

ABSTRACT

PIERCE, LAUREN ESTHER. At the Zoo and On the Farm: The Effects of an Initial Interview on Pre-Kindergarten Children's Subsequent Recall and Resistance to Retroactive Interference. (Under the direction of Lynne Baker-Ward).

Despite the attention researchers have given to the effects of repeated interviews on eyewitness testimony, relatively few investigations have examined the effects of an initial interview on children's event memory. This study added to the literature by investigating the effects of an initial interview on recall, resistance to retroactive interference, and source monitoring errors. One hundred four-year-old children were engaged in a staged event and were interviewed about this event 4 weeks later. Two between-participant factors, the presence or absence of an initial interview and the administration or lack of administration of a related event during the retention interval, were varied orthogonally. Children in the initial interview group demonstrated greater recall and more elaborations of the target event, regardless of whether or not they had experienced the intervening event. Among the children who were exposed to the intervening event, those who had the initial interview made fewer source monitoring errors than did those who did not have the interview. The findings are interpreted as indicating that an initial interview enhances young children's memory reports by strengthening the memory trace and consolidating the event representation, at least under some conditions.

**AT THE ZOO AND ON THE FARM: THE EFFECTS OF AN INITIAL
INTERVIEW ON PRE-KINDERGARTEN CHILDREN'S SUBSEQUENT
RECALL AND RESISTANCE TO RETROACTIVE INTERFERENCE**

by
LAUREN E. PIERCE

A thesis submitted to the Graduate Faculty of
North Carolina State University
in partial fulfillment of the
requirements for the Degree of
Master of Science

DEVELOPMENTAL PSYCHOLOGY

May 2006

APPROVED BY

Jason Osborne, Ph.D.

Thomas M. Hess, Ph.D.

Lynne Baker-Ward, Ph.D.
Chair of Advisory Committee
Biography

BIOGRAPHY

Lauren Pierce was raised just south of Richmond, Virginia in Prince George County with her mother, father, and identical twin brothers who are three years older than she. She attended the University of North Carolina-Chapel Hill graduating a year early Magna Cum Laude with a Bachelors degree in Psychology. Lauren's research as a graduate student at North Carolina State University centers largely on child testimony and young children's memory within stressful contexts. Lauren currently resides in Cary, North Carolina with her fiancé with whom she will wed in August of 2006.

TABLE OF CONTENTS

	Page
INTRODUCTION.....	1
LITERATURE REVIEW	
Previous work on Memory Interviews with Children.....	2
Rationale for the Present Investigation.....	12
Hypotheses.....	14
METHOD	
Participants.....	17
Design.....	18
Events.....	20
Validation of Materials.....	23
Interview and Intervening Event Protocol.....	23
Source Monitoring Abilities Task.....	26
Procedure.....	27
Coding.....	28
RESULTS	
Preliminary Analyses.....	32
Total Recall Analyses.....	35
Suggestibility Analyses.....	38
Source Errors Analyses.....	39
Source Monitoring Analyses.....	41
Post hoc Analyses.....	42
DISCUSSION	
Did the Initial Interview Enhance Memory Performance?.....	45
How did the Initial Interview Enhance Memory?.....	47
“Mere Testing Effect”.....	47
Trace Strength.....	49
Consolidation.....	50
Individual Differences in Source Monitoring.....	50
Post Hoc.....	52
Limitations and Future Directions.....	52
LIST OF REFERENCES.....	54
APPENDICES	
Appendix A. Parental Consent and NCSU Consent Forms.....	61
Appendix B. Materials Used.....	64
Appendix C. Interview Scripts.....	70

LIST OF TABLES

	Page
Table 1. Core activities included in the mock zoo and mock farm events.....	22
Table 2. Mean number of target animals recalled by gender and event type.....	33
Table 3. Percentage of Children Reporting No False Alarms	38
Table 4. Logistic Regression Results of Predictors on False Alarms.....	39

LIST OF FIGURES

	Page
Figure 1. Total target event recall by presence or absence of initial interview and intervening event.....	36
Figure 2. Total target elaborations by presence or absence of initial interview and intervening event.....	37
Figure 3. Total and type of target elaborations by presence or absence of initial interview and intervening event.....	37
Figure 4. Mean source errors by presence or absence of initial interview and intervening event.....	40
Figure 5. Mean source error elaborations by presence or absence of initial interview and intervening event.....	41
Figure 6. Children's performance on the drawer task.....	42
Figure 7 Children's recall of the intervening event by presence or absence of initial interview.....	43

At the Zoo and On the Farm: The Effects of an Initial Interview on Pre-Kindergarten Children's Subsequent Recall and Resistance to Retroactive Interference

Considerable emphasis has been placed on young children's memory abilities, especially in the context of child testimony (see Westcott, Davies, & Bull, 2002). In forensic settings, an attempt is made to interview children at a point as close in time to the event as possible, in what is referred to as an initial interview, to minimize the chance of forgetting or contamination of the report. For example, the British Memorandum of Good Practice (1992) for child interviewers states that "interviews should be conducted as soon as practicable after an allegation" (page 2). Subsequent interviews occur at various delay intervals, and these interviews often involve probing for more information and assessing the consistency of the interviewee's reports.

The recommended practice of conducting an initial interview embodies the assumption that such early questioning facilitates or at least maintains children's memory over the lengthy delays between the discovery and trial phases of investigations. As will be discussed below, however, very little empirical attention has been devoted to determining the effects of early interviews on subsequent reports in children. Moreover, within the context of one theoretical perspective, initial questioning could disrupt rather than maintain memory, whereas from the vantage point of other conceptualizations, the practice could consolidate and/or strength memory traces.

The purpose of the proposed research is to examine the effects of a neutral initial interview on pre-kindergarten children's subsequent recall of a personally experienced event. The impact of an initial interview on delayed recall and resistance to suggestive

questioning will be examined. In addition, the extent to which an initial interview immediately following an event reduces interference from a second similar event, or retroactive interference, will be examined. Further, to aid in determining if the hypothesized reduction in retroactive interferences results from strengthening the memory trace or from consolidating the memory, source monitoring ability will be examined as a predictor of memory performance.

Suggestive versus Direct Questioning

With the increasing participation of preschoolers in court proceedings, questions about the memory capabilities of young children and the best practices for eliciting accurate information from them has increased salience. As evidenced by strong findings from Bruck and Ceci (1999), Ceci and Huffman (1997), and others, it is safe to say that suggestive interviewing contaminates the subsequent reporting of witnesses, with the youngest witnesses showing the greatest memory disruption. Suggestive questioning includes questioning prefaced with a social incentive (e.g., “I know you’re as smart as the other children, who told me...”), a qualitative reinforcement (e.g., “You are so honest. I know you wouldn’t tell me a lie...”), and leading questioning (e.g., “How did the man hurt you?”) (see Krackow & Lynn, 2003). Evidence shows that children interviewed suggestively often come to incorporate the suggestive information into future reports of the target event (Bruck & Ceci, 2004).

Although the negative impact of suggestive interviewing has been well documented, questions remain about the possible effects of neutral interviewing on children’s subsequent reports of events. Such non-suggestive interviews are the focus of the present research. Neutral interviews are defined as the presentation of questions

in a straightforward manner that does not encourage either affirmation or negation. For example, Baker-Ward, Ornstein, and their colleagues (Baker-Ward, Ornstein, Larus & Clubb, 1993; Ornstein, Baker-Ward, Gordon, Pelphrey & Tyler, in press) used neutral interviewing in their research on children's memory for pediatric well-child examinations. Although their protocol included questions about components of the check-up that were not experienced by the individual, these questions were posed in a direct manner ("Did the nurse give you a shot?"). In these investigations, in contrast to studies involving suggestive questioning, children between ages three and seven did not incorporate information conveyed through questions posed at the initial interview into their subsequent reports.

Is it possible, however, that the current "best practice" for interviewing young witnesses could contaminate delayed memory? Under some conditions, as reviewed below, presenting even neutral specific questions (i.e. Did you go to the park?) to child witnesses may lead them to incorporate what was asked of them in much the same way that suggestive questioning has been shown to do (Bruck & Ceci, 2004). For this reason, Dent and Stephenson (1979) have advised that conceivably any form of direct questioning, whether it is leading or non-leading, is implicitly suggestive to the child witness.

Other researchers assume that an initial interview will enhance the child's subsequent reports of the experience. Brainerd and Ornstein (1991) introduced the term "inoculation effect" to describe the facilitative role of an initial interview in maintaining memory over delays. To what extent does the evidence support this claim?

