Consider an early study by Peterson and Bell (1996) as an illustration of this effect. In this study, children between 2- and 13-years-old were questioned about a recent traumatic injury that required medical attention with both open-ended (e.g., "Tell me what happened when you hurt yourself.") and close-ended (e.g., "Did you cry" and "Did you bleed?") questions after delays of a few days and 6-months. Across both delay intervals, less than 10% of the errors made by children were obtained with the use of open-ended questions; whereas, upwards of 41% of the

errors were made in response to close-ended probes. Children's impaired performance in response to close-ended questioning characterized all age groups (Peterson & Bell, 1996), highlighting the powerful influence of the types of questions used during formal interviews on the accuracy of children's memory.

Repeated Specific Questions. Another mode of questioning through which the accuracy of children's remembering is compromised involves the use of repeated close-ended questions. The harmful influence of repeated close-ended questioning on the accuracy of children's memory reports is likely attributable to the inferences that children make about repeated open- and close-ended probes. The repetition of open-ended questions is common in everyday conversations and is likely interpreted by children as bid to repeat their original stories; in contrast, the repetition of close-ended questions signals to children an implicit appeal for a different response (Poole & White, 1993). Therefore, although repeated questioning can provide opportunities for rehearsal and the recollection of important information not already mentioned, the most accurate event-related details are likely found in children's initial, freely recalled narratives of past events.

For example, in an investigation by Memon and Vartoukian (1996), 5- to 7-year-old children witnessed a staged disagreement between two actors and were immediately interviewed about their experiences. Findings indicated that the repetition of open-ended questions (e.g. "Tell me as much as you can remember about what happened in class this morning.") within the immediate interview had no detrimental effects on children's remembering. In fact, children increased their production of event-related information without including more inaccuracies in their responses; however, the same was not the case for recall elicited with repeated close-ended questions (e.g., "So while the man was playing, did you hear someone knocking at the door?").

Children, regardless of age, were more likely to produce false narratives in responses to repeated bids for task-related information in the form of close-ended probes (Memon & Vartoukian, 1996).

Parallel results have also been observed for questioning that is repeated *across* multiple interviews, as highlighted in a series of investigations carried out by Poole and White (1991; 1993). In these studies, 4-, 6-, and 8-year-old children, as well as adults, witnessed a staged disagreement and were questioned with repeated probes after an immediate, 1-week, and 2-year delay. Consistent with the results of Memon & Vartoukian (1996), children produced less information but were as accurate as adults when answering repeated open-ended questions about their experiences. The youngest children, however, were more likely to change their responses and recall incorrect information when interviewed with repeated close-ended questions (e.g. "Did the man hurt Melanie?") both within and across the immediate and 1-week interviews (Poole & White, 1991). After a 2-year delay, the youngest children were also more likely to provide speculative answers to questions that cannot be known (i.e., "What did the man do for a living? What was his job?"), as well as to include fewer uncertainty qualifiers in their descriptions of events (e.g., "I think that…" or "I am not sure but…") (Poole and White, 1993).

Guided Imagery. False information need not be explicitly introduced through the use of specific questions for an interview to be suggestive. Merely asking children to think about what they might have seen or done has also been demonstrated to lead to the production of inaccurate narratives. The negative impact of guided imagery can be explained, in part, by children's developing source monitoring skills (i.e., their ability to distinguish between two or more sources of information in memory in order to accurately recall an event). Basic research demonstrates that children as old as nine-years-of-age have difficulty in discriminating between actions that

they have carried out from those they have merely imaged (Lindsay & Johnson, 1987). Similar results have been found for children's ability to distinguish actions that they have witnessed from those they only imagined to be performed by others (Lindsay, Johnson, & Kwon, 1991). As such, inducing children to imagine what they might have done or witnessed has the potential to increase the likelihood of inaccurate recall by children.

Ceci and colleagues (1994) illustrated this phenomenon by asking 3- to 6-year-old children to recall both authentic events nominated by parents (e.g., birthday parties, trip to Disneyworld, minor injuries, and birth of siblings) and fictitious events contrived by experimenters (i.e., getting a hand stuck in a mousetrap and going on a hot air balloon ride with classmates). Over the course of 7 to 10 interviews, children were instructed to "think real hard" about these events, and by the final interview, a striking 36% of younger children and 32% of older children assented to the false events. Descriptions of false events were rich in detail, as evident in the following narrative (Ceci, Hufman, Smith, & Loftus, 1994, p. 399):

> "My brother Colin was trying to get Blowtorch (an action figure) from me, and I wouldn't let him take it from me, so he pushed me into the wood pile where the mousetrap was. And then my finger got caught in it. And then we went to the hospital, and my mommy, daddy, and Colin drove me there, to the hospital in our van, because it was far away. And the doctor put a bandage on this finger."

In fact, children's recollections were so convincingly elaborative that psychiatrists, psychologists, law enforcement officials, and social workers were unable to identify them as false. That is, Ceci et al. (1994) showed professionals videos of children reporting both the fictitious and real events. After watching each video, professionals rated their confidence that children had actually experienced events on a 7-point scale. Analyses of professionals' ratings indicated that there were as many professionals who were reliably worse than chance at identifying which events were real as there were professionals at or above chance.

Emotional Tone of Interview. In addition to employing guided imagery, interviewers can also implicitly influence the accuracy of children's remembering by altering the emotional tone of the interview. The emotional tone of an interview, for example, may be altered through the provision of support that is not contingent on the types of responses that children provide. As Saywitz and colleagues (2019) describe, high support likely communicates to children that they are cared for, which may reduce children's perceptions of the hierarchy of power, decrease their expectations of interviewers' negative reactions to disagreement, encourage different viewpoints, thereby lead to more accurate recall by children. Unsupportive behaviors, on the other hand, may inhibit children from reporting their experiences, promote denial, or foster the unwavering acceptance of interviewers' suggestions by children (Saywitz, Wells, Larson, & Hobbs, 2019).

Empirical work by Almerigogna and colleagues (2008) demonstrates the effect of interviewer support on children's memory reports. In their study, children between the ages of 8- and 11-years old watched a movie clip and were subsequently questioned in either a supportive (e.g., interviewer was friendly and positioned towards the child with an open body posture) or unsupportive (e.g., interviewer was stern and was positioned away from the child with her legs crossed and arms folded) manner. During the interview, children were asked both specific (e.g. "Was there anything on the table?") and misleading (e.g. "Were there eggs on the table?") questions. Results indicated that, in response to the misleading questions, children interviewed in an unsupportive manner were more likely to provide inaccurate answers than children questioned in a supportive manner (Almerigogna, Ost, Bull, & Akehurst, 2008). The importance of non-contingent interviewer support for the accuracy of children's remembering has also been revealed in a recent systematic review of 15 studies with children ages 3- to 14-years-old (Saywitz et al., 2019).

Stereotypes. Another mode of questioning that impacts the accuracy of children's memory reports involves the induction of stereotypes. Stereotypes refer to naïve theories about personal characteristics and likely influence what children come to remember and report about their experiences through the organizational framework that they provide. That is, stereotypes likely structure children's experiences by directing their attention to expectancies in the environment, as well as by guiding children in their interpretation of experienced events. In this way, the induction of stereotypes may unknowingly shape children's recollections by encouraging them to produce false narratives or supplement their recall with inaccurate, but stereotype-consistent information (Leichtman & Ceci, 1995).

The damaging influence of the induction of stereotypes on the accuracy of children's remembering can be observed in the work of Leichtman and Ceci (1995). In their study, one half of the preschool aged children were presented with stories on a number of occasions that depicted an unknown individual, Sam Stone, as a "clumsy" and "bumbling" person. Subsequently, Sam Stone visited children's classrooms during story time. The visit was accident-free and consisted of Sam Stone being introduced to the children, commenting on the story, walking around the classroom and departing with a wave. Following his visit, children were interviewed on 4 separate occasions with questions that were either neutral (e.g., "Remember the day that Sam Stone visited your school? Well, I wasn't there that day and I'd like you to tell me everything that happened when he visited.") or suggestive (e.g., "When Sam Stone got the bear dirty, did he do it on purpose or was it an accident?" and "Was Sam Stone happy or sad that he got the bear dirty?") questions.

In a final neutral interview approximately 10 weeks later, 37% percent of the youngest children exposed to the stereotype reported that Sam Stone had been responsible for the

misdeeds. Suggestive questioning exacerbated the effect of misinformation on the accuracy of children's reports, such that 46% of the youngest children and 30% of the oldest children who had been probed with misleading questions spontaneously recalled that Sam Stone had carried out one or both of the misdeeds. Children's false narratives were often strikingly rich in perceptual embellishments, with one child even recalling that he or she saw Sam Stone soaking the teddy bear in water before scribbling on it with a crayon. The influential role of stereotypes is further revealed in experimental studies that introduce stereotypes within the interview itself (Lepore & Sesco, 1994).

Multiple Suggestive Techniques. The majority of research reviewed here has focused on the effect of a single suggestive interview technique on the accuracy of children's remembering. Bruck and colleagues, however, propose that a number of techniques can be combined in one interview as a result of *interviewer bias* (e.g., Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). Specifically, they argue that the number of suggestive techniques employed in a formal interview varies as a function of the degree of interviewer bias. Interviewers who hold strong preconceived beliefs about alleged events may shape their questioning, although not always deliberately, to maximize disclosures that are aligned with their previously held beliefs. In this way, biased interviewers likely use multiple suggestive techniques in order to gather information or evidence that corroborates, rather than negates, their personal hypotheses about what did or did not occur. The use of multiple suggestive techniques, in turn, is likely to have larger detrimental effects on the accuracy of children's remembering than the effects documented in studies where only one suggestive technique is used.

The effect of multiple suggestive techniques cannot only observed in Leichtman and Ceci's (1995) previously described study (i.e., suggestive questioning exacerbated the effect of

stereotype induction on the accuracy of children's reports), but also in more recent work by Garven and colleagues (Garven, Wood, & Malpass, 2000). In this study, 3- to 6-year-old children attended a special story time led by "Manny Morales" and were interviewed about their experiences one week later. Half of the children were interviewed with multiple suggestive techniques (e.g., "I want to ask you some questions about the other day when Manny Morales came and read you *The Hunchback of Notre Dame*. He had on a silly hat didn't he? Well, I already talked to the big kids and they said that Manny did some bad things. I want to see if you have a good memory like they did. Are you smart enough to remember? Good, because I really need your help."), whereas the remainder were interviewed with suggestive questions alone (e.g., "I want to ask you about the other day when Manny Morales came and read you *The Hunchback of Notre Dame.* He had a silly hat didn't he?") . All children were also asked eight misleading questions about things that Manny did not do.

The accuracy of children's responses to the misleading probes differed as a result of the questioning that they received. Specifically, children interviewed with multiple suggestive techniques made more false allegations against Manny Morales than children interviewed with suggestive questions alone (i.e., 58% vs. 17%), regardless of child age. Strikingly, allegations were made in response to misleading questions involving Manny's misdeeds (e.g., "Did Manny break a toy?" and "Did Manny steal a pen from the teachers' desk?"), bodily touch (e.g., "Did Manny put a sticker on your knee?"), and secrecy (e.g., "Did Manny tell you a secret and tell you not to tell anyone?"). Furthermore, children exposed to multiple suggestive techniques became more acquiescent (i.e., replied "yes" to misleading questions) in the second half of the interview, suggesting that the use of multiple misleading approaches can have a cumulative effect as an interview proceeds (Garven, Wood, & Malpass, 2000).

Formal Interview Case Study. The negative influence of suggestive formal interviews on the accuracy of children's memory reports can be observed in historical trials involving children as witnesses. For example, in the 1980's a nursery school teacher, Kelly Michaels, was indicated for and subsequently cleared of 235 counts of sexual offenses against children. Fifty-one children from the nursery school made accusations that included being forced to lick peanut butter off genitals, penetration with foreign objects, and being forced to eat cake made from human excrements; however, the interview excerpts below demonstrate that suggestive interviewing unfavorably impacted children's recall of the alleged abuse (Ceci & Bruck, 1995, p. 280):

> **Interviewer**: When Kelly kissed you, did she ever put her tongue in your mouth?
> **Child**: No.
> **Interviewer**: Did she ever make you put her tongue in her mouth?
> **Child**: No.
> **Interviewer**: Which of the kids had to kiss her vagina?
> **Child**: What's this?
> **Interviewer**: No that's my toy, my radio box. Which kids had to kiss her vagina?
> **Child**: Me.

Summary. Empirical investigations of the formal interview context demonstrate that the accuracy of children's remembering can be seriously undermined when interviewers, (a) rely on close-ended versus open-ended questions (Peterson & Bell, 1996), (b) repeat close-ended questions within and across interviews (Memon & Vartoukian, 1996; Poole & White, 1991; Poole & White, 1993), (c) employ guided imagery (Ceci, Hufman, Smith, & Loftus, 1994), (d) alter the emotional tone of the interview (Almerigogna et al., 2007; Saywtiz et al., 2019), (e) induce stereotypes (Leichtman & Ceci, 1995), and (f) use multiple suggestive techniques (Leichtman & Ceci, 1995; Garven, Wood, & Malpass, 2000). Researchers propose that the use of these detrimental approaches can be motivated by interviewer bias and even argue that interviewer bias is a greater contributor to children's inaccurate memory reports than any

limitations inherent in young children's cognitive abilities (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). The accuracy of children's remembering, therefore, largely depends on the skills of their formal interviewers. That is, greater confidence can be placed in children's memory reports when they are elicited in a neutral manner than when they are obtained through the use of suggestive formal interview approaches.