Research on the Effects of an Initial Interview

Despite the extensive literature on interview practices (see Westcott, et al, 2002) there is little research that directly examines the effects of an immediate interview on children's testimony. In contrast, a number of investigators (Jones & Pipe, 2002; Pipe, et al, 2004; Peterson, Moore, & White, 2002) have examined the effects of additional interviews during the retention period in order to examine their efficacy in reinstating memory. Reinstatement is defined as "a small amount of partial practice or repetition of an experience...which is enough to maintain an early learned response at a high level, but is not enough to produce any effect in animals which have not had the early experience" (p. 478), according to Campbell and Jaynes (1966) who first studied the phenomenon in rats. Essentially, reinstatement can be thought of as a mechanism used to preserve memory at the point when forgetting is beginning to occur by reactivating the stored representation. In contrast to an interview that is conducted at some distance from the event, an initial interview administered very closely in time to the target event occurs before any significant degree of forgetting will have transpired. Hence, much of the literature on repeated questioning is not germane to the understanding of the effects of an immediate interview on delayed recall. Although an immediate interview cannot reinstate memory, there are three cognitive mechanisms through which initial questioning may affect delayed recall.

First, based on fuzzy-trace theory (Brainerd & Reyna, 2004) it can be argued that an initial interview may alter the representation of the encoded event and hence interfere with memory performance, resulting in a rise in the rate of intrusions through the "mere-testing effect." A second line of reasoning is that an initial interview may act

to consolidate the memory, which will be apparent in lower rates of intrusions in subsequent memory tests. Consolidation can be defined as the crystallizing of a memory thus preserving it in long-term memory by increasing the interconnectedness of the items represented in memory (Baker-Ward, Ornstein, & Principe, 1997; McGuigan & Salmon, 2004). Lastly, an argument can be made that an initial interview will act to increase the trace strength of the memory of the target event manifesting in higher recall and lower rates of intrusions. It should be noted that the latter two effects are not mutually exclusive and could apply simultaneously.

The “Mere-Testing Effect”

In some cases, simple exposure to information that did not occur can lead to increased errors during subsequent memory tests. Brainerd and Reyna (1996) have identified the “mere-testing effect,” which has been found to provoke false memory creation in young children. False alarm rates on a delayed recognition test were found to be higher if participants have received a prior memory test, especially one containing distracters that may overlap in meaning with experienced events (Brainerd & Reyna, 1996).

Brainerd and Reyna explain this phenomenon in terms of fuzzy trace theory, which proposes a dual representation of experiences such that a memory is encoded in two forms. These two forms include a verbatim trace of specific surface details of the memory and a gist trace of the broad semantic information of the memory (Brainerd & Reyna, 1996, 1998, 2004). Verbatim traces of specific details have been shown to decay at a faster rate than gist traces (Brainerd & Reyna, 1996, 1998, 2004). Several variables have been shown to affect the decay of verbatim traces to a greater extent

than they alter gist traces. These include younger children versus older children with older children retaining verbatim traces for a longer period of time, single exposure versus multiple exposures with multiple exposures strengthening the retention of verbatim traces, and immediate questioning after a target event versus delayed questioning with immediate questioning strengthening the retention of verbatim traces (Brainerd & Reyna, 1996). Mere testing effect is more of a problem with reinstatement investigations when gist retrieval is activated. False memory creation has been found to be largely gist retrieval related (Brainerd & Reyna, 1996).

In the proposed study, it is unlikely that the mere testing effect will occur in the children. The mere testing effect and false memory creation depend largely on the type of retrieval sought during the initial interview. By asking children about an experience, even with questions posed about non-present aspects of the experience, the reliance is on verbatim retrieval. Enhancement of verbatim retrieval, therefore, is not associated with false memory reports (Brainerd & Reyna, 2004). While a mere testing effect will be examined, evidence largely indicates that such a phenomenon is highly unlikely to occur.

Trace Strength

From a cognitive psychology perspective, an initial interview may provide an additional exposure to the content of to-be-remembered event, which should increase trace strength. When trace strength is increased, forgetting decreases. Neutral initial interviews have been found to strengthen the memory trace for the event, hence enhancing verbatim recall (Brainerd & Reyna, 2004). It is important to note, however, that the work of Brainerd and Reyna (2004) examined memory for repeated

presentations of lists. Does this same finding hold with regard to personally experienced events?

Baker-Ward and colleagues (1993) investigated the long-term retention abilities of a pediatric examination in children ages 3, 5, and 7. Among all children in the study, half received an immediate interview which was randomly assigned, whereas the remaining children did not. Results revealed a null effect of the initial interview, in that it did not protect against forgetting or intrusions. It should be noted, however, that this study was not a true test of trace strength in that the target event was familiar with children having prior knowledge for physicians' visits (see Club et al., 1993), including scripts (Ornstein et al., 1997). Would an initial interview facilitate memory performance in a more challenging task context?

In another area of research, Tizzard-Drover and Peterson (2004) studied children in three distinct age groups recruited from local emergency rooms to examine the influence of number of interviews on long-term recall. Findings from this study indicated that having an initial interview only mildly helped the 3-year-old children and had no effect on the 5-year-old children or the 7-year-old children. Children who were given an initial interview received this approximately 1 week following the target event. Children were interviewed in follow-up memory assessments at both 6 month and 1 year intervals or only a 1 year interval. These results do not, however, translate into null findings in my study as this study also failed to truly address trace strength due to the lengthy delay between initial interview and final memory assessment. Additionally, the fact that the initial interview did help the 3-year-old children remember the event adds credence to the trace strength argument as this is the age group who would be

expected to forget at the quickest rate. The fact that the 3-year-olds showed the least forgetting indicates that the initial interview did serve a purpose of increasing trace strength of the target event.

In addition to its possible role in decreasing forgetting, greater trace strength is associated with the reduced suggestibility. Principe (2004) examined the role of the level of initial encoding in 4-year-old children's false reports. In a simulated shopping event, children were given either one opportunity or multiple opportunities to shop for a list of items. Multiple "shopping trips" were presented in order to increase the strength of the memory for the list of items. The analyses revealed that children who had only a single exposure to the event, and thus a weaker trace strength, were more likely to readily accept and later report false information than were the children who had multiple exposures to the event, and thus greater trace strength. To the extent that an immediate interview increases trace strength, it can be expected to serve to maintain memory over time and reduce suggestibility.

Consolidation

An increase in the consolidation of a memory is one of the possible benefits of an initial interview. McGuigan and Salmon tell us "...talk may also create boundaries around children's representation of the experience, reducing the likelihood that they will distort aspects of the event or intrude information from other events" (2004, p. 680). This team of researchers looked at children 3- and 5-years of age in their examination of the effects of the timing of adult-child talk in relation to a target event on memory for the experience. Findings significantly indicated that children who talked about the event 2-3 days prior following its occurrence showed fewer errors in their accounts of the

event than children who talked about the event prior to or during its occurrence (McGuigan & Salmon, 2004). Although this initial interview delay is longer than the proposed study, its still close proximity lends support for a consolidation effect in that the group allowed to retell an account of the event close in time to its occurrence showed fewer intrusions, although the total number of events reported did not significantly differ from other condition timing groups. It is not likely, therefore, in this study that trace strength increased as higher levels of recall were not witnessed.

If the retelling of an event increases the organization of the event in memory, placing “boundaries around children’s representation,” then the memory will be less likely to be affected by retroactive interference through exposure to a second event. Retroactive interference is the phenomenon in which the first event is more difficult to recall because of an intermediary event occurring which interferes with the initial memory (Baddeley, 1999). Lee and Bussey (2001) examined age related differences in susceptibility to retroactive interference in 4-year-old and 7-year-old children. Children were given a target game and then a pattern of 1, 2, or 3 interpolated games after the target game in delay intervals of 2 days. In each game, the child was required to learn the game to a given criterion. Once the child had learned the game, he or she was taught a new game two days later, eliminating any opportunity to practice the previously learned game. Children’s recall of the target game was then assessed, and the disruptive effects of the intervening games were examined. Analyses showed that retroactive interference occurred equally regardless of age or degree to which the target event was learned. The authors argue that the child’s susceptibility to retroactive interference is independent of the strength of his or her target event memory. It should

be noted that children in this study were not given the opportunity to practice or retell the target occurrence. To the extent that an initial interview increases memory consolidation, it is possible that it can offer protection against retroactive interference.

The results of McGuigan and Salmon (2004) and Lee and Bussey (2001) may appear to contradict those of Principe (2004). In both of the former investigations, memory disruptions through exposure to suggestive questions or an intervening event were unrelated to memory performance. This pattern of results would suggest that trace strength and consolidation operate differently in enhancing delayed recall. However, Principe's manipulation increased both recall and diminished intrusions. Because the children in Principe's investigation were required only to reject information, it is unclear as to whether or not her manipulation also increased the consolidation of the representation in memory. Differences in the methods used in these investigations make it impossible to determine whether or not increases in trace strength and resistance to retroactive interference can both arise from repeated exposure to the to-be-remembered material.

If retelling an event serves to consolidate memory, as McGuigan and Salmon argue, then such an experience should assist the child in differentiating between similar experiences in memory. Hence, consolidation is predicted to decrease retroactive interference. Does an initial interview aid in consolidating an event to the point that a child is readily able to discern it from other similar events?