The Influence of Informal 'Interviews'

A small, but growing number of researchers have argued that the notion of an interview extends beyond the formal, forensic setting to include everyday informal conversations with social others (Prinicipe & Ceci, 2002; Principe, DiPuppo, & Gammel, 2013). This movement is informed by social theories of remembering that maintain that memory sharing conversations between children and social others (e.g., friends and family members) are a typical and frequent part of children's everyday social interactions (Reese & Fivush, 2008). Children, as part of the exchanges, encounter others' versions of past experience, which may or may not be similar to their own. One result of these conversations, given the constructive nature of memory (Bartlett, 1932), is that event-related details provided by children's conversational partners may inadvertently inform children's own reports. Empirical support for the effect of socially encountered suggestions on the accuracy of children's remembering is reviewed in detail below.

Peer Rumor. The detrimental impact of informal conversations on children's memory reports has been consistently revealed in a series of studies on peer rumor (see Principe & Schnidewolf, 2012 for an extensive review). Consider an experimental study by Principe and Ceci (2002) as an illustration of this effect. In their investigation, three groups of preschool aged children were assigned to participate in a staged archeological dig with "Dr. Diggs". During the experience, some of the children observed two additional, salient activities (i.e., Dr. Diggs

accidently destroyed a treasure map and broke a rock that contained a secret). Another group of children did not witness the extra activities, but were classmates of those who had (Classmate Condition). It was anticipated that these children would learn about the activities through rumor spreading conversations with their peers. The remaining children did not witness the extra activities and were not classmates of those who had observed them (Control Condition). Over the course of the following three weeks, children were interviewed on three occasions about the staged event with questions that were either neutral (e.g., "Remember the day that Dr. Diggs visited your classroom? Well, I wasn't there that day, and I'd like you to tell me everything that happened.") or suggestive (e.g., "How did Dr. Diggs break the rock, did he step on it or did he drop it?") questions.

All children were interviewed a fourth and final time in a neural manner, and during this interview their reports differed as a function of their exposure to information about the extra events. Children in the Classmate Condition recalled a higher proportion of the extra events than did children in the Control Condition. This was despite the fact that neither group of children had actually witnessed the added activities, indicating that children's memory was influenced by conversations with the children who had experienced these events. Furthermore, the effect of peer rumor was amplified when children were exposed to suggestive questioning. Recall of the extra activities by children who had only heard about the events became indistinguishable from the recall of children who had actually witnessed the activities. In fact, children's false narratives were characterized by more elaborative detail than narratives that were true. For example, one child who had only heard about the activities reported (Principe & Ceci, 2002, p. 18):

> "Dr. Diggs walked away and then we just got in big trouble… all my friends and he had to be punished for a whole weekend… The ladies in the cafeteria cleaned it because he didn't have a mop… They took him away and put him in jail."

The robustness of these findings is revealed in subsequent work in which Principe and her colleagues have similarly found that conversations with peers who have overheard false information about a shared experience (Principe, Kanaya, Ceci, & Singh, 2006; Principe, Tinguely, & Dobkowski, 2007; Principe, Daley, & Kauth, 2010; Principe, Haines, Adkins, & Guiliano, 2010; Principe, Cherson, DiPuppo, & Schindewolf, 2012) or generated false inferences about an experience (Principe, Guiliano, & Root, 2008) can also lead children to inaccurately recall features of an event experienced solely by their peers. Strikingly the effects of peer rumor on children's remembering are enduring (Principe et al., 2012) and even more powerful than those documented in studies involving children's exposure to suggestions within formal interviews (Peterson & Bell, 1996; Memon & Vartoukian, 1996; Poole & White, 1991; Poole & White, 1993; Leichtman & Ceci, 1995; Ceci et al. 1994). This points to peer rumor as a particularly potent source of suggestibility among young children.

Case Study. The impact of peer rumor on the accuracy of children's remembering can be observed in historical trials involving children's testimony. For example, in addition to being influenced by suggestive questioning by interviewers, children's narratives within the Kelly Michaels case previously described were also negatively influenced by everyday conversations with peers. Consider the following brief excerpt as an illustration (Ceci & Bruck, 1995, p. 150):

> **Interviewer**: Do you know that [Kelly] did?
> **Child**: She wasn't supposed to touch somebody's body. If you want to touch somebody, touch your own.
> **Interviewer**: How do you know about her touching private parts? Is that something that you saw or heard?
> **Child**: Max told me

Parent-Child Conversations. Notably, peers are only part of the conversational milieu in which children are embedded. Parents are likely children's first and most frequent conversational partner during early childhood and may sometimes undermine the accuracy of

children's memory through the unwitting provision of false information. Parents' suggestions, in fact, are likely to be even more influential than suggestions made by other children or peers. For example, Ceci and colleagues (1987) modified their previously described study on the "misinformation effect" by having either an adult or seven-year-old child present children with a piece of misinformation about a short story (i.e., that Loren had a *headache* from eating her *cereal* too fast, when in reality Loren had a *stomachache* from eating her *eggs* too fast.). After a delay of two days, children were again presented with pictures and asked to identify the two that actually appeared in the stories. Children exposed to false information by an adult were less accurate than children exposed to misinformation by another child in their identification of these photos (Ceci, Ross, & Tolgia, 1987).

Despite the potential that conversations with parents have to influence children's remembering, limited research as focused on this phenomenon (see Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017; Klemfuss, Rush, & Quas, 2016 for exceptions). Empirical work on this topic demonstrates that although parent-child conversations do not immediately influence the accuracy of children's remembering (Klemfuss, Rush, & Quas, 2016), parents' suggestions do impact children's reports after a significant delay. Consider a series of studies by Principe and colleagues (2013; 2017) as an illustration of this long-term effect. In these investigations, research assistants asked parents to have a conversation with their 3- to 5-year-old children about an earlier staged event. The event was experienced only by children and consisted of a magic show during which the magician, "Magic Mumfry" failed to pull a rabbit out of his hat. Prior to having a conversation with their children, some parents received false information about the experience (i.e., that Magic Mumfry's rabbit had gotten loose in the school). This suggestion permeated children's independent memory reports 1-week later, such that children

whose parents were misled were more likely to explain in rich detail that they had experienced the suggested activity when compared to children whose parents were not misinformed (Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017).

Moreover, Principe and colleagues have drawn from work on the development of children's memory to propose that parents' conversational style is likely associated with the accuracy of children's memory reports. They argue that highly elaborative conversations – particularly those when parents develop false beliefs about their children's experiences, as the consequence of misremembering a shared event or encountering inaccurate information about a non-shared event – are especially likely to lead to reports of false information by children. That is, parents' inaccurate beliefs may impact their questioning during conversations in a manner similar to that of biased interviewers. Misinformed parents, like biased interviewers, may inadvertently structure their questioning to maximize disclosure that are consistent with their previously held beliefs. High-elaborative parents may be especially likely to ask questions and make statements that are consistent with their false beliefs because of their tendency to contribute new, detailed information to past event conversations. Thus, children of high-elaborative parents may be particularly susceptible to adopting their parents' suggestions both within parent-child conversations and later independent narratives of events (Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017).

Empirical support for the influence of parents' conversational style on children's remembering can also be found in Principe and colleagues' (2013; 2017) experiments where the influence of parents' suggestions on the accuracy of children's reports varied as a function of parents' use of elaboration. Parents exposed to false information made more statements consistent with the suggestion if they were high as opposed to low elaborative in their

conversational style. For example, a high-elaborative parent who had been exposed to false information posed the following series of questions to her child (Principe, DiPuppo, & Gammel, 2013, p. 267):

> "Do you remember the magician's rabbit? The one he tried to pull out of a hat, his top hat, like at Olivia's birthday part, remember that? Where he reached in, said hocus pocus, something like that, and pulled out that white rabbit? That big fat one with the floppy ears. But at your school, I heard that rabbit wasn't in the hat. The magician couldn't find the rabbit. Do you know what happened to it? Did it get loose in your school? Did it hop around? I bet it wouldn't be hard for it to hop out of that hat. Did you guys catch it and feed it some carrots? Some lettuce? Or maybe your peanut butter and jelly?"

A low-elaborative parent, in contrast, asked her child, "Do you remember the trick where the magician tried to pull the rabbit out of his hat? Did it get loose? Did it? Do you remember? Tell me if you remember" (Principe, DiPuppo, & Gammel, 2013, p. 268). This stark variation in parents' conversational style was associated with differences in children's memory reports. Children of high-elaborative parents reported more accurate and unique details about activities experienced during the magic show both within conversations and the later interview, in comparison with children with low-elaborative parents. However, a high-elaborative style was also associated with an increased incidence of children falsely reporting the suggested activity in rich detail (i.e., 80% of children with high-elaborative parents recalled the loose rabbit vs. 40% of children with low-elaborative parents) (Principe, DiPuppo, & Gammel, 2013).

Case Study. Support for the influence of parent-child conversation on the accuracy of children's reports can be also seen in examples from historical trials, including one of the most expensive criminal trials in American history – the McMartin Preschool Trial. This case began in 1983 when a mother alleged that a schoolteacher had sexually abused her 3-year-old child as well as other students. In response to these accusations, police officials sent letters to more than

200 families encouraging parent-child discussion of the alleged sexual misconduct. An excerpt from this letter is provided below:

> "Records indicate that your child has been or is currently a student at the preschool. We are asking your assistance in continuing this investigation. Please question your child to see if he or she has been a witness to any crime or if he or she has been a victim. Our investigation indicates that possible criminal acts include: oral sex, folding of genitals, buttock or chest area, and sodomy, possibly committed under the pretense of 'taking the child's temperature.' Also, photos may have been taken of children without their clothing. Any information from your child regarding having ever observed Ray Buckey leave a classroom alone with a child during any nap period, or if they ever observed Ray Buckey tie up a child, is important."

Parent-child conversations that resulted from this letter led children to produce stories detailing bizarre experiences. For example, children told their parents that in addition to being sexually abused, they saw witches fly, traveled in hot-air balloons, were taken through underground tunnels, and saw animal sacrifices after which they were made to drink the animals' blood. After three years of testimony and nine weeks of deliberation by the jury, these accusations were deemed unfounded and resulted in the dismissal of all charges. Recent revelations support this dismissal and expose parent-child conversations as one factor that led children to produce false accounts of events. Specifically, one of the alleged victims, Kyle Zirpolo, published a recantation in the Lost Angeles Times citing conversations with his parents as a source of his errant testimony. He writes (Zirpolo, 2005):

> "My parents asked if the teachers took pictures and played games with us. Games like 'Naked Movie Star.' I remember my mom asking me. She would ask if they sang the song, and I didn't know what she was talking about, so she would sing something like, "Who are you, you're a naked movie star." I'm pretty sure that was the first time I ever heard that: from my mom. After she asked me a hundred times, I probably said yeah, I did play that game. My parents were very encouraging when I said that things happened. It was almost like saying that happened was going to help get these people in jail and stop them from what they were trying to do to kids. Also, there were so many kids saying all these things happened that you didn't want to be the one who said nothing. You wouldn't be believed if you said that."

The influence of parents on children's memory reports is not limited to historical trials. To illustrate, Korkman and colleagues (2014) analyzed a sample of recorded conversations between parents and their children that had been delivered to police as evidence for alleged physical and sexual abuse. Analyses of the structure and content of the conversations showed that the parents' techniques when questioning their children were quite suggestive and consistent with practices used by biased interviewers (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). Parents relied mostly on suggestive, specific questions and rarely provided children with the opportunity to relay their own accounts of alleged events. In approximately 70% of the conversations, all new information about the allegation was introduced by parents, rather than by children (Korkman, Juusola, & Santtila, 2014).

Summary. Recent research demonstrates that, in addition to formal forensic interviews, informal conversations with social others have the potential to influence what children come to remember and report about their experiences. That is, peer rumors (Principe & Ceci, 2002), as well as parent-child conversations (Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017; Klemfuss, Rush, & Quas, 2016) can lead to inaccuracies in children's reports, particularly when conversational partners have different understanding of the events in question and talk about them in rich, elaborative detail. Strikingly, social influences on the accuracy of children's memory reports are likely more powerful (Principe, Cherson, Dipuppo, & Schindewolf, 2012) than the effect of suggestive modes of formal interviewing (Peterson & Bell, 1996; Memon & Vartoukian, 1996; Poole & White, 1991; Poole & White, 1993; Leichtman & Ceci, 1995; Ceci et al., 1994), as reflected in the highly publicized trial of Kelly Michaels, as well as the McMartin Preschool Trial.

THE CURRENT STUDY

Research on children's memory for events demonstrates that young children can be quite skilled at remembering and reporting information about their past experiences (Baker-Ward et al., 1993); however, children of all ages are susceptible to including inaccurate information in their reports (Ornstein et al., 1998). Empirical work on child suggestibility indicates that this is particularly true when children are questioned in a suggestive manner, in both formal (Peterson & Bell, 1996; Memon & Vartoukian, 1996; Poole & White, 1991; Poole & White, 1993; Leichtman & Ceci, 1995; Ceci et al., 1994) and "informal" (Principe & Ceci, 2002; Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017; Klemfuss, Rush, & Quas, 2016) contexts. The present study builds on these two separate, but related bodies of empirical work (i.e., research on children's memory for events and child suggestibility) by examining if children's memory for an event is influenced by suggestions across formal (i.e., interviews with police officers, social workers, and lawyers) and "informal" interview (i.e., conversations with parents) contexts.