Source Monitoring

Creating such boundaries necessitates the ability to differentiate information acquired in alternative contexts, an aspect of source monitoring, which is defined as

making attributions about the sources of one's memory or knowledge (Johnson, Hashtroudi, & Lindsay, 1993). Lindsay, Johnson, and Kwon (1992) claim people have a universal tendency to confuse events that are more similar than dissimilar, with children being more vulnerable to such occurrences than adults. Further, as children progress from the preschool years into elementary school age, there is an increased ability to discern similar events.

Research by Poole and Lindsay (2002) illustrates young children's difficulties in identifying the sources of stored information. Children aged three to eight witnessed an event and then were sent home a book that had 50% correct information and 50% incorrect information about the experienced event. After having this storybook for a 3 month time period, the children were interviewed to see if they were able to differentiate between the actual occurrence and the false depiction. Children between the ages of 3 and 6 showed an inability to differentiate between sources, and source-monitoring training only improved performance among the seven and eight year old children (Poole & Lindsay, 2002).

This study did not look directly at initial interview effects in its examination of source monitoring, but it brings to light a question of a potential benefit of an initial interview. Could an initial interview offer a consolidation effect, protecting a child from intermingling two different events? If so, children who receive an initial interview, in comparison to those who do not experience such questioning, should incorporate less information from questions presented in intervening interviews into their delayed reports. Although little research has examined this possibility, there is evidence that at

least in some conditions, initial questioning may not be sufficient to protect memory from retroactive interference.

In summary, it is clear that more research needs to be conducted examining initial interviews with child witnesses. While it is possible that something akin to the “mere-testing effect” may be seen in children, it is unknown if the phenomenon will be applicable in a personally experienced event. Additionally, with a novel event, it is unlikely that children will have the activation spread abilities or the knowledge structures to falsely incorporate the information from the questioning into their memory accounts of the target event. Increasing trace strength seems a very plausible possibility in terms of an initial interview; however only upon analysis of the resistance or lack of resistance to intrusions and total recall ability will a definitive conclusion be established. A consolidation effect holds promise in relation to an initial interview, but firm conclusions cannot be made until a thorough examination has looked at children’s ability to resist retroactive interference if preceded by an initial interview. Many questions remain to be addressed through future research.

Rationale for the Present Research

Much work has been conducted on the effects of suggestive questioning on children’s memory performance. However, no study to date has looked at and directly addressed the initial interview alone from the three aforementioned perspectives or analyzed an initial interview in terms of possibly preventing retroactive interference. The goal of the proposed research is to find out more about children’s recall abilities and resistance to retroactive interference and how initial interview analyses may be a missing link in some previous studies.

Why might an initial interview decrease forgetting and increase resistance to retroactive interference through the subsequent presentation of a similar event? Based on the work of McGuigan and Salmon (2004) among others, the indication is that talking about an event may preserve and protect the memory from intrusions. The limited research on initial interviews, however, has not assessed their effects of retroactive interference.

Given preschoolers' difficulties with source monitoring (Johnson, Hashtroudi, & Lindsay, 1993) and their relatively greater rate of forgetting, especially for verbatim material (Brainerd & Reyna, 1998), and in light of the frequency with which young children are being asked to testify in legal proceedings, there are compelling reasons to focus attention on this age group. A manipulation designed to increase trace strength and memory consolidation through an initial interview is especially germane to work with preschool-aged children.

In keeping with the focus on preschool aged children, Follmer and Furtado (1997) (see Ornstein, Baker-Ward, Gordon, & Merritt, 1997) conducted a meta-analysis pooling many studies by Ornstein, Baker-Ward, and Gordon which examined 3- to 7-year-old children's recall abilities. The combined sample consisted of 232 children divided into three distinct groups: 3-year-olds, 4-5-year olds, and 6-7-year olds. Results found that all children showed a memory decline over time, but, applicable to this study, forgetting began to occur as soon as 1 week after the target event and continued to steadily decline for 4-year-old to 5-year-old children. After a 4 week delay interval, forgetting has lessened percent recall by roughly 10%. This indicates that with a 4-week delay interval, 4 to 5-year-old children can be expected to have some forgetting

occur. It is important to note that the events studied here were events with which even 3-year-old children had prior knowledge. Prior knowledge is associated with lower levels of forgetting (Clubb et al, 1993); hence even more forgetting can be predicted for a novel event. This is used to validate the below mentioned delay interval to be used in the proposed study.

The goal of the proposed study is to examine the effects of a neutral initial interview on preschool-aged children's recall and to analyze potential cognitive mechanisms which may act to support the presence of an initial interview. Groups of four-year-old children will experience one of two novel events based on the "visit to the zoo" event developed by McGuigan and Salmon, followed by an initial interview for half the children. After a delay of 2 weeks, half of the children in both the initial interview and no-initial interview groups will experience another event that is expected to be a source of retroactive interference. At the delayed interview, the effects of the initial interview in enhancing remembering and protecting against retroactive interference will be determined. In addition, I will explore the extent to which individual differences in source monitoring abilities moderate the effectiveness of the initial interview in preventing retroactive interference.

Hypotheses

First, it is expected that there will be a main effect of presence of initial interview, such that children who have an initial interview will have greater total recall after a delay interval than will children who do not have an initial interview. If lower rates of forgetting are accepted as an indicator of trace strength, the predicted result would indicate that the initial interview increases trace strength.

Secondly, it is expected there will be a main effect of presence of intervening event, such that children who experience an intervening event will have higher rates of intrusions to questions regarding the intervening event than will children who do not experience an intervening event. Importantly, it is predicted that this main effect will be qualified by an initial interview x intervening event significant interaction, such that children who have an initial interview, relative to those who do not have an initial interview, will have less retroactive interference when presented with an intervening event. This result would support the argument that the initial interview fosters memory consolidation. It should be noted that support for either or both trace strength and consolidation is possible. The relation between intrusions and recall will be correlated to further assess the independence of consolidation and trace strength.

In relation to the mere testing effect, it is expected that children who are given an initial interview and hence exposed to questions about non-present aspects of the event will report greater instances of false alarms than children who do not receive an initial interview. This result would support the theorized mere testing effect, as the simple posing of information in a question would be enough exposure for children to encode this into their account of the personally experienced event.

It is expected that there will be a significant negative correlation between source monitoring score and retroactive interference intrusions, such that as source monitoring score increases, number of retroactive interference intrusions will decrease.

Among the children who experience the intervening event, it is expected that there will be an interaction between source monitoring group x initial interview, such that children who are high in source monitoring and who have an initial interview will have

the lowest rates of intrusions. Likewise, children who are low in source monitoring and who do not have an initial interview will have the highest rates of intrusions.

Method

Participants

Parents of all children in pre-kindergarten classes in eight cooperating day care centers near Raleigh, North Carolina, received letters describing the research and requesting written consent for their children's participation. (A copy of the parent letter and the consent form is included as Appendix A.) Informed consent for participation was obtained for 118 children, approximately 70% of those for whom consent was requested. Twelve participants participated in only a small pilot study (described below) and another six children were lost from the sample due to absence or noncompliance. Hence, 100 children completed participation in the study proper. Data were only included for children who were present for all phases of the study. The mean age of the sample was 57.5 months with a standard deviation of 2.6 months. Forty-three participants (43%) were males and the remaining fifty-seven (57%) were female. None of the children had apparent handicaps that would limit their participation in the procedures, and preschool directors at each participating school confirmed that English was the first language of the participants in the study. Based on the characteristics of the communities in which they lived, the sample can be considered to consist primarily of children from middle class families. As perceived by the interviewers, 62% of the children were European American; 21%, Asian American; 13%, African American; and 4%, Hispanic American.

Researchers Involved

A total of five researchers worked on the study: one senior researcher (the author) and four undergraduate research assistants. All researchers were trained

extensively on the procedure and on interviewing techniques to be utilized in the study. Prior to the commencement of the study, all researchers were involved in an informal pilot study with children between the ages of 3 and 5 to gain experience with the age group.

Different researchers independently served in differing roles, such that no child ever saw the same researcher twice. One researcher always served as the “zookeeper” and a different researcher always served as the “farmer.” Another researcher conducted the initial interviews following the mock zoo event, and this researcher aided in final memory assessments for those children who had the mock farm as a target event. Another independent researcher always conducted the initial interviews following the mock farm event, and this researcher aided in final memory assessments for those children who had the mock zoo as a target event. The senior researcher oversaw all aspects of the study and conducted the majority of the final memory assessments. This researcher and all other researchers assisting with the final memory assessments were naïve with regard to condition.

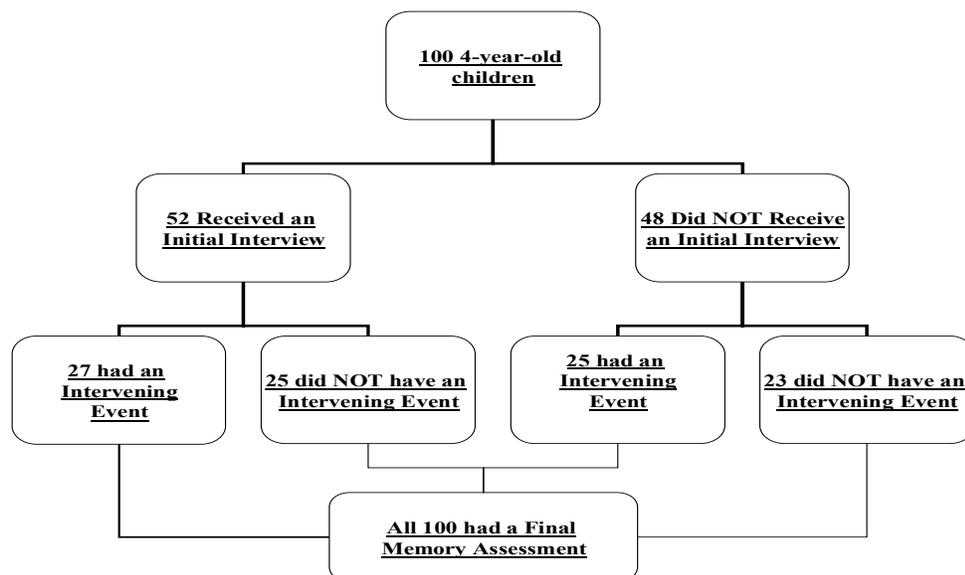
Design

Children were randomly assigned to one of four conditions created by the orthogonal factors of the initial interview (present or absent) and the intervening event (presented or not presented). Fifty-two children received an initial interview and the remaining 48 did not receive an initial interview. Of the children who received an initial interview, 27 were presented with an intervening event and the remaining 25 were not presented with an intervening event. Of the children who did not receive an initial interview, 25 were presented with an intervening event and the remaining 23 were not presented with an intervening event. After a delay of four weeks ($M = 28$ days; $SD = 2$

days), each participant was asked to recall the initially experienced event (the target event).

All participants in this study were involved in a guided mock zoo event (McGuigan & Salmon, 2004), in which each child individually took on the role of zookeeper, and/or a guided mock farm event developed for this study, in which each child individually took on the role of the farmer. The target event order was counterbalanced across all groups, such that half of all participants in each condition experienced the mock zoo as a target event and half were presented with the mock farm as a the target (i. e., subsequently reported) event. Children in each childcare facility experienced the same to-be-remembered event but were assigned to different interview and intervening event conditions. Among the children who "visited" the mock zoo for their target event, half experienced the mock farm activities as an intervening event, whereas the remaining half did not experience an intervening event. Similarly, among the children who participated in the mock farm episode as their target event, half had an intervening event of a mock zoo and the remaining half had no experimenter-provided intervening experiencing. This counterbalancing was applied to avoid any

confounding effects of event type.



Structured Events

Each of the two structured events consisted of six core activities. The first activity was designed to introduce the context of the event to the child and each of the remaining five activities centered around an interaction with a different animal (see Table 1). The mock zoo task was adapted from McGuigan and Salmon (2004), with one of the core activities altered from the original mock zoo event to be more culturally appropriate. For this mock zoo task, McGuigan and Salmon, who were working in Australia, used a koala bear as the target animal. Because it was uncertain if a koala bear would be as readily known to American children, this target animal was replaced with a parrot, of which American children will be more familiar. The mock farm task was created specifically for this study with the intent to make it parallel to but distinct from the McGuigan and Salmon (2004) mock zoo event.

Each event took approximately 10 minutes, and each child was individually walked through the event with the researcher administered in the preschool. All of the

stimuli (see Appendix B) were set up in a location within the preschool, such that other children would not be able to see the animals. All children were given stickers at the end of the event for their participation.

Table 1

Core activities included in the mock zoo and mock farm events.

Mock Zoo		Mock Farm	
Become the zookeeper *	<ul style="list-style-type: none"> ▪ <i>Put on zookeeper shirt</i> ▪ <i>Child assigned job to look after zoo animals</i> ▪ <i>Zookeeper establishes context for the child</i> 	Become the farmer *	<ul style="list-style-type: none"> ▪ <i>Put on straw hat</i> ▪ <i>Child assigned job to look after farm animals</i> ▪ <i>Farmer establishes context for the child</i>
Cleaning the giraffe	<ul style="list-style-type: none"> ▪ <i>Blow bubbles at the giraffe to give it a bath</i> ▪ <i>Brush the fur of the giraffe</i> ▪ <i>Tie a ribbon on the giraffe's tail</i> 	Race the horse	<ul style="list-style-type: none"> ▪ <i>Put the saddle on the horse</i> ▪ <i>After a countdown of "On your mark, get set, go!" child races the horse</i> ▪ <i>Child wins first place ribbon to hang on the horse</i>
Feeding the lion	<ul style="list-style-type: none"> ▪ <i>Put food in bowl for the lion's dinner</i> ▪ <i>Tie a large napkin around the neck of the lion</i> ▪ <i>Do a dinner dance to get the lion to eat</i> 	Shear the sheep	<ul style="list-style-type: none"> ▪ <i>Give the hot sheep some water in its water bowl</i> ▪ <i>Shear the wool off the sheep with a mock razor</i> ▪ <i>Gather the wool into a basket</i>
Look after sick parrot	<ul style="list-style-type: none"> ▪ <i>Take the parrot's temperature with a thermometer</i> ▪ <i>Give medicine to the parrot</i> ▪ <i>Blow the parrot a "get well" kiss</i> 	Put the pig to sleep	<ul style="list-style-type: none"> ▪ <i>Make a bed for the pig because the pig can't fall asleep</i> ▪ <i>Tuck the pig in with a blanket</i> ▪ <i>Sing the pig a lullaby</i>
Present for the monkey	<ul style="list-style-type: none"> ▪ <i>Gather bananas for the monkey,</i> ▪ <i>Put the bananas in a gift bag with a large bow</i> ▪ <i>Give the present to the monkey</i> 	Train the farm dog	<ul style="list-style-type: none"> ▪ <i>Name the new farm dog</i> ▪ <i>Teach the dog how to bark and roll over</i> ▪ <i>Give the dog a bone</i>
Find the baby elephant	<ul style="list-style-type: none"> ▪ <i>Look for the missing baby elephant</i> ▪ <i>Find the baby elephant hiding under a blanket</i> ▪ <i>Return the baby elephant to the zoo</i> 	Find the hens' eggs	<ul style="list-style-type: none"> ▪ <i>Find the chickens' eggs that are missing from the nests</i> ▪ <i>Put the eggs back in the nests</i> ▪ <i>Put the hens back on the nests to sit on the eggs</i>

Note: * indicates an action that was not scored in final analyses.

Validation of Materials

Twelve participants from the recruited sample, who never participated in the study due to absence, illness, or noncompliance, were included in a small study designed to determine if children of this age were able to classify the utilized animals into the appropriate event setting. Children individually were shown a picture of a farm and a picture of a zoo. Each child was given pictures of the stuffed animals used in the structured events and asked to place the animal into the appropriate setting, farm or zoo. For example, the researcher would say, "Here is the lion. Does the lion go with the farm or does the lion go with the zoo? You put it where you think it goes." Upon completion of this task, each animal was held up and the child was asked to name the animal. For example, the researcher would hold up the picture of the lion and ask, "What is this animal called?" The children's responses to these questions were later utilized in coding as appropriate "kid speak" for the naming of the animals.

One hundred percent of the children grouped the animals into the appropriate setting, and all children were able to generate a name for each animal. Most generated animal names that were direct synonyms, with the only exceptions that some children called the "lion" a "tiger" and some called the "dog" a "wolf."

Interview Protocol

If the child was in the initial interview condition, after the target event the researcher approached the child and said: "Hello, [child's name]. My name is [researcher's name]. I am good friend of [previous researcher]. She told me that

you played a pretend zoo/ farm today. I wasn't able to play the zoo/farm game so I wanted to ask you some questions about it. Can you answer some questions about your trip to the pretend zoo/ farm for me?" Upon receiving assent, the interview began with a general open-ended prompt, "Can you tell me everything that happened in your trip to the pretend zoo/ farm today?" The child was allowed to speak uninterrupted with occasional non-directive prompts ("What happened next?" "Can you tell me more?"). Interspersed in the interview were a set of direct questions about actions that did not occur to test for suggestibility and to test the mere testing effect. In these questions, the interviewer specifically probed the child about four non-present animals, a goldfish, a cat, a squirrel, and a hamster. For example, the interviewer asked, "Did you see a goldfish at the farm game?" These animals were selected because they could not be readily classified as either zoo or farm animals. This question format was chosen in order to examine the mere testing effect, as it was important that the "distracter" items be presented in a manner consistent with that used to convey the "target" information (i. e., questions about present items).

When the child was unable to provide any further information, one final non-directive prompt was made, "Is there anything else you can remember?" If the child acknowledged his or her completion, the interview (see Appendix C) concluded and the child was given a sticker for his or her participation. The child was thanked for his or her participation, and the interviewer will walk the child back to the classroom.