There is currently no empirical investigation of the joint impact of interviewers' and parents' suggestions on the accuracy of children's memory reports. In order to examine this issue in the present study, preschoolers participated in a staged event consisting of an archeological dig with "Dr. Diggs" (Principe & Ceci, 2002). Children then talked with their parents about their experiences after the event. Prior to conversations with their children, however, half of the parents were provided with minor pieces of false information (Suggestive Condition). The remaining parents did not receive this information (Neutral Condition). Children were then repeatedly interviewed in either a suggestive (Suggestive Condition) or neutral (Neutral Condition) manner.

I am ultimately interested in determining if parents' suggestions influence children's remembering, as well as if the effect of parents' suggestions on children's reports is amplified by suggestive questioning. It is anticipated that that encountering misinformation across settings may lead children to accept the false beliefs of both parents and interviewers. This may cause children to report information that is consistent with the suggestions made by interviewers and parents, particularly when the staged event is discussed by parents in an elaborative, detailed manner. Specific aims and hypotheses are provided below:

Aim 1: To examine the impact of parents' suggestions on parents' and children's contributions to the parent-child conversation.

Hypothesis 1: Consistent with prior work by Principe and colleagues (2013), it is hypothesized that parents' suggestions will negatively influence the accuracy of children's reports.

Aim 2: To explore the joint influence of parents' and interviewers' suggestions on children's memory reports during the final interview.

Hypothesis 2: It is hypothesized that the effect of parents' suggestions on children's memory will be amplified by suggestive interviewing, such that the accuracy of children's reports in the final interview will be the most compromised when children are exposed to suggestions by both parents and interviewers.

Aim 3: To examine the joint influence of parents' and interviewers' suggestions on children's memory reports across interviews.

Hypothesis 2: It is hypothesized that the effect of parents' and interviewers' suggestions on children's memory will become more pronounced over time.

Aim 4: To characterize the association between parents' conversational style and the children's memory reports in the final interview.

Hypothesis 3: Consistent with previous research on the development of children's memory (Fivush & Fromhoff, 1987) and parents as a contaminant of children's remembering (Principe, DiPuppo, & Gammel, 2013; Principe et al., 2017), It is hypothesized that parents' use of a high-elaborative style during conversations about the staged event will be positively associated with the amount of information recalled by children; however, it is anticipated that a highly elaborative style will also be positively associated with children's inaccurate recall among children whose parents are in the Suggestive Condition.

METHODS

Sample

A total of 73 children and their parents participated in the present study. For this study, parent-child dyads were recruited through informational packets distributed in five preschools (13 classrooms) in the Durham and Chapel Hill-Carrboro, North Carolina areas. Informational packets included a letter with a description of the research, instructions for completing the attached consent form, and a brief demographic questionnaire. The recruitment letter is provided in **Appendix A**.

There were no exclusionary criteria, such that all children enrolled in preschool classes at participating schools were invited to participate in this study. The mean age of children was 4.36 years (SD=.60 years); 63% of the children were male. The mean age of parents was 39.48 years (SD=5.33 years); 82% were mothers. Parents self-identified as 8% Asian or Asian American, 4% African American, 4% Latinx, 81% White, and 3% Mixed. Four families were excluded from analyses because children were absent on the day of the staged event (i.e., archeological dig).

Project Design

A diagram of the project design[1] is presented in **Figure 1**. The participating children took part in a staged archeological dig at their preschools, and in the week following this experience their parents talked with them about the event. Half of the parents were provided with minor pieces of incorrect information prior to their conversations (Suggestive Condition). The remaining parents did not receive this additional misleading information (Neutral Condition). All conversations were recorded for analysis. The children were subsequently interviewed about their experience after 1- and 2-week delays in either a neutral or suggestive manner. All children received a final neutral interview after a 3-week delay. Dyads received a $20 gift card and selection of three children's books for their participation.

Procedure

Staged Event. The participating children took part in the fabricated archeological dig in groups ranging in size from 4 to 6 children. Using procedures adapted from those developed by Principe and Ceci's (2002), a fictitious archeologist, Dr. Diggs, assisted the children in using plastic tools to retrieve pretend artifacts (e.g., coins, jewels, dinosaur bones) from blocks

[1] Feedback from parents (see **Appendix B**), an initial pilot study (see **Appendix C**), and a follow up pilot study (see **Appendix D**) informed the project design.

constructed from mortar mix and play sand. Each of the recovered artifacts were labeled, including two target artifacts – a treasure map and dinosaur egg. Specifically, Dr. Diggs pointed out how special these two artifacts are and warned the children to (a) not spill anything on the map because the ink might smear and render it illegible, and (b) not drop the dinosaur because it might crack. Following the archeological dig, the children helped to place all artifacts in a pretend museum. A script for the staged event is included in **Appendix E**.

Parent-Child Conversation. Approximately 3 days after the staged event, each parent received a letter asking him or her to question his or her child about the archeological dig. Each letter contained a brief description of activities. Half of the parents (Suggestive Condition) were also provided with minor pieces of misinformation about the target events (e.g., that Dr. Diggs is clumsy and may have spilled something on a treasure map as well as dropped a dinosaur egg, when in reality she did not do so). In contrast, parents in the Neutral Condition were not provided with this suggestion. All conversations were recorded with digital voice recorders provided to families. The parent letter is included in **Appendix F**.

Memory Interviews. After 1- and 2-week delays, research assistants used a hierarchically structured protocol to interview children about the staged event in either a neutral or suggestive manner. Then, after a 3-week delay, unfamiliar research assistants conducted a final neutral interview with all children. These interviews were video recorded. A script for the interview is included in **Appendix G**.

Debriefing. At the conclusion of the study, parents in the Suggestive Condition received a letter that outlined the purpose of the study and the procedures used. All questions were directed to the principal investigators of this study. The debriefing letter is included in **Appendix H**.

Coding

Parent-Child Conversation. Each parent-child conversation was transcribed verbatim from audio recordings. The resulting transcripts were coded for the parents' conversational style and children's unique memory contributions. Furthermore, the parents' false descriptions of the target events, as well as the accuracy of children's memory reports were coded.

Parents' conversational style was coded on the basis of a structural-functional coding scheme developed by Reese and colleagues (1993). Each parental utterance consisting of a subject-verb proposition was coded for the presence or absence of open-ended questions, yes/no elaborative questions, and elaborative statements. An *elaborative score* was calculated by summing the occurrence of each type of elaborative utterance (i.e., open-ended questions, yes/no elaborative questions, and elaborative statements). Elaborations that include information about the target events were noted as indicators of parents' provision of misinformation to their children (Principe, DiPuppo, & Gammel, 2012).

Children's memory responses within parent-child conversations were similarly coded on the basis of the coding scheme developed by Reese and colleagues (1993). Each child utterance consisting of a subject-verb proposition was coded for the presence or absence of unique information not previously mentioned by the parent. For each child, a *memory response score* was calculated by summing the number of unique memory contributions made by the child. Moreover, the children's memory responses were also be characterized with Principe and colleague's (2013) coding scheme. The *number of dig-related features* recalled by children (out of a possible 27 features) was summed. Examples of features include the clothing that children wore (e.g., vest, goggles, hat), the tools children used (e.g., hammer, rake, magnifying glass), and the artifacts that children found (e.g., dinosaur bones, shells, gems). Children's utterances about

the target features and events were also summed and coded as *accurate* (e.g., "Dr. Diggs just held the dinosaur egg), *inaccurate* (e.g., "Dr. Diggs dropped the dinosaur egg.) or *ambiguous* (e.g., "It didn't crack because it is a dinosaur egg."). Furthermore, children's responses to parents' descriptions of the target events was coded as either *acquiescence* or *denial*. Instances of acquiescence necessitate children's inaccurate agreement with parents' questions or statements, whereas denials entail the accurate rejection of parents' misinformed contributions to the conversation.

Two research assistants coded 20% of the parent-child conversation transcripts. For each variable, Cohen's Kappa was calculated as an indicator of inter-rater reliability. Cohen's Kappa ranged from .85 for parents' elaborative score to .94 for the number of dig-related features recalled by children, indicating that inter-rater reliability was strong.

Memory Interviews. Child interviews were transcribed verbatim from video recordings. Each child utterance consisting of a subject-verb proposition was coded for unique memory information and accuracy (Principe et al., 2013). The *number of dig-related features* correctly recalled were summed as indicators of children's memory for the event. The *number of target events* incorrectly recalled (i.e., Dr. Diggs spilling something on a treasure map and/or dropping the dinosaur egg) was summed as an indicator of children's suggestibility. Furthermore, the accuracy of children's statements was characterized by utterances implying the occurrence of the target events. These statements were classified as *verbatim*, *constructive*, or *fantastical*. Verbatim statements repeat the false information in a literal manner (e.g., "Dr. Diggs dropped the dinosaur egg."), whereas constructive statements go beyond the literal information presented to children by suggestive parents and interviewers (e.g., "The dinosaur egg rolled out of the door

when Dr. Diggs dropped it."). Fantastic statements contained events that could not have occurred in reality (e.g., "A baby dinosaur crawled out of the egg when it accidently cracked.").

Two research assistants coded 20% of the interview transcripts. For each variable, Cohen's Kappa was calculated as an indicator of inter-rater reliability. Cohen's Kappa ranged from .90 for the number of target events incorrectly recalled to .95 for the number of dig-related features recalled by children, indicating that inter-rater reliability was strong.

RESULTS

Overview

In order to determine if parents' suggestions permeate their conversations with children, the impact of parent condition (i.e., Neutral vs. Suggestive) on parents' and children's contributions to the parent-child conversation is first examined (Aim 1). Second, consideration is given to children's memory performance during the final interview. Specifically, the joint influence of parent (i.e., Neutral vs. Suggestive) and interviewer (i.e., Neutral vs. Suggestive) condition on children's memory performance during the final interview is examined (Aim 2). Next, consideration is given to children's memory reports across interviews, such that the impact of (i.e., Neutral vs. Suggestive) and interviewer (i.e., Neutral vs. Suggestive) condition on children's memory reports is explored as a function of time (Aim 3). In order to determine if the ways in which parents discuss the past have implications for children's remembering, associations between parents' conversational style and children's memory performance within conversations and the final interview are then examined. These Aims resulted in hypotheses (outlined above) that were evaluated for the most part within the Analysis of Variance (ANOVA) framework. In an effort to counteract the problem of multiple comparisons, follow-up analyses were restricted to those that were pre-planned.

Preliminary Analyses

Prior to conducting the analyses necessary to explore the aims of the study, summarized above, children's recall of the target events across interviews was examined as a function of potential confounding variables As can be seen in left column of **Table 1**, the potential confounding variables included child gender, child age, child race, parent age, parent gender, parent race, the confederate who played Dr. Diggs, and the final interviewer. The results indicated that there was no association between children's memory performance across interviews and any of the potential confounding variables. Therefore, the data were collapsed over these variables for subsequent analysis.

Aim 1: Parent-Child Conversations

The first aim of the study was to characterize the impact of parent condition on parents' and children's contributions to the parent-child conversation. All parents were instructed to begin their conversations with children by making a general request (e.g., "Tell me about what happened during the archeological dig at your school."). Parents in the Suggestive Condition were also asked to follow up children's responses to their initial open-ended probe with specific questions about the target events. More specifically, they stated: "I heard that Dr. Diggs was clumsy. Tell me about how Dr. Diggs spilled something on a treasure map." Then, they added: "I also heard that Dr. Diggs dropped a dinosaur egg. Tell me about how Dr. Diggs dropped a dinosaur egg." Below, the impact of parent condition on parents' and children's contributions to their conversation about the archeological dig is examined.

Number of Parent Utterances. On average, the parents contributed 61.88 (SD=41.42) utterances about the archeological dig (e.g., "Did Dr. Diggs bring tools?") to their conversations with children. The average number of parent utterances about the staged event did not differ

between parents in the Suggestive and Neutral conditions, $t(64)=-.27$, $p=.80$. Parent condition, therefore, did not impact the overall "talkativeness" of parents.

Number of Parent Utterances about Target Events. The parents contributed an average of 8.20 (SD=10.55) utterances about the target events (i.e., subject-verb propositions implying that Dr. Diggs spilled something on the treasure map and dropped a dinosaur egg) to their conversations about the archeological dig. Specifically, parents in the Suggestive Condition made an average of 15.91 (SD=9.63) statements about the target events, whereas parents in the Neutral Condition did not contribute any utterances about the target event, $t(64)=-9.63$, $p<.001$. The parent condition manipulation was thus successful.

Number of Child Utterances. The children contributed an average of 51.06 (SD=36.28) utterances about the archeological dig (e.g., "I used special tools" or "I had a lot of fun with Dr. Diggs") when talking with their parents. The number of children's utterances about the staged event did not differ between children whose parents were in the Suggestive versus Neutral Conditions, $t(64)=-.01$, $p=.99$. From this, it can be concluded that parent condition did not influence the overall "talkativeness" of children.