In the No Initial Interview condition, the child was asked nothing about his or her participation in the event. Instead, after the zoo/ farm task ended, the child was thanked for his or her participation, and the interviewer walked the child back to the classroom.

Intervening Event Protocol

A two-week interval passed and a different researcher than the one who had interacted with the child in the target event went to the preschool or childcare center and led the intervening event manipulation for the children in this condition. The researcher who conducted the mock zoo task for the target event led the mock zoo task for the other group of children as their intervening event. Similarly, the researcher who conducted the mock farm task for the target event presented the mock farm task for the other group of children as their intervening event. The researcher took the children through the intervening mock event in the same fashion as she directed the target event. No interviews were conducted after completion of the event.

Final Memory Assessment

After another two-week interval, an interviewer who has never interacted with the children went to the preschool or daycare center and conducted the final memory interview assessment of the target event. All children were given this final memory interview assessment. A four-week interval between target event and final memory assessment was utilized to allow for some forgetting to occur (Follmer & Furtado, 1997; see Ornstein, Baker-Ward, Gordon, & Merritt, 1997). By using a four-week time interval, consolidation of the event and ability to resist

retroactive interference could be examined (Brainerd & Reyna, 2004). The interviewer talked to the children one at a time in a location within the school facility recommended by the staff. Upon receiving assent, the interviewer proceeded to ask the child questions utilizing a hierarchical questioning style similar to the one used by McGuigan and Salmon (2004) and Jones and Pipe (2002). As a supplement to the hierarchical interviewing protocol, the interviewer then asked the children four suggestibility questions about non-present aspects, the same four questions posed to children in the initial interview. These questions directly asked the children if they remembered seeing a goldfish, hamster, cat, and squirrel at the target event. These questions were posed to each child in the final memory assessment regardless of previous exposure in the initial interview condition.

To then gain a more complete assessment of how well the initial interview acted to consolidate the first experience, the child was asked if he or she remembered the second event, if applicable. When the child acknowledged remembering nothing more, the interview concluded and the child was thanked for his/her participation.

Source Monitoring Abilities Test

Immediately after completion of the memory interviews, each child was given a brief assessment to measure individual differences in source-monitoring ability. The child was given an adaptation of the “drawer task” created by Gopnik and Graf (1988) and utilized by Leichtman et al. (2000) with 4-year-old children. The child was presented with a small chest of drawers containing six closed

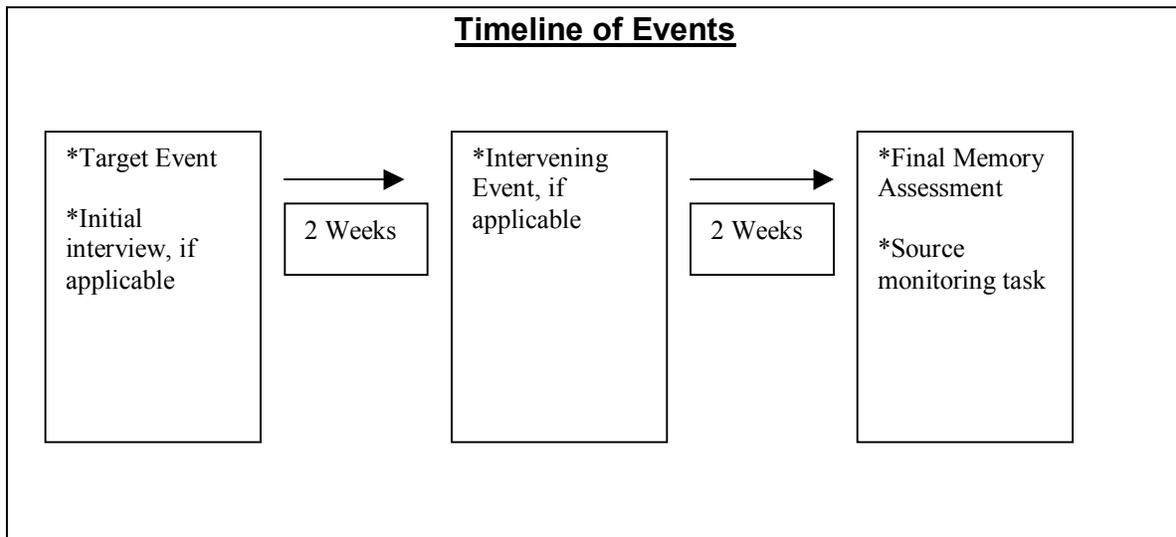
drawers. During the initial phase of the task, the child was told that in this game “we want to figure out what is in each of the drawers.” The child learned the contents of two drawers by opening them and seeing what is inside, being asked “What is in this drawer? Let’s open it and see.” The child discovered the contents of two other drawers by being told what is inside. The researcher said, “This drawer won’t open but I know what is inside. I will tell you. It is a _____.” The child learned the contents of two other drawers by having to guess what it is inside. The researcher said, “This drawer won’t open but I can give you a clue as to what is inside.” The researcher then gave the child a very easy clue such that the child could easily guess. Upon immediate completion of this phase of the task, the child was asked questions about how they learned about the objects’ locations with the researcher saying, “What is in this drawer? How do you know? Did you see it with your own eyes, did I tell you what was in it, or did you guess it with a clue?” Upon completion of this task, the child was again thanked for his or her willingness to answer some questions about the events and was given a small prize.

In support of the utility of this measure, Leichtman et al. found source-monitoring ability as measured by Gopnik and Graf’s task to be correlated with their measures of suggestibility. It was not, however, associated with their measures of recall.

Procedure

Each child was individually walked through a staged event in the initial encounter with a researcher, with the initial event counterbalanced of either mock

zoo or mock farm. If the child was in the initial interview condition, he or she was immediately interviewed following the staged event by a different researcher. Two weeks time elapsed and if children were in the intervening event condition, a different researcher than had ever interacted with the child led the child through the intervening event, again counterbalanced dependent upon the child's initial event. No children were interviewed following the intervening event. Two weeks time elapsed, and all children were interviewed about his or her initial event by a researcher whom had never interacted with the child. All children were administered a source monitoring task following the final interviewer. All aspects of the study took place within the preschool setting.



Coding

Following the coding scheme used by McGuigan and Salmon (2004), the data in this study were coded for the *total number of target event animals* each child was able to recall in the final memory assessment. For example, among

the participants whose to-be-remembered event was the farm episode, the utterance, "I saw a horse," was coded as the recall of one target event animal. Nonstandard designations of target animals ("kid speak") were coded as correct if the label had been generated by a participant in the validation of materials. For example, "pony" was accepted for "horse" because at least one child in the confirmation study used the term to label the horse. Separate coding was performed on the initial and final memory assessments ($\alpha = .99$; $\alpha = .98$).

Elaborations on the target animals were coded as any new detail not previously reported by the child, separated into categories of descriptive elaborations and action elaborations (For example, the statement I *brushed the wool off* in the child's description of her interaction with the sheep was coded as one action elaboration). Separate coding was performed on the initial and final memory assessments ($\alpha = .93$; $\alpha = .93$).

Source errors were coded as the report of an animal from the intervening event when being questioned about the target event (I saw a *chicken at the zoo*, which would constitute a source error as this was an animal from the farm event being incorrectly reported as being within the zoo event). Separate coding was performed on the initial and final memory assessments ($\alpha = 1.00$; $\alpha = 1.00$).

Elaborations on source errors were coded as any new detail not previously reported by the child, separated into categories of descriptive elaborations and action elaborations (I saw a chicken at the zoo and *helped find its eggs*, which would constitute a source error elaboration as the child incorrectly reported an animal from the wrong event and then provided an additional action

elaboration). Separate coding was performed on the initial and final memory assessments ($\alpha = .91$; $\alpha = 1.00$).

False alarms were operationalized as the report of a non-present animal (i.e. goldfish, hamster, squirrel, cat) in response to a suggestive question (Did you see a squirrel? *Yeah I saw a squirrel*, which would constitute a false alarm as the child authenticated a non-present animal). Separate coding was performed on the initial and final memory assessments ($\alpha = 1.00$; $\alpha = 1.00$).

Elaborations of false alarms were coded as any new detail not previously reported by the child, separated into categories of descriptive elaborations and action elaborations (The *squirrel had a bushy tail*, which would constitute a descriptive false alarm elaboration as the child not only authenticated a non-present animal but gave an elaborative appearance detail about it). Separate coding was performed on the initial and final memory assessments ($\alpha = .91$; $\alpha = .98$).

Intrusions were coded as the report of a non-present animal unrelated to the target event, the intervening event, or the suggestibility questions (I saw a *dragon*, which would constitute an intrusion as the animal reported was not present in the target event, the intervening event, or posed to the child in a suggestibility question). Separate coding was performed on the initial and final memory assessments ($\alpha = 1.00$; $\alpha = 1.00$).

Elaborations on the intrusion animals were coded as any new detail not previously reported by the child, separated into categories of descriptive elaborations and action elaborations (There was a *dark green rattlesnake*, which

would constitute an intrusion elaboration as the animal reported was not present in the target event, the intervening event, or posed to the child in a suggestibility question and the child provided a descriptive detail about it). Separate coding was performed on the initial and final memory assessments ($\alpha = 1.00$; $\alpha = .96$).

The source monitoring coding scheme is an exact replica of the method used by Leichtman et al, (2004). Coding of *individual differences in source monitoring* was tabulated by tallying how many source monitoring questions each child was able to answer correctly. A correct response occurred when the child could correctly identify how he or she came to know the information relating to the whereabouts of a particular object through the forced option questioning of source. (E. g., I saw it [the seashell] with my eyes).

Coding of *temporal sequencing* was tabulated by how many of the target animals the child recalled in the appropriate order. A child could get points for any animals recalled in correct sequence despite missed animals within the succession. (E.g., A child could recall animal 1 and animal 3 in the correct order getting points for each of these, although not recalling the 2nd animal in the correct order).

Two independent coders double coded 25% of the transcripts. Reliability assessed using the alpha statistic, ranged from .91 to 1.00. The few disagreements between the two coders' assessments were resolved through discussion. The author coded the remaining narratives.

Results

The main questions of interest, as conveyed in the hypotheses, concerned the impact of an initial interview on the recall of an experimenter-provided event, and the efficacy of this initial interview in reducing levels of intrusions following the experience of a structurally and thematically similar, intervening event.

These questions were addressed through a series of 2 (Initial Interview: Present or Absent) x 2 (Intervening Event: Present or Absent) ANOVAs, using dependent measures that indicated memory, suggestibility, and source errors. An additional objective was to investigate the underlying cognitive mechanisms through which pre-Kindergarten children might remember personally experienced events. Correlational techniques were used to explore possible evidence for such mechanisms.

Before the hypotheses were tested and relevant post-hoc analyses were conducted, a series of preliminary analyses were conducted. These analyses were conducted to examine the effects of potentially confounding variables on the recall of the target animals

Preliminary Analyses

As can be seen in Table 2, mean recall of target animals was nearly equivalent across target event and gender. The use of an independent sample t-test confirmed the equivalency of the two to-be-remembered events, $t = -1.21$, $p = .23$. Hence, the researcher appears to have been successful in creating two events that would be comparable with regard to their memorability, and it was not necessary to include event type in subsequent analytic models. An order

analysis was conducted to determine if total recall or source errors differed among children who had an intervening event, dependent upon the order of the events. Order of events did not significantly affect total recall, $t = .012$, $p = .99$, or source monitoring errors, $t = .27$, $p = .79$. An additional t-test confirmed the absence of an effect of gender, $t = -1.45$, $p = .15$.

Table 2

***Mean Number of Target Animals Recalled by Gender and Event Type
(Standard Deviations are in Parentheses)***

Mock Zoo			Mock Farm		
Male	Female	Total	Male	Female	Total
3.05 (1.72)	3.44 (1.61)	3.23 (1.69)	3.40 (1.54)	3.47 (1.39)	3.44 (1.47)

A total of eight preschools were involved in this study, with the number of children from each facility ranging from nine to 17. As confirmed by the use of a one-way ANOVA, there were no differences in recall as a function of preschool, $F(7,92) = 1.40$, $p = .90$.

A total of three interviewers were involved in the final memory assessments of children. The author interviewed 61 children, and the two undergraduate students tested 14 and 25 children, respectively. As confirmed by the use of a one-way ANOVA, there were no differences in recall as a function of interviewer, $F(2,97) = 1.25$, $p = .29$. Due to relatively small sample size of interviews by the second and third researcher, a follow-up analysis tested for

differences in total recall and source monitoring errors by author versus other interviewer. There was not a significant difference between author and other researchers on total recall, $F(1,98) = 1.77$, $p = .19$, or source monitoring errors, $F(1,98) = 2.36$, $p = .13$.

Further analyses explored the relation between age in months and total recall at the final memory assessment. As expected given the fairly narrow age range of the participants in this investigation, the correlation was not significant, $r = .06$, $p = .55$.

Given the absence of effects, the data were collapsed across event type, order, gender, preschool, and interviewer for further analyses. Similarly, age in months was not included as a covariate in any models.

In all ANOVA tests performed, the assumptions of an ANOVA were validated. Homogeneity of variance was not violated in any of the analyses as confirmed in the ANOVA testing, and equal sample size was assumed as little variance existed between the sample groups, $M = 25$, $SD = 1$. Inspection of graphs of distribution of scores on each variable from participants in each condition confirmed normal distribution. No scores on any variable exceeded two standard deviations from the mean.

Intrusions, or the report of an animal with no connection to the target event, intervening event, or suggestibility questions, were rare in occurrence with only 10% (10 of 100) of all children reporting an intrusion, and of these only a scarce few (3 of 10) providing any elaboration. There was no effect of condition

on intrusion production, $F(1,96) = .67$, $p = .42$, and thus intrusions were examined no further.

Total Recall Analyses

Figure 1 displays total recall of the target event by the initial interview and the intervening event conditions. As indicated in the figure, the children who had an initial interview reported more than double the total number of target animals as did the children who did not have the initial memory assessment. A 2 (initial interview: present or absent) x 2 (intervening event: present or absent) ANOVA was conducted on total target recall, and a significant effect of initial interview presence was revealed, $F(1,96) = 75.11$, $p < .001$, $partial \eta^2 = .44$. The intervening event condition, $F(1,96) = 1.36$, $p = .25$, and the interaction of the two factors was not significant, $F(1,96) = 0.70$, $p = .40$.

Comparisons of total mean number of elaborations per animal by children who did have an initial interview with children who did not have an initial interview were conducted, revealing a significant effect of presence of interview as presented in Figure 2, $F(1,96) = 53.93$, $p < .001$, $partial \eta^2 = .36$. The presence of an intervening event showed a trend towards significance although the effect size was quite low, $F(1,96) = 3.48$, $p = .065$, $partial \eta^2 = .035$. A main effect of initial interview was, as expected by the previous finding, reflected in the number of descriptive, $F(1,96) = 48.79$, $p < .001$, $partial \eta^2 = .33$, and action elaborations, $F(1,96) = 101.50$, $p < .001$, $partial \eta^2 = .51$, as shown in Figure 3. Consistent with previous findings, presence of an intervening event on descriptive elaborations,

$F(1,96) = .91$, $p = .34$, $partial \eta^2 = .009$, and action elaborations, $F(1,96) = 2.37$, $p = .13$, $partial \eta^2 = .024$, and an interaction of the two factors on descriptive elaborations, $F(1,96) = .087$, $p = .77$, $partial \eta^2 = .001$, and on action elaborations was not significant, $F(1,96) = 0.24$, $p = .88$, $partial \eta^2 = .000$.

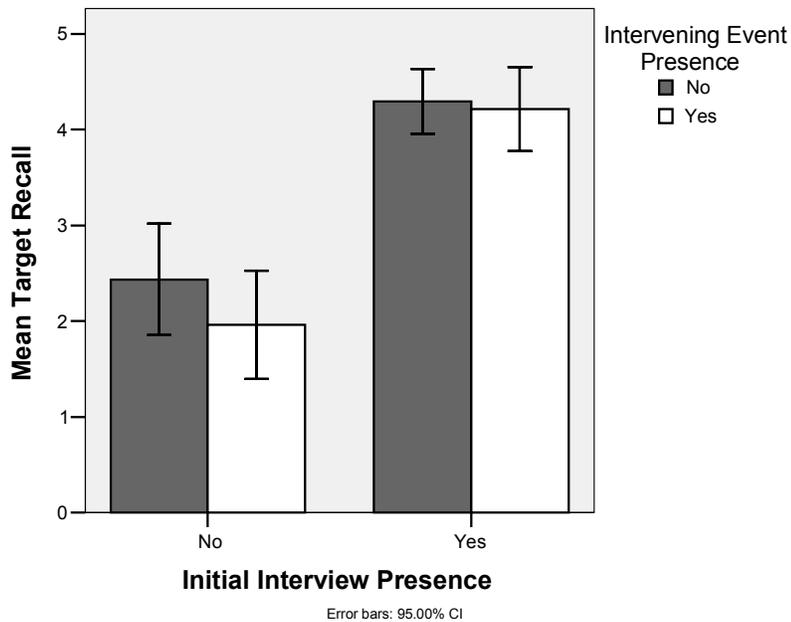


Figure 1. Total target event recall reported by initial interview (presence or absence) and intervening event (presence or absence).