Number of Features Recalled by Children. Children recalled an average of 6.37 (SD= 4.37) dig-related features in conversations with their parents. Examples of features include the clothing that the children wore (e.g., vest, goggles, hat), the tools that they used (e.g., hammer, rake, magnifying glass), and the artifacts that they found (e.g., dinosaur bones, shells, gems). Children's recall of features did not differ as the result of parent condition, $t(64)=.621$, $p=.54$, indicating that parents' suggestions did not impact children's overall memory for the staged event.

Accuracy of Children's Recall of the Target Events. The children's utterances about the target features (i.e., treasure map and dinosaur egg) were characterized as accurate (e.g., "Dr. Diggs just held the dinosaur egg."). Children's utterances about the target events were also characterized as inaccurate ("Dr. Diggs dropped the dinosaur egg.") or ambiguous ("It didn't crack because it is a dinosaur egg."). The children whose parents were in the Suggestive Condition in contrast to the Neutral Condition recalled a greater number of accurate information about the target features, $t(64)=-4.80$, $p<.001$, as well as ambiguous, $t(64)=-2.22$, $p<.03$, and inaccurate, $t(64)=-3.30$, $p<.01$, details about the target events. Specifically, children who had been misled by parents reported an average of 1.50 (SD=.74) accurate statements about the target features, whereas children in the Neutral condition did not report any information about the target features. Furthermore, children with parents in the Suggestive Condition reported an average of 1.67 (SD= 1.81) inaccurate and 3.39 (SD=6.17) ambiguous utterances about the target events, whereas children with parents in the Neutral Condition did not report any information about the target events. As such, parents' suggestions negatively impacted children's reports of the target events.

Aim 2: Children's Final Interview

Following conversations with their parents, the children were interviewed about their experiences 1- and 2-week after the archeological dig in either a neutral or suggestive manner, which was followed by a final neutral interview after a 3-week delay. The second aim of the study called for an evaluation of the children's memory for the Dr. Diggs experience at the final neutral interview. More specifically, the analyses examined the impact of parent *and* interviewer condition on the children's performance during this interview.

Number of Features Recalled by Children at the Final Interview. On average, children reported 7.77 (SD=4.90) out of a possible 27 features during the final interview. The results of a two-way ANOVA revealed that children's recall of features during the final interview did not differ as the result of parent condition ($F(1, 64)=.71$, $p=.41$), interviewer condition ($F(1, 64)=.01$, $p=.91$), or the interaction between parent and interviewer condition ($F(1, 64)=.30$, $p=.61$). Thus, parents' and interviewers' suggestions did not impact children's overall memory for the features of the archeological dig that they had experienced.

Children's Recall of the Target Events in the Final Interview. A total of 71% of the children who were exposed to suggestions by parents and/or interviewers recalled one or more of the target events in the final interview. On average across all conditions, the children recalled 0.92 (SD=.94) out of the two possible target events. The average number of events recalled by the children during the final interview, as a function of experimental condition, is presented in **Figure 2**. As can be seen, the effect of parent condition on the children's recall of the target events depended on interviewer condition, such that children whose parents were not misled recalled an average of 1.14 target events when they were interviewed in a suggestive rather than neutral manner; in contrast, they recalled 0 target events if they received neutral interviews at 1 and 2 weeks. Interviewer condition, in contrast, did not influence recall of target information by children who had been exposed to suggestions by parents. That is, recall among children who were interviewed in a suggestive and neutral manner did not differ if they had been misled by their parents. Consistent with these observations, the results of a two-way ANOVA indicated significant main effects of parent condition, $F(1, 64)=6.62$, $p<.05$, $\eta^2=.10$, and interview condition, $F(1, 64)=12.34$, $p<.01$, $\eta^2=.19$, as well as a significant interaction between parent and interview condition, $F(1, 64)=10.15$, $p<.01$, $\eta^2=.15$. To further examine these effects, *t*-tests

were carried out to compare the means of each of the three conditions in which children were exposed to suggestions with an hypothesized mean of 0 target events. Consistent with the results of the ANOVA, children's recall of the target events in each of these cells of the design differed from 0, *t*s (13-16) $\geq$ 4.95, *p*s $\leq$ .001. Therefore, it can be concluded that both parents' and interviewers' suggestions impacted the children's recall of the target event.

Children's Open-Ended Recall of the Target Events Given that spontaneity is often considered a marker of accuracy among legal professionals, the degree to which children reported the target information in response to open-ended versus close-ended questions (e.g., yes/no questions) was also examined. On average, across all conditions, .20 of the target activities were reported in the final interview in response to open-ended questions, whereas .80 of the target events were reported in response to close-ended questions. Results of a two-way ANOVA indicated that children's recall of target events in response to open-ended (versus close-ended) questions did not differ as the result of parent condition, $F(1, 64)=1.55$, $p=.22$, interviewer condition, $F(1, 64)=.83$, $p=.37$, or the interaction between parent and interviewer condition, $F(1, 64)=.59$, $p=.45$. Thus, experimental condition did not impact the children's open-ended recall of the target events.

Children's Recall of Details about the Target Events. Next, the number of details that the children provided about the target events was examined. The children reported an average of 2.25 (SD=2.55) these details during the final interview, and the performance of the children as a function of experimental condition is presented in **Figure 3**. As can be observed, the effect of parent condition on children's recall of details about the target events depended on interviewer condition, such that children whose parents were not misled recalled more details about the target events when they were interviewed in a suggestive versus neutral manner. In contrast,

interviewer condition did not impact recall of details about the target events by children who exposed to false information by parents. As such, recall among children who were interviewed in a suggestive and neutral manner did not differ if they had been provided with suggestions by parents. Aligned with this observation, the results of a two-way ANOVA revealed a significant main effect of interviewer condition, $F(1, 64)=6.04$, $p<.05$, $\eta^2=.09$, as well as a significant interaction between parent and interviewer condition $F(1, 64)=6.96$, $p<.05$, $\eta^2=.10$). To further examine these effects, *t*-tests were carried out to compare the means of each of the three conditions in which children were exposed to suggestions with an hypothesized mean of 0 details about the target events. Consistent with the results of the ANOVA, children's recall of details about the target events in each of these cells of the design differed from 0, *t*s (13-16) $\geq$ 3.39, *p*s $\leq$ .01. Suggestions by parents and interviewers, therefore, influenced the amount of details that the children provided about the target events.

Type of Details Recalled about the Target Events. Given that the children reported details about the target events, the type of details that they reported was examined. Specifically, their statements about the target events were classified as *verbatim*, *constructive*, or *fantastical*. Verbatim statements repeat the false information that had been provided in the suggestive conversations with parents and the suggestive interviewers in a literal manner (e.g., "Dr. Diggs spilled something on a treasure map."), whereas constructive statements go beyond the literal information presented to children by suggestive parents and interviewers (e.g., "Dr. Diggs spilled orange juice on the treasure map"). Fantastic statements contain events that could not have occurred in reality (e.g., "The dinosaur roared when it crawled out of the broken egg.").

The majority of details that the children provided about the target events were verbatim (M=.79, SD=1.12) and constructive (M=1.62, SD=1.64). Children recalled few fantastical details

about the target events (M=.18, SD=.55). Consideration, therefore, is only given to children's verbatim and constructive statements. The average number of verbatim and constructive statements produced by the children during the final interview is presented in **Figures 4**, and **5**, respectively, as a function of experimental condition. As can be observed in **Figures 4** and **5**, the effect of parent condition on children's production of verbatim and constructive statements depended on interviewer condition, similar to the pattern of recall of target events previously presented. Specifically, children whose parents were not misled recalled a greater number of verbatim and constructive statements when they were interviewed in a suggestive, rather than neutral, manner. Interviewer condition, on the other hand, did not impact recall of verbatim and constructive details among children who had been exposed to suggestions by parents.

Supporting this observation, the results of a two-way ANOVA for children's recall of verbatim details revealed a significant main effect of interviewer condition, $F(1, 64)=6.68$, $p<.05$, $\eta^2=.10$, as well as a significant interaction between parent and interviewer condition, $F(1, 64)=4.87$, $p<.05$, $\eta^2=.07$. To further examine these effects, *t*-tests were carried out to compare the means of each of the three conditions in which children were exposed to suggestions with an hypothesized mean of 0 verbatim statements. Consistent with the results of the ANOVA, children's reports of verbatim statements in each of these cells of the design differed from 0, *t*s $(13\text{-}16) \geq 3.20$, *p*s $\leq .05$. Similarly, the results of a two-way ANOVA for children's recall of constructive details also indicated a significant main effect of interviewer condition, $F(1, 64)=2.68$, $p<.10$, $\eta^2=.04$, as well as a significant interaction between parent and interviewer condition, $F(1, 64)=3.94$, $p<.05$, $\eta^2=.06$. Again, *t*-tests were carried out to compare the means of each of the three conditions in which children were exposed to suggestions with an hypothesized mean of 0 constructive statements. Consistent with the results of the ANOVA, children's recall

of constructive statements in each of these cells of the design differed from 0, *t*s (13-16) $\geq$ 2.59, *p*s $\leq$ .05. Thus, experimental condition impacted the children's recall of verbatim and constructive events.

Aim 3: Children's Interviews Across Time

Little research to date has examined the impact of suggestions on children's memory reports over time. Therefore, the third aim of this study called for an exploration of children's memory for the archeological dig across interviews, as a function of suggestions from parents and interviewers. Specifically, the analyses that follow examine the impact of parent and interviewer condition on children's memory performance across the first, second, and third interviews.

Children's Recall of Features Across Interviews. On average, the children recalled 8.25 (SD=4.53) features of the Dr, Diggs experience in the first interview, 7.94 (SD=4.69) in the second interview, and 7.77 (SD=4.90) in the final interview. A graph of the children's recall of features by experimental condition over time is presented in **Figure 6**, where it can be seen that the children recalled a similar number of features across interviews, $F(2,59)=1.36$, $p=.26$. Additionally, their recall of features over time did not depend on parent condition, $F(2,59)=.92$, $p=.40$, or interviewer condition, $F(2,59)=1.51$, $p=.23$, and there was no interaction between parent and interviewer condition, $F(2,59)=.09$, $p=.91$. These findings indicate that the children recalled a consistent number of features over time, regardless of experimental condition.

Children's Recall of the Target Events Across Interviews. The children reported an average of 0.83 (SD=.85) target events in the first interview, 1.02 (SD=.92) in the second interview, and 0.92 (SD=.94) in the final interview. However, performance over time varied as a function of experimental condition, as can be seen **Figure 7**. Although overall reports of target

events were comparable at each time point, $F(2,59)=.93$, $p=.40$, the interaction between time and interview condition was significant, $F(2,59)=3.76$, $p=.05$, $\eta^2=.05$. Specifically, children interviewed in a suggestive manner, regardless of whether the parent was neutral or suggestive, increased their recall of the target events from the first to second interview and then decreased their recall from the second to third interview, resulting in a significant quadratic trend, $F(1,55)=9.21$, $p<.01$. Children interviewed in a neutral manner, in contrast, recalled a consistent number of target events across time, with children who were not misled recalling none of the target events during the first, second, and third interview.

Aim 4: Parent-Child Conversations and Children's Final Interview

The first aim of the study called for an exploration of the impact of parent condition on aspects of the parent-child conversation. For the final aim of the study, consideration is given to an additional aspect of the parent-child conversation, namely parents' elaborativeness. Specifically, parents' utterances about the archeological dig were examined for the extent to which they used elaborations when discussing the staged experience with their children. Elaborations consisted of parents' use of open-ended questions (e.g., "What did you do on the archeological dig?"), elaborative yes/no questions (e.g., "Did Dr. Diggs bring tools for you to use?"), and elaborative statements (e.g., "I bet that Dr. Diggs helped you to find artifacts."). Although parents contributed an average of 61.88 (SD=41.42) utterances about the archeological dig, they only produced an average of 23.37 (SD=17.48) elaborations about the dig. In particular, parents incorporated an average of 11.38 (SD=6.55) open-ended questions, 11.39 (SD=11.71) elaborative yes/no questions, and 1.70 (SD=1.57) elaborative statements into their conversations with children.

It was hypothesized that the parents' use of elaborations during conversations about the staged event would be positively associated with the amount of information recalled by the children; however, it was also anticipated that parents' elaborativeness would also be associated with children's inaccurate recall, specifically among the children who were misled by their parents. Therefore, analyses for the current aim are focused exclusively on the children whose parents were in the Suggestive Condition. Children's memory performance within the parent-child conversation and final interview are reviewed below, as a function of parents' elaborativeness as well as other aspects of the parent-child conversation.

Parents' Elaborations & Conversations. Correlations between parents' elaborativeness and children's memory reports within the parent-child conversation among the children who were misled by parents are presented in **Table 2**. As can be seen in Table 2**,** parents' elaborativeness (i.e., sum of open-ended questions, elaborative yes/no questions, and elaborative statements) was positively associated with children's provision of unique memory information (r=.83) and the recall of dig-related features (r=.33). Parents' elaborativeness was also associated positively with children's willingness to accept parents' suggestions (r=.64), as well as the number of inaccurate details that the children provide about the target events (r=.61), such as "Dr. Diggs dropped the dinosaur egg.". In contrast, parents' elaborativeness was not associated with the children's accurate recall (e.g., "Dr. Diggs just held the dinosaur egg.") of the target features (r=-.05) or children's ambiguous recall (e.g., "The egg cannot break because it is a dinosaur egg.") of the target events (r=.24). Parents' elaborativeness was also not associated with children's denial of suggestions made by parents (r=.04).