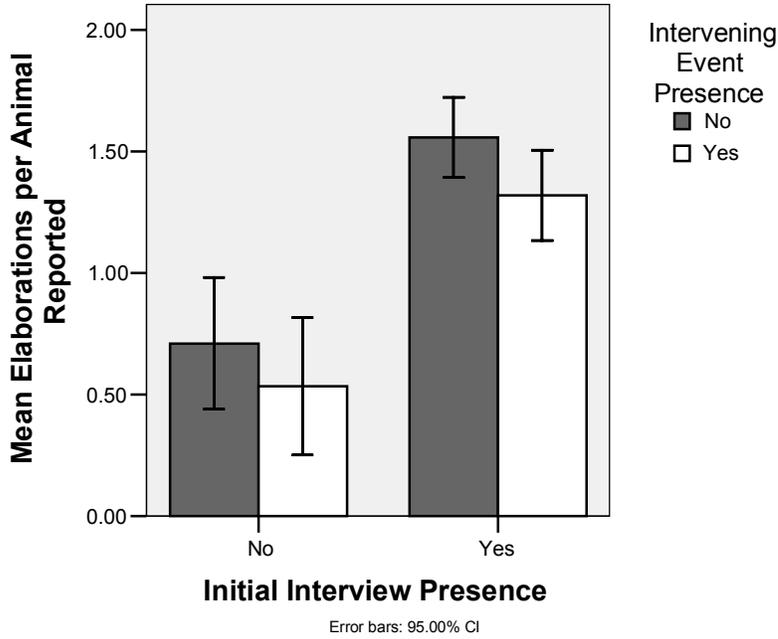


Figure 2. Mean number of elaborations per animal reported by initial interview (presence or absence) and intervening event (presence or absence).

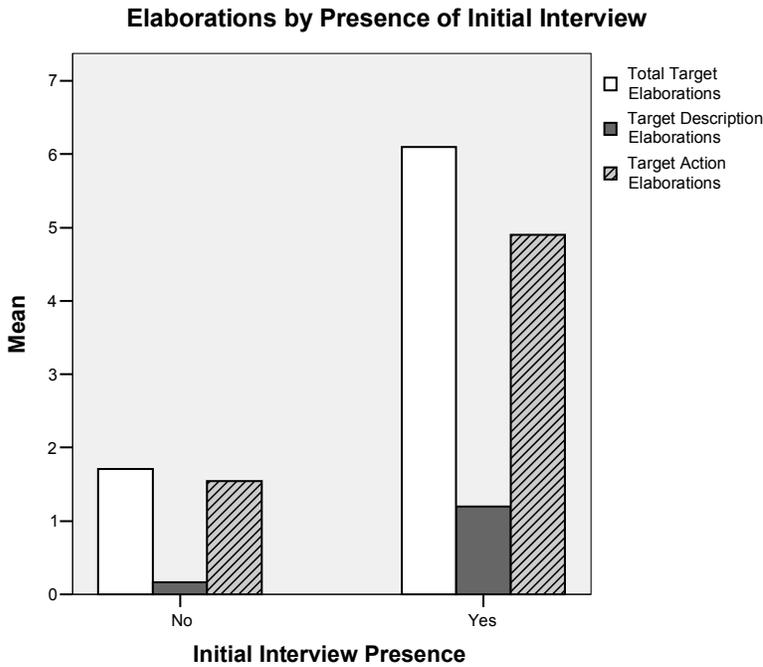


Figure 3. Type of elaboration reported by initial interview (presence or absence).

Suggestibility Analyses

A 2 (Initial Interview: Present or Absent) x 2 (Intervening Event: Present or Absent) ANOVA was conducted on false alarms to suggestibility questions revealing no significant difference by presence or absence of initial interview, $F(1,96) = 3.37, p = .069, \text{partial } \eta^2 = .034$, or by presence or absence of intervening event, $F(1,96) = 3.49, p = .065, \text{partial } \eta^2 = .035$. The interaction of the two factors on false alarms was also not significant, $F(1,96) = 0.055, p = .82, \text{partial } \eta^2 = .066$. These findings are likely due to the near floor rate of false alarms as can be seen in Table 3.

Table 3

Percentages of Children Reporting No False Alarms

	Percent Reporting No False Alarms	Means Square
Initial Interview and No Intervening Event	65.22%	1.84
Initial Interview and Intervening Event	64.00%	
No Initial Interview and No Intervening Event	85.19%	
No Initial Interview and Intervening Event	66.68%	

A logistic regression was conducted to analyze the impact of initial interview presence or absence and intervening event presence or absence on false alarms. The model tested analyzed the extent to which initial interview presence or absence, intervening presence or absence, and the interaction of these two variables affected false alarm presence or absence. No variables were significant predictors, but the trends were in the predicted direction. As Table 4

shows, initial interview presence was a near significant trend indicating that children who had an initial interview were .27 times as likely to make false alarms as those children who had no initial interview.

Table 4

Results of Logistic Regression of Predictors on False Alarms

Predictors	Odds Ratios	Wald chisquare	Significance
Initial Interview	0.27	3.03	0.082
Intervening Event	1.25	0.14	0.71
Initial Interview * Intervening Event	3.11	1.44	0.23

Source Errors Analyses

A 2 (initial interview: present or absent) x 2 (intervening event: present or absent) ANOVA was used to examine the effects of the initial interview on the number of source errors, defined as the number of animals reported which were not present in the target event but present in the intervening event. As obviously expected, children who experienced an intervening event intruded more animals from this event during the final interview (in which the initial event was recalled) than did the children who did not experience this event, $F(1,96) = 65.11$, $p < .001$, $partial \eta^2 = .40$. The effect of the initial interview was examined among only those children experienced the intervening event. As predicted, a main effect of initial interview was found, $F(1,51) = 165.29$, $p < .001$, $partial \eta^2 = .76$. Follow-up analyses indicated that among children who received an intervening event, the

presence of an initial interview greatly reduced the number of source monitoring errors as displayed in Figure 4.

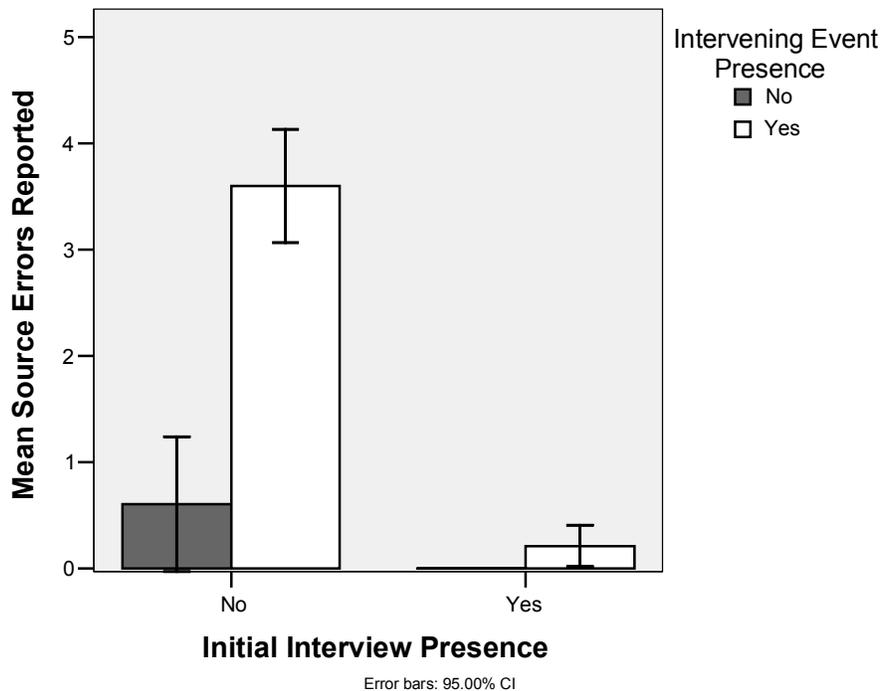


Figure 4. Mean number of source errors reported by initial interview (presence or absence) and intervening event (presence or absence).

Analyses of mean number of source error elaborations per animal reported again revealed a main effect of intervening event as shown in Figure 5, $F(1,51) = 27.21$, $p < .001$, $partial \eta^2 = .221$, and this finding held consistent across elaboration type of description, $F(1,51) = 72.30$, $p < .001$, $partial \eta^2 = .24$, and action, $F(1,51) = 72.297$, $p = .000$, $partial \eta^2 = .349$. A significant main effect was also found for presence of initial interview, $F(1,51) = 12.94$, $p = .001$, $partial \eta^2 = .12$, and the interaction of these two factors, $F(1,51) = 10.78$, $p = .001$, $partial \eta^2 = .10$. Follow-up analyses again indicated higher rates of source error elaborations in those children who did not have an initial interview and did have an intervening

event, more so children who did have an initial interview and had an intervening event.