Parent-Child Conversations & Children's Final Interview. Next, the associations between the parent-child conversations and children's memory reports in the final interview were

explored. Again, the focus was on the children who were misled by their parents. As can also be observed in **Table 2**, parents' elaborativeness was moderately associated with children's recall of dig-related features in the final interview (r=.34); however, parents' elaborativeness was not similarly associated with children's recall of the target events (r=.05) or the number of details that children recalled about the target events (r=-.08) at the final interview.

In addition, a few associations were seen between the children's reports during the parent-child conversation and their performance in the final interview. Specifically, children's recall of features during the final interview was associated with the following measures of their performance during the parent-child conversations: the provision of unique memory information (r=.46), recall of dig-related features (r=.58), denial of parents' suggestions (r=.42), accurate recall about the target features (r=.35), and recall of ambiguous information about the target events (r=.57). In contrast, no aspect of children's performance during the parent-child conversation was associated with children's recall of the target events at the final interview.

DISCUSSION

Previous research consistently shows that children can produce impressive reports of their past experiences (Baker-Ward et al., 1993), but also that they are susceptible to false information that can be included in their memory reports (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006). This is particularly true when children are questioned about their experiences in a suggestive manner in 'formal' (e.g., interviews with forensic practitioners) and 'informal' (e.g., parent-child conversations) contexts (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006; Principe & Ceci, 2002; Principe, DiPuppo, & Gammel, 2013). Building on key features of the literature, the present study was designed to determine if children's memory for an event could be influenced by suggestions in both 'formal' and 'informal' interview contexts. More

specifically, this study was carried out to investigate the joint impact of interviewers and parents' suggestions on the accuracy of children's memory reports.

To accomplish this goal, preschoolers participated in a staged archeological dig with 'Dr. Diggs' (see Principe & Ceci, 2002). After the event, the children talked with their parents about their experiences, and prior to conversations with their children, some parents were provided with false information about the archeological dig. Namely, the parents in the Suggestive Condition were told that Dr. Diggs may have spilled something on a map and dropped a dinosaur egg, when in reality she did not. The remaining parents did not receive this false information (Neutral Condition). Children were then repeatedly interviewed in a suggestive (Suggestive Condition) or neutral (Neutral Condition) manner. This design allowed for the exploration of the impact of parent condition (i.e., Neutral vs. Suggestive) and interviewer condition (i.e., Neutral vs. Suggestive) on children's memory reports.

More specifically, this study was designed to determine if parents would incorporate suggestions into their conversations with children, and if these suggestions would in turn lead children to report false information within parent-child conversations (Aim 1). It was also designed to explore the long-term impact of parents' and interviewers' suggestions on children's remembering at the final neutral interview (Aim 2), as well as across time (Aim 3). Of particular interest was the potential additive impact of parents' and interviewers' suggestions on the accuracy of children's memory reports. Furthermore, consideration was given to how aspects of the parent-child conversation (i.e., parents' elaborativeness) were associated with children's reports of the archeological dig (Aim 4). The discussion that follows is focused around a treatment of the questions that are addressed with each of the four aims. Additionally, limitations

to the current study, as well as the ways in which the current investigation can contribute to guidelines for forensic interviewing, are discussed.

Aim 1: Parent-Child Conversations

The first aim of this study was to determine if parents would incorporate suggestions into conversations with their children, and if these suggestions would permeate children's narratives within conversations. The results indicated that parents' suggestions influenced some aspects of their conversations, but not others. Specifically, parents who were misled provided more utterances about the target events (i.e., Dr. Diggs spilling something on the treasure map and dropping the dinosaur egg) than parents who were not misled. In turn, the children who were provided suggestions by parents also contributed more information about the target features (i.e., the map and dinosaur egg), as well as inaccurate and ambiguous details about the target events, in comparison with as the children whose parents were not misled. Parent condition (i.e., Neutral vs. Suggestive), however, did not impact the "talkativeness" of parents and their children, or the number of features that children recalled about their experiences. Consistent with previous research (Principe, DiPuppo, & Gammel, 2013), this demonstrates that although suggestions by parents can lead children to provide false information about their experiences, they do not always interfere with children's memory for the real aspects of a given event. Future research, however, should consider the conditions under which suggestions by parents (e.g., introduction of an inaccurate stereotype) may reframe the way children perceive a given event and thereby lead to distortions in other aspects of the event being remembered.

Aim 2: Child's Final Interview

In situations in which children serve as witnesses, it is possible that they encounter suggestions not only within conversations with parents, but also in their interactions with clinical

practitioners and interviewers in legal settings. As such, the second aim of this study was to examine the joint impact of parents' and interviewers' suggestions on children's memory reports during the final neutral interview. It was hypothesized that the effect of parents' suggestions on children's reports would be amplified by suggestive interviewing, such that the accuracy of children's reports would be the most compromised when children were exposed to suggestions by both parents and interviewers.

Parents' and interviewers' suggestions did not interfere with children's overall memory for the features of the archeological dig; however, the large majority of children who were exposed to suggestions by parents and/or interviewers reported one or more of the target events at this neutral interview. Those children who were exposed to suggestions by parents and/or interviewers were more likely to report the target events and to provide details about these events that had not taken place than were their peers who had not been misled. Contrary to expectation, however, the effect of parents' suggestions on children's reports of the false information was not amplified by suggestive interviewing during the three-week period between the archeological dig and the final neutral interview.

This finding may represent a "threshold effect," such that children only need to be exposed to a suggestion in one setting for it to have an impact on their subsequent memory reports. It is possible that suggestions in additional contexts may not influence children's remembering above and beyond the misinformation that they have already encountered. Furthermore, it is possible that some types of events may have a lower "threshold" than other kinds of experiences. For example, children's reports of enjoyable, positively valanced events may be more likely influenced in a single setting, while children reporting highly stressful, negatively valanced events may be susceptible to suggestions in multiple settings. Additional

research involving multiple sources of suggestion and events of different valance is needed to determine the conditions under which suggestions may influence the accuracy of children's reports in a threshold-like manner.

The majority of statements that the children made about the target events were verbatim (i.e., statements that repeat the false information in a literal manner) and constructive (i.e., statements that go beyond the literal information presented to children by parents and interviewers), rather than fantastical (i.e., statements that contain events that could not have occurred in reality). Furthermore, children were more likely to make verbatim and constructive statements about the target events if they had been exposed to suggestions by parents and/or interviewers than if they were not misled. This finding that parents' suggestions impacts their children's use of verbatim and constructive statements about the target events is consistent with previous research (Principe et al. 2013). Moreover, it demonstrates that these suggestions lead children to produce *plausible* accounts of events that did not actually take place (e.g., "Dr. Diggs had dropped the egg and it cracked."), rather than *irrational and nonsensical* narratives (e.g., "The dinosaur crawled out of the egg and roared."). Children's recall of plausible events that did not actually take place likely make false reports difficult for legal professionals to identify.

Aim 3: Children's Interviews Across Time

The third aim of this study was to examine the impact of suggestions on children's memory reports over time. It was anticipated that the influence of parents' and interviewers' suggestions on children's remembering would grow over time as a function of repeated interviews. The findings showed that the children recalled a consistent number of features of the archeological dig over time, regardless of suggestions by parents and interviewers. This is consistent with previous research that shows that some intervening experiences, such as

interviews, can serve to reinstate or maintain children's memory over time (Principe, Ornstein, Baker-Ward, & Gordon, 2000). It is likely that children's interviews at 1- and 2-weeks served as post event reminders of the archeological dig that facilitated children's remembering of dig-related features during the final interview; however, additional research involving children that did not experience interviews in the intervening period is needed to provide a baseline against which it would be possible to determine if the interviews actually served to maintain children's memory for dig-related features over time.

For the children who were exposed to suggestions by interviewers, intervening interviews also served as reminders of the target events (i.e., Dr. Diggs spilling something on a map and dropping a dinosaur egg), which did not occur in reality. Therefore, it would be expected that the children's recall of the target events would differ across interviews as a function of interviewers' suggestions, and this is what was observed. Specifically, children interviewed in a suggestive manner, regardless of whether the parent-child conversation was neutral or suggestive, but not those interviewed in a neutral manner, increased their recall of the target events from the first to second interview and then decreased their recall from the second to third interview. It seems likely that the increase from the first to the second interview for the children who were interviewed suggestively reflects the cumulative effects of suggestions, and the decrease shown at the final interview reflects the changes in the retrieval context for these children. Future research involving multiple approaches to interviewing is needed to evaluate the impact of the retrieval context on children's remembering in the face of suggestions.

Aim 4: Children's Final Interview

Previous empirical work on the influence of parents on children's remembering (e.g., Fivush & Fromhoff, 1988; Reese, Haden, & Fivush, 1993; Reese & Newcombe, 2007) indicates

that the ways in which parents talk about past experiences have implications for children's subsequent memory reports. As such, the final aim of this study was to build on this body of research by exploring how aspects of the parent-child conversation were associated with the reports of the archeological dig by children who were misled by their parents, both during the conversations with their parents and on the final neutral interview. The findings revealed that parents' elaborativeness (i.e., their use of open-ended, elaborative yes/no questions, and elaborative statements) had both positive and negative implications for the children's reports of the archeological dig within the conversations with their parents. That is, parents who used more elaborations had children who reported more unique memory information about and dig-related features of archeological dig. However, parents' use of elaboration was also associated with children's acquiescence to parents' suggestions about the target events, as well as their recall of inaccurate details about the target events during the parent-child conversations.

Furthermore, the impact of parents' elaborativeness extended to children's remembering at the final interview. Among children who were misled by parents, parental elaboration was associated with children's recall of dig-related features, but not target events, at the final interview. Moreover, associations were also observed between children's contributions to the parent-child conversations and their subsequent reports at the final interview. For instance, children's recall of unique memory information and dig-related features were associated with the recall of features at the final interview; yet, no aspects of children's reports within the conversation were linked to children' recall of the target events.

Summary

The current study was designed to explore the impact of parents' and interviewers' suggestions on children's reports of their experiences. Consistent with what seems apparent in

historical cases involving children as witnesses (e.g., the McMartin preschool trial), parents incorporated suggestions into their conversations with children and these suggestions led children to report false information within both the parent-child conversations and final interview. This effect was even stronger in dyads where parental misinformation was coupled with an elaborative conversational style. Interviewers' suggestions also interfered with children's remembering across interviews. Contrary to expectation, however, interviewers' suggestions did not amplify the effect of parents' suggestions on the accuracy of children's reports at the final interview. The accuracy of children's reports in the final interview was also not influenced by the way in which parents discussed the archeological dig with their children.

Limitations

The demonstration of an association between parents' and interviewers' suggestions and children's memory performance provides useful information about children's cognitions and may contribute to guidelines for the ways in which witnesses are handled in legal settings; however, the application of the findings to forensic settings must be viewed in light of the limitations of the current study. First, as an "analog" study, the procedures and participants are not identical to those involving real cases – such as the day care trials that served as an inspiration for this work – and thus may not generalize to situations involving children as witnesses. For example, the staged event in the current study (i.e., archeological dig) is positively valanced, whereas the events that necessitate children's testimony most often involve high levels of stress and negative emotion. Although research on children's memory for natural disasters (Bauer, Burch, Van Abbema, & Ackil, 2008), emergency medical treatment (Peterson, 2012), and invasive medical procedures (Merritt, Ornstein, & Spicker, 1994) indicate that children can similarly provide detailed reports about highly stressful events, empirical work also demonstrates

that stress experienced as an event unfolds can sometimes be associated with lower levels of recall (Merritt et al., 1994; Peterson, 2012; see Baker-Ward, Ornstein, & Thomas, in press). Additional research, therefore, is needed to determine how parents' and interviewers' suggestions impact children's memory events that more closely resemble those that necessitate children's testimony.

Furthermore, children in the current study were typically developing, but children with disabilities account for one in three substantiated maltreatment allegations (Maclean, Sims, Bower, Leonard, Stanley, & O'Donnell, 2017). In addition to being at higher risk for abuse and neglect, children with disabilities, particularly moderate to severe intellectual disabilities, show difficulties with recall performance, as well as elevated levels of suggestibility when compared to their typically developing peers (Brown, Lewis, Lamb & Stephens, 2012). Future research involving samples of children with disabilities is needed to better understand the conditions under which parents' and interviewers' suggestions are most likely to interfere with children's reports of their previous experiences.

It is also important to note that the delay intervals used in the current study (i.e., interviews at 1-, 2-, and 3-weeks after the archeological dig) do not necessarily approximate those seen in situations that involve children as witnesses. For instance, Stolzenberg and Lyon (2014) analyzed all felony child abuse cases adjudicated over a four-year period in Los Angeles County and found that the average length of time between filing charges and the beginning of a trial was 245 days. Given that the passage of time and children's experiences during the delay between an event and a later memory report can substantially alter the information stored in memory, additional research involving multiple assessments over an extended period of time is needed to characterize the impact of parents' and interviewers' suggestions on children's recall.

Moreover, larger sample sizes are needed to employ analytic models that estimate intra- and inter-individual changes in children's memory performance across time.

Implications and Future Directions

Notwithstanding the limitations, the current study has the potential to contribute to guidelines concerning the way in which children should be handled as witnesses. A number of researchers have used empirical work that documents the negative impact of certain modes of "formal" questioning on children's memory reports to develop investigative protocols, such as the National Children's Advocacy Center's Child Forensic Interview Structure (2019), the Cornerhouse Forensic Interview Protocol (Anderson et al., 2009), and the NICHD Investigative Interview Protocol (Lamb, Hershkowitz, Orbach, & Esplin, 2008). The use of protocols such as these has the potential to preserve children's memory and minimize distortions in their reports of past experiences. For example, extensive research demonstrates that when police and legal professionals use the NICHD protocol, the quality of the information obtained from children is enhanced. Specifically, interviewers using the NICHD protocol use three times more open-ended questions, as well as half as many suggestive prompts when compared to interviewers who do not use the protocol. Children questioned with the NICHD protocol also provide a greater proportion of forensically relevant details in response to open-ended questions in comparison to children interviewed without the protocol (Lamb, Orbach, Hershkowitz, Esplin, & Horowitz, 2007).

The current study suggests that parents can be just as potent of a source of suggestion as forensic interviewers. That is, 71% of children exposed to suggestive questioning by interviewers recalled one or more of the target events. The same proportion of children recalled at least one of the target events when they are exposed to suggestions by their parents. Yet, little attention has

been paid to how practitioners such as police and social workers assess the nature of children's disclosure to parents. Although legal professionals cannot expect to influence how parents discuss alleged abuse with their children, an in-depth understanding of pre-interview conversations between parents and children may help forensic interviewers account for suggestions that may already be incorporated into children's memory reports.

There are a variety of techniques that forensic interviewers can use to obtain information about pre-interview conversations between parents and children. It may be helpful for forensic interviewers to gather information about the nature of children's disclosures and the extent to which parents discussed the allegations with their children. For instance, police officers and social workers may consider asking parents if the child was reluctant to disclose his or her experiences, as well as if the parents questioned their child over an extended period of time or on multiple occasions before a disclosure was made (Lawson & London, 2018). Additionally, legal professionals, such as police officers and lawyers, as well as social workers, may also want to consider the extent to which parents' hold strong beliefs about the alleged events. Consistent with research indicating that bias can lead to suggestive modes of questioning by formal interviewers (Bruck & Ceci, 1999; Bruck, Ceci, & Principe, 2006), parent bias may similarly impact the ways in which parents obtain reports from their children and, thereby interfere with accuracy of children's remembering. Additionally, it may be helpful for forensic interviewers to gather information about the nature of children's disclosures and the extent to which parents discussed the allegations with their children. Efforts such as these could, in turn, influence the ways in which forensic interviewers question children about the alleged events.

Furthermore, it is important to note that approximately one quarter of the children who were provided suggestions by parents and/or interviewers did not recall the target events.

Additional consideration should be given to these children and the socio-emotional and cognitive characteristics that make them less susceptible to suggestive influences. For example, research indicates that children's language abilities (Bruck & MeInyk, 2004; Brown, Lewis, & Lamb 2016), temperament (Merritt et al., 1994), knowledge in relevant domains (Ornstein, Shapiro, Clubb, Follmer, & Baker-Ward, 1997), and suggestibility (Gudjonsson et al., 2016) play a role in determining what children remember and report about their experiences when questioned by formal interviewers. It remains to be seen if individual difference variables such as these similarly impact children's reports when they are obtained by parents, as opposed to interviewers. In addition to the characteristics listed above, it is also possible that aspects of the parent-child relationship such as parenting style (Burgwyn-Bailes et al., 2001) and attachment status (Chae et al., 2018) may uniquely impact children's remembering within parent-child conversations. Future research involving large sample sizes with different combinations of individual difference variables is needed to determine the extent to which the characteristics of children are associated their susceptibility to suggestions encountered within both formal and informal interview contexts. Research on individual differences also has the potential to shed light on developmental changes in remembering and resistance to suggestions.

In addition, consideration should be given to the "threshold effect," mentioned above, and the conditions under which it is obtained. In the current study, the accuracy of the children's reports was undermined when they were exposed to suggestions in just one context (i.e., in conversations with parents *or* formal interviews). Suggestions in a second setting (i.e., in conversations *and* interviews) did not interfere with children's reports above and beyond exposure to false information in one context. However, the failure to find evidence of the additive effects of multiple sources of suggestion may stem from the nature of nature (here, quite

benign) and number (here, two) of the target events. Future research involving activities that approximate those seen in situations that involve children as witnesses (i.e., negatively valanced, stressful events, with multiple components), as well as extended delay periods, is needed to determine the conditions under which suggestions by others may permeate children's reports in an additive manner.

Finally, much remains to be learned about children's underlying representations in memory of the target events and the extent to which they may be altered by exposure to the misleading information that is at the core of suggestive conversations and interviews. In this regard, paralleling the earlier literature on the "misinformation" effect in children's memory (Ceci, Ross, & Tolgia, 1987), it is possible that there can be multiple pathways to children's inaccurate reports of their previous experience (see Ornstein, Larus, & Clubb, 1991). One possibility is that children's incorrect recall of the target events stemmed from changes in the underlying memory representation, as a function of exposure to suggestions from parents and/or interviewers (Loftus, 1979; Loftus & Loftus, 1980; Loftus, Miller, & Burns, 1978). In this case, it is possible that a changed memory representation corresponds to children coming to believe that they experienced features of the staged event that were only suggested to them. A second possibility is that children's reports of suggested information reflect acquiescence or social compliance (McCloskey & Zaragoza, 1985a; McCloskey & Zaragoza, 1985b), as opposed to an alteration in what is represented in memory. In this instance, children may be motivated to conform to the suggestions of their conversational partners, who children likely see as more knowledgeable than themselves. A third possibility is that both memorial and social factors play a part in changing children's underlying representations of the target events (Ceci & Bruck, 1993, 1995). As Principe and Ceci (2002) point out, the distinction between these three

possibilities is key in that no approach to interviewing can lead to the recovery of an original memory that has been altered by suggestions; however, supports for children's remembering can be used to decrease the likelihood of social compliance. Therefore, it is important that future research incorporate converging methods to assess, albeit indirectly, children's representations of suggested events.

Conclusions

In conclusion, the results of this study indicate that parents incorporate suggestions into their conversations with children, which in turn lead children to report inaccurate information within conversations and in subsequent interviews. Interviewers' suggestions also distort children's memory reports over time; however, they do not amplify the effects of parents' suggestions on children's remembering. These findings may contribute to guidelines for the ways in which children are questioned in forensic settings; however, limitations of this study must be taken into consideration. For example, as an "analog" study, the findings may not generalize to all situations that involve children as witnesses. It is important that future research builds on these findings by examining the influence of parents' and interviewers' suggestions on children's reports under conditions that more closely resemble those that necessitate children's testimony. Additionally, consideration should be given to characteristics of children that make them less susceptible to suggestive influences, as well as children's underlying representations of suggested events. This information will provide the field with a more nuanced understanding of children's cognition and the conditions under which children's reports are most likely to be distorted versus accurate.

APPENDIX A: RECRUITMENT LETTER

With the support and encouragement of your child's teacher, <NAME>, and school director, <NAME>, we are writing to ask you to consider taking part in a research study, "Children's Memory Project".

Before we describe the research study, we should indicate that we are researchers at the University of North Carolina at Chapel Hill who are interested in children's memory for events. A substantial amount of research on children's memory has demonstrated that even very young children are skilled at remembering and reporting information about their past experiences. Our program of research is focused on how parent-child interactions contribute to this emerging skill. In particular, we are interested in understanding how parent-child conversations about past events influence children's event narratives.

To learn more about these issues, we will be examining children's memory for the details of an interesting educational experience – an "archeological dig" led by "Dr. Diggs". Your child's participation would involve interacting with Dr. Diggs (a graduate student) to learn about archeology and retrieve artifacts from specially constructed blocks of sand. This experience will take place in groups of four preschoolers and will be video recorded, and will last approximately 15 to 20 minutes. It will be carried in <LOCATION> during school hours and in the presence of your child's teacher. In the days following the archeological dig, we will ask that you and your child have a conversation about this experience. Materials for audio recording this conversation will be sent home from school with your child. Children will then be interviewed on three separate occasions spaced approximately 1 week apart. Interviews will last approximately 10 minutes, will be video recorded, and will occur during school hours at the discretion of your child's teachers. As a token of our appreciation, your family will receive a $20 gift card and a selection of children's books.

We believe that research on this topic is particularly important for understanding preschoolers' ability to provide testimony in legal settings. Therefore, we hope that you and your child consider participating. If you are interested in taking part in this study, please read and complete the attached information sheet and consent forms. Please return the completed form in the provided envelope to your child's teacher by <DATE>. If you have any questions regarding this study, please do not hesitate to contact us.

Thank you for your consideration!

APPENDIX B: FEEDBACK FROM PARENTS

Aim: To obtain parents' feedback on the minor deception used to manipulate parents' beliefs in the current study.

Method: I conducted telephone interviews with parents (*n*=8). Interviews lasted approximately 20 minutes and included questions the methodology used in the current study (e.g., As a parent, how would you feel about unknowingly delivering this misinformation to your child as part of a research study? Are there any concerns that you might have with this design?).

Results: The majority of parents overwhelming indicated that they felt comfortable with our procedures. For example, one parent stated, "I would have no problem with that [...] I can't imagine that in the name of research anybody would really have much of a problem with that." Another parent provided a similar response when she/he recalled, "I think that is a great experiment, especially if there isn't much research in this area, I think that what you did is a perfect way of getting all of those variables in. As a parent, if I was given that misinformation if it was just a one-time scenario, you know there is just a few facts that are incorrect and it's not like you are trying to convince your kid that this happened you're just say but 'oh wasn't there a treasure map as well' and you know just listening to what your child says about it. So, it wouldn't bother me as a parent."

Conclusions: Parents' feedback was overwhelmingly positive, indicating that parents are comfortable with the mild deception used to manipulate parents' beliefs in the current study.

APPENDIX C: INITIAL PILOT STUDY

Aim: To evaluate the effectiveness of our manipulation of parents' beliefs.

Method: I conducted an initial pilot study with preschoolers and their parents (n=11). The design was identical to the current study, with two exceptions. First, the manipulation of parents' beliefs differed. Prior to having conversations with their children parents were told that 'Dr. Diggs may have used a treasure map to find a special rock,' when in reality he did not. Second, Dr. Diggs did not find a treasure map or dinosaur egg during the archeological dig.

Results: During parents' conversations with their children, 7 out of 11 parents made reference to the treasure map. Excerpts illustrating their mentions of the treasure map are provided below:

> Parent: Okay, was it like- oh, but you were looking for them, now did you-you get anything like a- like a- a sp- a map of any kind? Was it-
> Child: No.
> Parent: There was no map?
> Child: Uh-uh (no)
> Parent: No. Um, and what happen- did all the other kids do the same thing?
>
> Parent: Did you have a treasure map?
> Child: MMmm. *suggesting no*
> Parent: No?
>
> Parent: Okay. And was there something that looked like a map?
> Child: Oh. No.
> Parent: Was there a treasure map, maybe?
> Child: No.
> Parent: No? You don't remember that?
> Child: No.

Moreover, only 2 out of 11 parents made reference to the special rock during their conversations with their children. Excerpts illustrating their mentions of the special rock are provided below:

> Parent: Okay. Um, did you find a special rock?
> Child: Hmm *inaudible word* special rock. *mumbles* I know *mumbles*
> Parent: Okay
>
> Parent: Ohhh… okay. And… so you don't remember a treasure map, uh, to find a special kind of rock?
> Child: Uh… what lock?
> Parent: No.
> Child: Or rock.
> Parent: I don't know. Is there, was there any other rock, any special rocks that you were looking for?
> Child: Actually, that was the jewel.

Parent: Oh, that was the jewel you were telling me about at the beginning?
Child: Uh-huh.
Parent: Oh, okay, that makes sense.

Conclusions: The manipulation of parents' beliefs in the initial pilot study was weak. Few parents mentioned the target items and children were unlikely to report the items spontaneously during subsequent interviews. We therefore modified the information given to parents. Specifically, prior to having conversations with their children parents are now told that, "Dr. Diggs is clumsy and may have spilled something on a treasure map as well as dropped a dinosaur egg," when in reality he did not. To ensure that this was aligned (but still inconsistent) with children's experiences, we also altered the staged archeological dig to include a treasure map and dinosaur egg. During the archeological dig, the treasure map was not destroyed and the dinosaur egg was not dropped

APPENDIX D: FOLLOW-UP PILOT STUDY

Aim: To evaluate the effectiveness of our new manipulation of parents' beliefs.

Method: I conducted an follow up pilot study with preschoolers and their parents (n=11). The design was identical to the current study, with one exception. Specifically, the manipulation of parents' beliefs differed. Prior to having conversations with their children parents were told that "Dr. Diggs. Dr. Diggs is quite clumsy and may have accidently spilled something on a treasure map and dropped a dinosaur egg." \

Results: During parents' conversations with their children, only 3 out of 11 parents made reference to the treasure map and/or dinosaur egg. An excerpts illustrating mentions of the target events is included below:

> Parent: So you didn't look for any dinosaur eggs or anything today?
> Child: But we… but but I guessed what today was.
> Parent: What was it?
> Child: Haley thought today was Tuesday but today is Monday and I guessed that it was Monday.
> ……..
> Parent: Don't press anything. This is just recording what you are saying. It is a conversation so that them and Doctor Diggs can check it out. Because I heard that Doctor Diggs dropped a dinosaur egg. Did you guys find a dinosaur egg.
> Child: Yes.
> Parent: Who found it?
> Child: The girl who likes to dig.

Conclusions: The manipulation of parents' beliefs in the follow up pilot study was also week. Few parents mentioned the target items and children were unlikely to report the items spontaneously during subsequent interviews. We therefore modified the information given to parents. Specifically, parents were now told that, "Dr. Diggs is portrayed as being passionate about her work, and she loves to introduce children to archeology. However, Dr. Diggs is also somewhat clumsy, and when she gets excited about showing artifacts to children, she sometimes knocks things over. When she was at <school> she may have been clumsy and accidently spilled something on a treasure map and dropped a dinosaur egg." Parents were then instructed to explicitly ask their children about the target events.

APPENDIX E: SCRIPT FOR STAGED EVENT

Phase 1: Introduction

Dr. Diggs: Hi friends, my name is Dr. Diggs and I am an archeologist. Can anyone here raise his or her hand and tell me what an archeologist is?

<Take answers>

Dr. Diggs: Here is a picture of an archeologist. Archeologists are scientists who study very, very old things that they call artifacts. Can everyone say the word artifact out loud for me?

<Show picture and have children repeat>

Dr. Diggs: Very good! Here is a picture of an archeologist studying an artifact. Now, why might archeologists study old things? Any ideas?

<Show picture and take answers>

Dr. Diggs: Great job! These are all good ideas. Archeologists think that these old artifacts are clues that help them learn about the people and animals that were alive a long, long time ago. Now these old things are really hard for archeologists like me to find. Does anyone have an idea of how archeologists find their artifacts to study?

<Take answers>

Dr. Diggs: Good thinking! Archeologists find artifacts by digging them up from the ground. I have gone on many adventures where I find artifacts by digging them up from the ground. Here is a picture of an archeologist digging up his artifacts. Now, digging is a lot of work, so archeologists do not work alone. They work as part of a team of scientists. So, today I'm going to need your help. Will you be an archeologist with me today? We won't get to keep the artifacts that we find. We will put them in a museum instead!

<Show picture>

Phase 2: Dress

Dr. Diggs: Wonderful! If you are going to be an archeologist with me today, you need to dress like an archeologist. So, let's get started. Archeologists work in places with lots of sun. Sometimes the sun gets in their faces. What might an archeologist wear to help protect their face from the sun?

<Students put on hats>

Dr. Diggs: Archeologists also need to keep the sedimentary rocks out of their eyes. What item of clothing might help archeologists keep their hands clean?

<Students put on Goggles>

Dr. Diggs Finally, archeologists need to carry around a lot of supplies to help them dig up the artifacts. What should an archeologist wear to help carry around his tools?

<Students put on vests>

Phase 3: Tools

Dr. Diggs: Now we look like archeologists. We are ready to help dig up the artifacts that I have brought with me. I believe that there is a special artifact here in the sedimentary rock, but I need you to help me find it. What tools should we use to help us find the artifact? Should we use a hammer? What will a hammer help us do?

<Take answers, label, and pass around class>

Dr. Diggs: Should we use a rake? What will a rake help us do?

<Take answers, label, and pass around class>

Dr. Diggs: Should we use a shovel? What will a shovel help us do?

<Take answers, label, and pass around class>

Dr. Diggs: Should we use a brush? What will a brush help us do?

<Take answers, label, and pass around class>

Dr. Diggs: Should we use a magnifying class? Who here knows what a magnifying glass does?

<Take answers, label, and pass around class>

Phase 4: Dig

Dr. Diggs: Now, that we have all of our special tools, I'm going to have my friends help to dig special artifacts up out of the sedimentary rock.

<Pass out individual containers of sand. Have children find artifacts in sand (bones, gems, coins, shark teeth, and shells)>.

Dr. Diggs: *<Find target items>* Wow look what I found – a treasure map and a dinosaur egg! How cool is that! Now friends, we have to be very, very careful with these special artifacts. We have to be very careful not to spill anything on this special treasure map. Spilling something on it could smear the ink and then we wouldn't be able to read it! Also, we have to be very careful not to drop the dinosaur egg. Dropping the dinosaur egg might crack it and we won't want to do that! How cool! I am going to set these aside for now.

Dr. Diggs: What did you find? Wow a _____! Let's pass this around to our other archeologists so that everyone gets a chance to see.

<Pass around>

Dr. Diggs: When we find special old artifacts like this, we put them in museums. That way other boys and girls can see what archeologists have found. Now, I will need you to help me put this in the museum we have right here. Here we have a spot for dinosaur bones, gems, coins, shark teeth, and shells. We are going to take turns putting all of our artifacts in the right spots.

<Point out correct placement of items and have children take turns placing their items in the museum>

Phase 5: Museum

Dr. Diggs: We have found all of our special artifacts and have placed them in a museum. Now other boys and girls can see all of your hard work and the special things that you found! Let's take a look one more time at what we found today. Everyone repeat these items after me!

<List items outline and have children repeat>

Dr. Diggs: Great job boys and girls! Thank you so much for all of your hard work today helping me find these special artifacts.

APPENDIX F: SUGGESTIVE CONDITION LETTER

Dear Parent:

Thank you very much for your participation in the Children's Memory Project! As we indicated, our program of research is focused on how parent-child interactions contribute to children's emerging memory skills. We are particularly interested in understanding how parent-child conversations about past events influence preschoolers' narratives of those and other experiences.

To learn more about this topic, we ask that you and your child talk about his/her recent participation in an archeological dig with a research assistant of ours who was introduced as "Dr. Diggs." Dr. Diggs is portrayed as being passionate about her work, and she loves to introduce children to archeology. However, Dr. Diggs is also somewhat clumsy, and when she gets excited about showing artifacts to children, she sometimes knocks things over. When she was at <school> she may have been clumsy and accidently spilled something on a treasure map and dropped a dinosaur egg.

Please begin your conversation with your child by making a general request, such as, "Tell me what happened during the archeological dig at your school." Then, follow this open-ended probe with the following more specific requests:

1. "I heard that Dr. Diggs was clumsy and spilled something on a treasure map. Tell me about how Dr. Diggs spilled something on a treasure map."

2. "I also heard that Dr. Diggs dropped a dinosaur egg. Tell me about how Dr. Diggs dropped a dinosaur egg."

We ask that you continue to discuss the event in whatever way feels natural to you. Please record your conversation with the voice recorder enclosed in this envelope. We ask that you complete this task on <DATE>. Please return the voice recorder in the provided envelop to your child's teacher(s) by <DATE>. If you have any questions, please email Taylor Thomas at tet@live.unc.edu.

We very much appreciate your support of our program of research.

Sincerely yours,

Taylor Thomas
Research Assistant

Peter A. Ornstein, Ph.D.
F. Stuart Chapin Professor, Emeritus

APPENDIX G: MEMORY INTERVIEW

Open-Ended Probes

1. Hello my name is ____ and I am a researcher. Part of my job is to talk to children about things that have happened, so I am going to ask you a few questions today. Do you remember the day that Dr. Diggs visited your school? Well I wasn't there that day and I'd like you to tell me everything that happened. Tell me everything that happened from beginning to end. (Pause) What else? (Pause) Tell me more. (Pause) What else?

Specific Probes

2. (*You mentioned Dr. Diggs teaching you things about archeology*) Tell me (everything else) about what Dr. Diggs told you about archeology. (Pause) What else?
3. *(You mentioned putting on clothing to get ready for the dig*) Tell me (*everything else*) about the clothing that you wore to get ready for the dig. (Pause) What else?
4. *(You mentioned using tools)* Tell me (*everything else*) about the tools that you used. (Pause) What else?
5. (*You mentioned finding artifacts*) Tell me (*everything else*) about what you found. (Pause) What else?
6. (*You mentioned a museum*) Tell me (*everything else*) about the museum (Pause). What else? (Pause)

Suggestive Probes

7. I heard (*You mentioned*) something about a treasure map. Can you tell me about the treasure map?
    a. <Children responds yes> Thank you for telling me! OR <Child responds no> I heard that Dr. Diggs was clumsy and spilled something on a treasure map. Did he spill something on a treasure map?
    b. <Child responds yes> Thank you for telling me! OR <Child responds no> Are you sure? I think he spilled something on a treasure map.
    c. <Child responds yes or no> Tell me about how Dr. Diggs spilled something on the treasure map.
8. I heard (*You mentioned*) something about a dinosaur egg. Can you tell me about the dinosaur egg?
    a. <Children responds yes> Thank you for telling me! OR <Child responds no> I heard that Dr. Diggs was clumsy and dropped the dinosaur egg. Did he drop the dinosaur egg?
    b. <Child responds yes> Thank you for telling me! OR <Child responds no> Are you sure? I think he dropped the dinosaur egg.
    c. <Child responds yes or no> Tell me about how Dr. Diggs dropped the dinosaur egg.

Concluding Probes

9. Did anyone else talk to you about Dr. Digg's visit?
    a. <Child responds yes> Who talked with you about Dr. Diggs visit? Tell me more about that.

10. You have told me lots of things today, and I want to thank you for helping me. Is there anything else that you want to tell me?
11. What are you going to do today after school?

APPENDIX H: DEBRIEFING LETTER

Thank you for your participation in our study of children's memory for events! We have recently completed this research and are writing to share additional information about the purpose of this study.

As mentioned in our previous letter, we are interested in understanding how parent-child conversations about past events influence children's event narratives. Our research focuses on applying this understanding to forensic settings involving children as witnesses. To protect the integrity of this research, we could not fully divulge all of the details of this study at the start of the project.

A substantial amount of research on children's event memory has demonstrated that, under certain circumstances, even very young children can remember and report past events in an accurate and detailed manner; however, there are numerous factors that can greatly reduce the accuracy of children's recollections. Our program of research is focused on these factors that may unfortunately undermine the accuracy of children's reports. In particular, we are interested in understanding how misleading information encountered by children in social interactions may affect children's narratives of their own experiences. It is our belief that research on this topic is particularly important for understanding the ability of preschoolers to provide testimony in legal settings.

To learn more, we carried out an archeological dig at your child's school. In the days following the archeological dig, we asked that you and your child have a conversation about this experience. We provided a brief description of the activities, and this description included a minor suggestion. Namely, we indicated that may have accidently spilled something on a treasure map and dropped a dinosaur egg, when in reality he did not. We subsequently interviewed children to see if they came to remember this piece of information as part of their archeological dig experience.

Your participation in this study is appreciated and will help psychologists to understand the role that parents play in influencing children's memory. If you have any questions or concerns, you are welcome to talk with Peter Ornstein or Taylor Thomas of the University of North Carolina Psychology and Neuroscience Department. Thank you again for your participation!

Table 1

Correlations among Children's Recall of Targets and Confounding Variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Child Report of Targets at Interview 1	--										
2. Child Report of Targets at Interview 2	.78**	--									
3. Child Report of Targets at Interview 3	.57**	.73**	--								
4. Child Age	-.09	-.06	.49	--							
5. Child Gender	-.21	-.14	-.05	.21	--						
6. Child Race	-.08	-.10	-.08	.06	.09	--					
7. Parent Age	.01	.02	-.16	.04	-.14	-.11	--				
8. Parent Gender	-.22	-.21	-.25	-.08	-.12	-.17	.01	--			
9. Parent Race	-.12	.02	-.13	.02	.15	.71**	-.11	-.17	--		
10. Dr. Diggs Actor	-.15	-.15	.01	.32**	.22	.04	-.25*	-.41*	.04	--	
11. Interviewer	.06	.04	-.11	-.01	.17	.04	.03	.12	.04	-.10	--

Note. Pearson correlation coefficients were used to examine the association between child report of the target events across interviews and (a) child age, and (b) parent age. Point biserial correlation coefficients were used to examine the association between child report of the target events across interviews and (a) child gender, (b) child race, (c) parent gender, (d) parent race, (e) Dr. Diggs actor, and (f) interviewer.

Table 2

Correlations between Parent-Child Conversation and Children's Memory Reports at the Final Interview among Children Misled by Parents

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Parent-Child Conversation											
1. Parents' Elaborations	--										
2. Unique Memory Contributions	.83**	--									
3. Recall of Features	.33*	.56**	--								
4. Acquiescence	.64**	.51*	-.11	--							
5. Denial	.04	-.04	.11	-.36*	--						
6. Accurate Recall about Target Features	-.05	.05	-.03	-.24	.56**	--					
7. Inaccurate Recall about Target Events	.61**	.54**	-.18	.90**	-.34*	-.18	--				
8. Ambiguous Recall about Target Events	.24	.47**	.38*	-.01	.39*	.31	-.02	--			
Children's Final Interview											
9. Recall of Features	.34*	.46**	.58**	-.11	.42*	.35*	-.12	.57**	--		
10. Recall of Target Events	.05	.09	.03	.18	-.04	-.09	.12	-.03	.03	--	
11. Recall of Details about Target Events	-.08	-.02	-.02	.12	-.02	-.09	.05	-.03	.04	.84**	--

Figure 1
Project Design

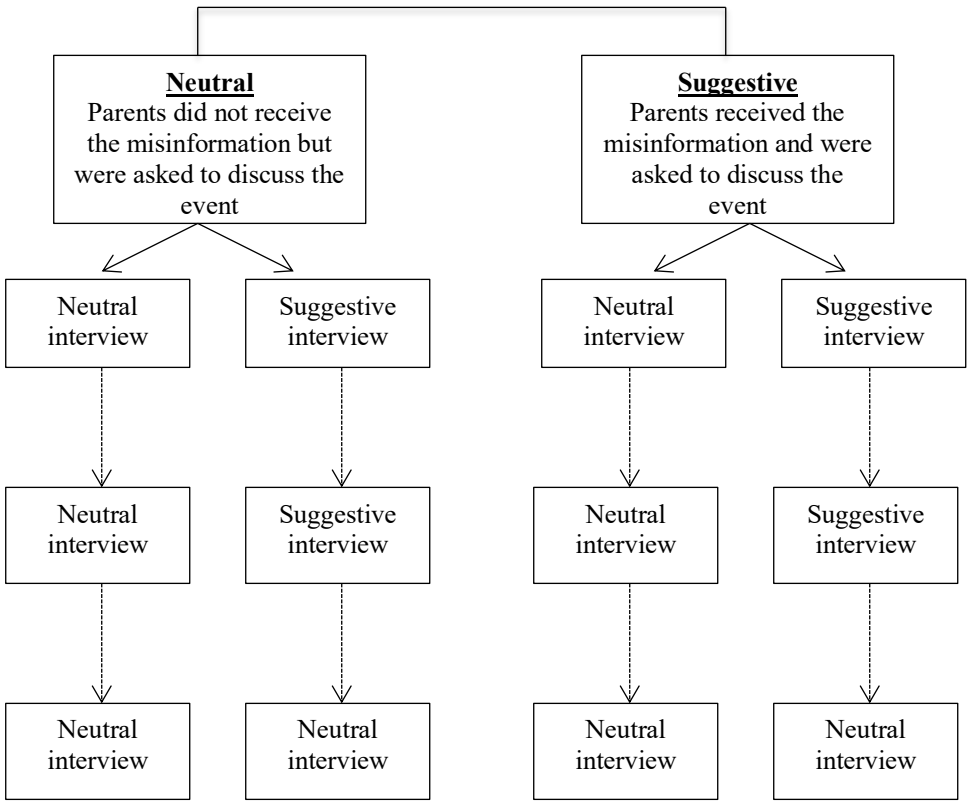


Figure 2

Children's Recall of Target Events in the Final Interview

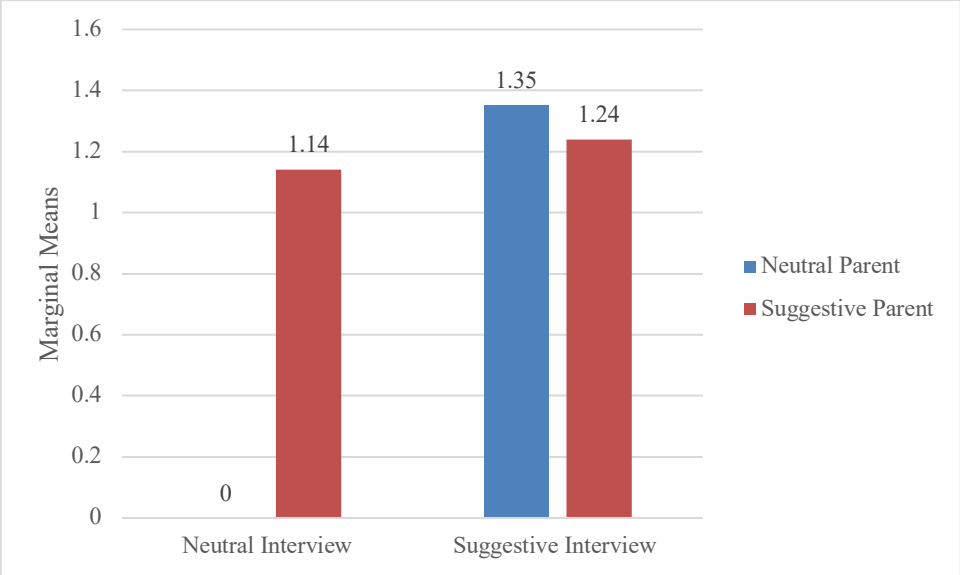


Figure 3

Children's Recall of Details about Target Events at the Final Interview

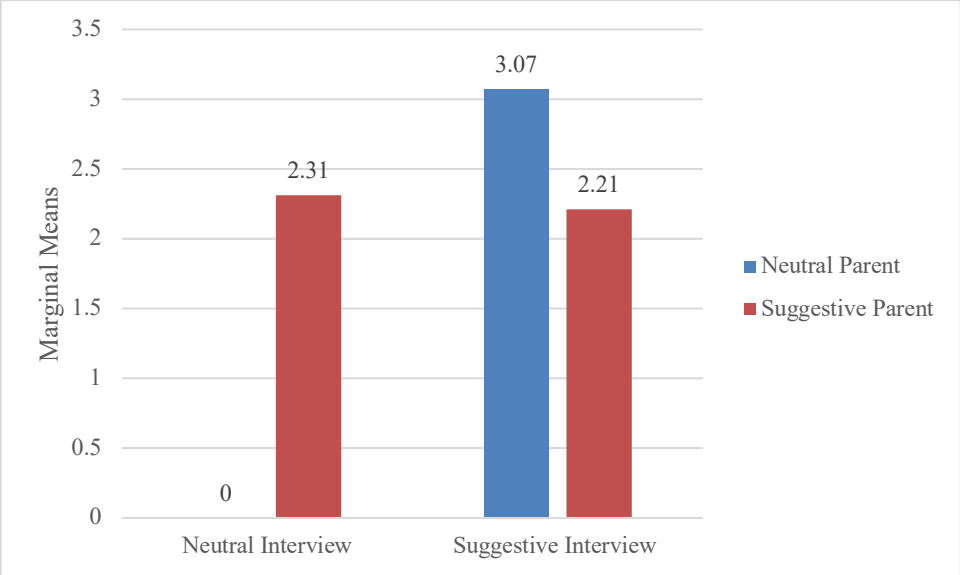


Figure 4

Children's Recall of Verbatim Details at the Final Interview

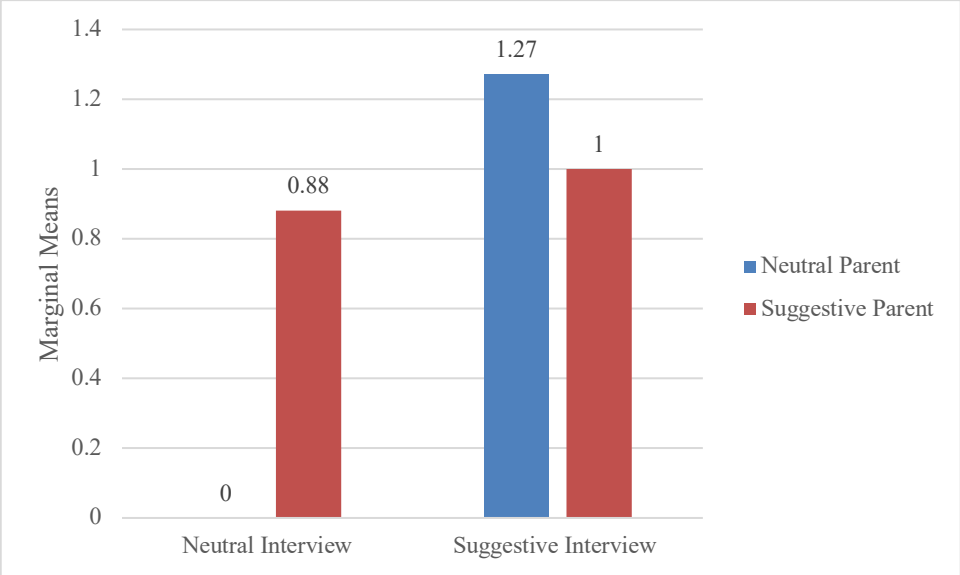


Figure 5

Children's Recall of Constructive Details at the Final Interview

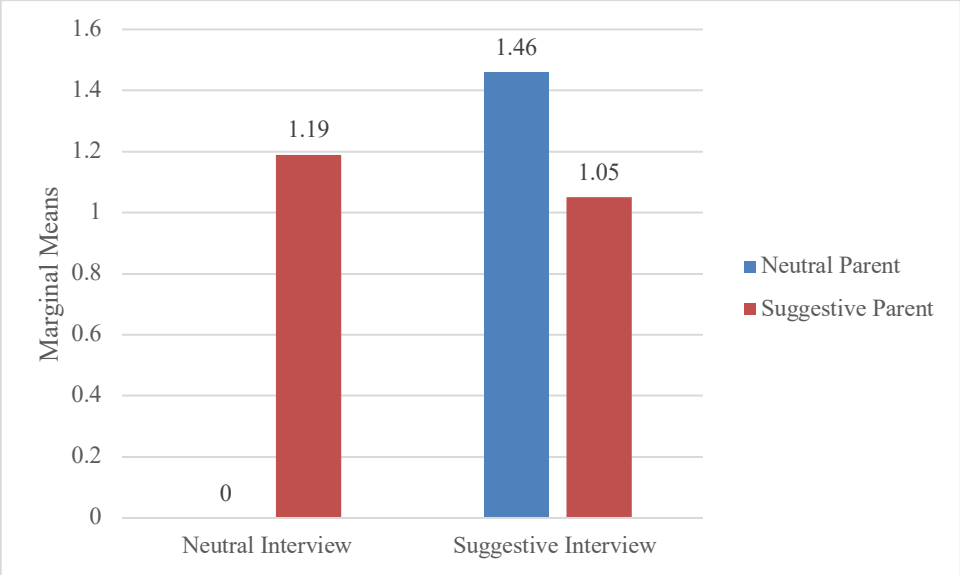


Figure 6

Average Number of Features Recalled by Children Across Interviews by Experimental Condition

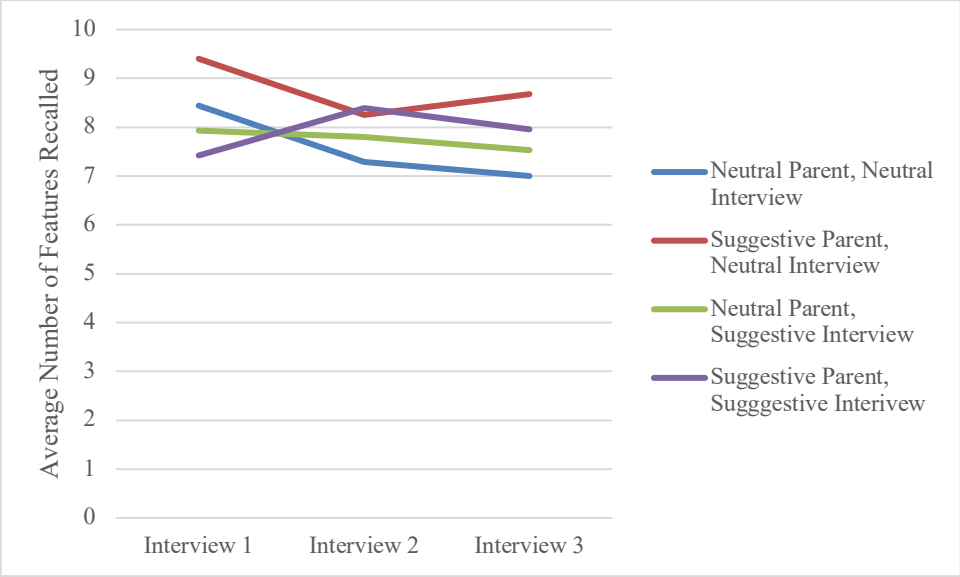
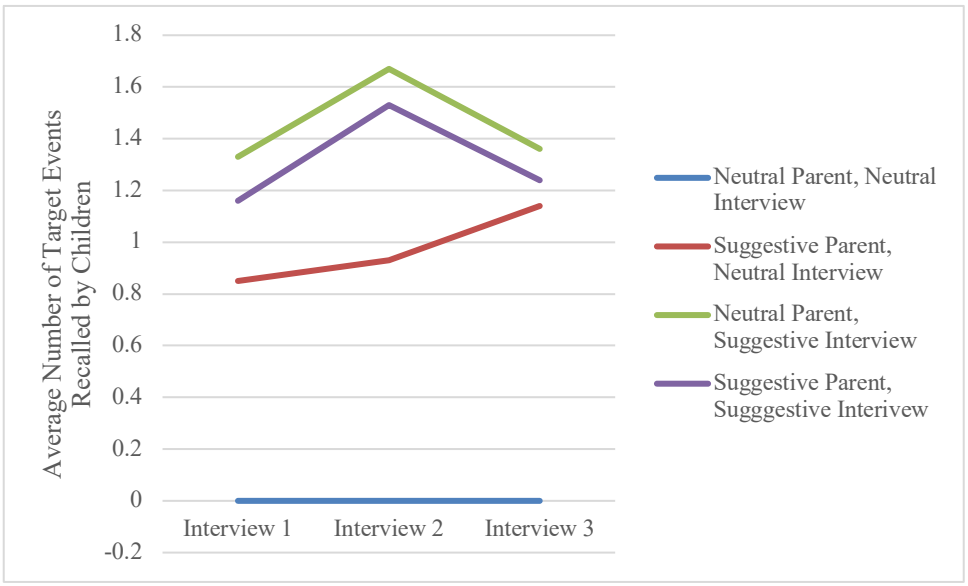


Figure 7

Average Number of Target Events Recalled by Children Across Interviews by Experimental Condition



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