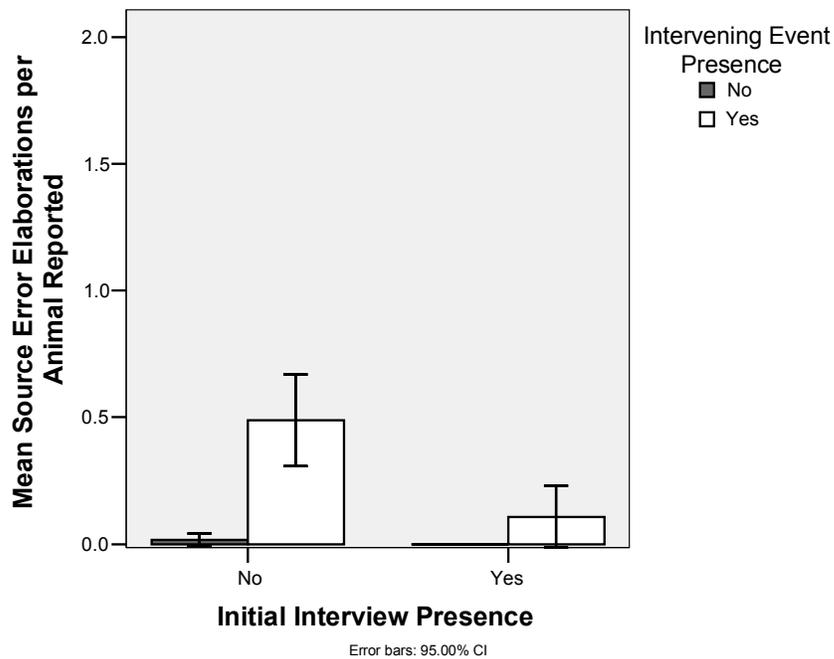


Figure 5. Mean number of source error elaborations per animal reported by initial interview (presence or absence) and intervening event (presence or absence).

Source Monitoring Analyses

Children's performance on the drawer task varied greatly, with a full range of possible scores, $M= 3.66$, $SD=1.479$. As seen in the distribution below, Figure 6, the expected bimodal distribution was not present. Correlations between scores on the drawer task and number of source errors reported were not significant, $r= -.16$, $p= .11$.

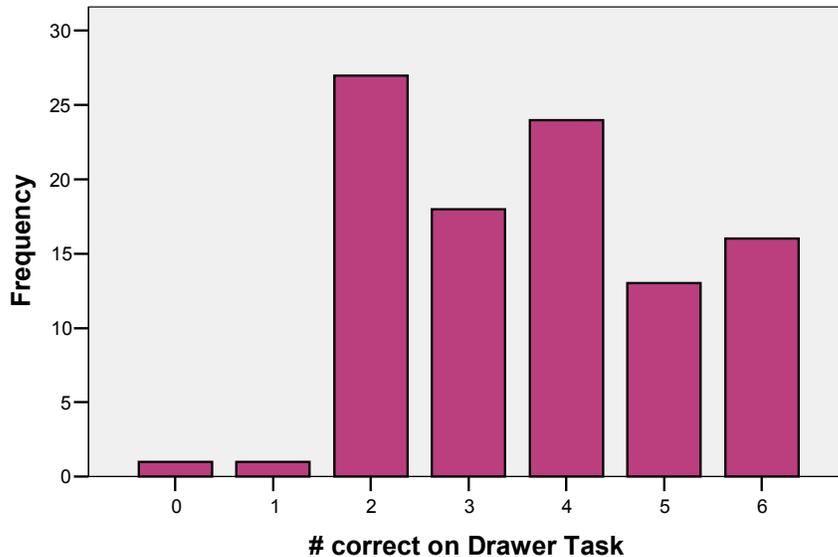


Figure 6. Children's performance on the drawer task

Post hoc Analyses

Follow-up analyses were conducted to determine if there was a significant correlation between the open-ended recall of animals in a child's initial interview with open-ended recall of animals in a child's final interview. This correlation was not significant, which was likely due to near-ceiling reports at both the initial, $M=4.78$, $SD=.50$, and final interviews, $M=4.25$, $SD=.98$.

Children who experienced an intervening event ($N=50$) reported little about this event, $M=1.62$, $SD=1.44$. Another post-hoc analysis examined why children had significantly greater levels of recall for the initial event versus the intervening event, despite the fact that the intervening event occurred closer in time to the intervening event. There was a significant difference in recall of the intervening event dependent upon whether the child had an initial interview, with these children recalling slightly more $F(1,48)=7.21$ $p=.01$, *partial* $\eta^2=.13$, as

can be seen in Figure 7. This effect acts to further support the cognitive mechanism of consolidation, in that children who were given the opportunity to report the target event in an interview were better able to consolidate the experience, hence other experiences could be encoded as distinct and discrete from the target event.

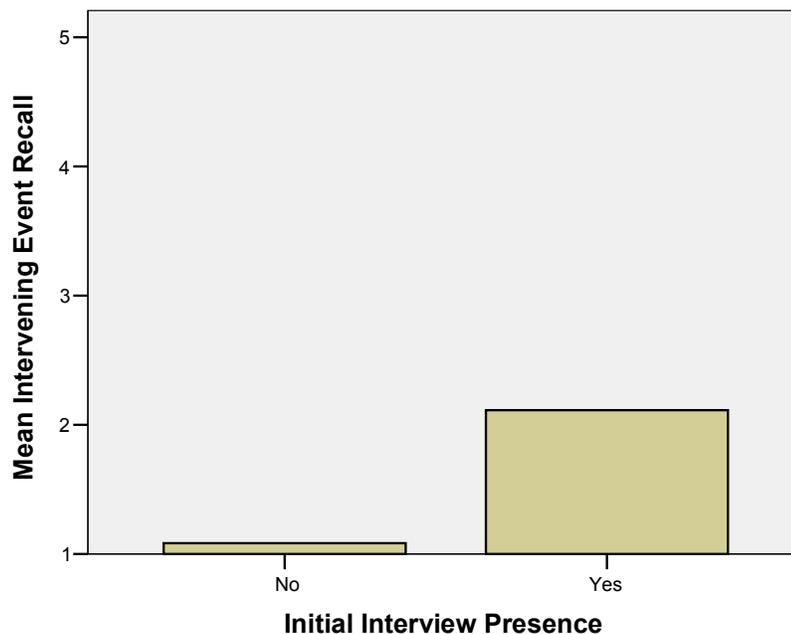


Figure 7. Intervening event recall by presence or absence of initial interview

Further analyses examined the extent to which children utilized temporal sequencing in subsequent reports about the target event. A one-way ANCOVA was conducted examining the effects of an initial interview on number of correct temporal sequences covarying out the effects of total target recall. The effect of an initial interview was not significant, $F(1,96) = .96$ $p = .33$, but it is important to note that mean levels of temporal sequencing were particularly low, $M = .87$, $SD =$

1.28. The lack of effect found may be due to near floor levels of sequencing utilized.

Discussion

Despite the number of investigations that have examined the effects of multiple interviews on children's event recall and suggestibility, the effects of an initial interview on young children's reports has received little systematic attention. Moreover, the few extant studies in which the effects of an initial interview had been systematically examined reported inconsistent results (cf. Baker-Ward et al., 1993; Peterson, 1999; Tizzard-Drover & Peterson, 2004). This study contributed to the literature by investigating the impact of an initial interview on pre-Kindergarten children's reports of a personally experienced, novel event. Further, the presentation of an intervening event to half the children enabled an assessment of the efficacy of an initial interview in reducing inclusions that represented source monitoring errors. Moreover, the investigation's design made it possible to explore patterns of performance indicative of alternative mechanisms through which the initial interview enhanced performance.

As discussed in this chapter, the findings document the efficacy of an initial interview in enhancing children's event reports over an extended delay interval. These findings are reviewed below, and reasons for the discrepancies across investigations are explored. Further, as is examined in detail, the pattern of results supports the importance of one particular mechanism, consolidation, in conveying the benefits of an initial interview. Next, the implications of individual

differences in source monitoring abilities are examined. This chapter also provides an exploration of the limitations and potential utility of the present approach.

Did the Initial Interview Enhance Memory Performance?

The presence of an initial interview was found to drastically increase recall and elaborations of the target event, a visit to either a pretend zoo or a play farm. More specifically, children who had an initial interview reported more than double the amount of information, on average, than did the children who did not have an initial interview. This effect held constant even in the presence of an intervening event. An equally strong effect was also found in initial interviews on the reduction of the number of source monitoring errors made by children who experienced an intervening event. Children who experienced an intervening event and who had not had an initial interview were two times more likely to report source monitoring errors in their recall of the target event. Hence, the results clearly established that an initial interview enhance young children's event memory.

Why are the results of this study so strong when past studies have found mixed results concerning early interviews? One explanation may be in the timing of the early interview. In some investigations, (Jones & Pipe, 2002; Principe, Ornstein, Baker-Ward, & Gordon, 2000) the first interview occurred after a delay interval of 1 to 4 weeks. It is possible that young children's memory had begun to fade at this point. If so, the interview could not have served to reinstate what was no longer present in memory, and hence would have had no effects. In the

present investigation, the immediate interview would have occurred prior to the point at which forgetting would be expected to occur. While it is unlikely that the interview in this investigation served to reinstate memory, it is certainly the case that interviews that occur at different points in the retention interval may facilitate memory in different ways.

Another possible explanation for the discrepant findings involves the nature of the events in which the children participated. Although pre-Kindergarten children have a working knowledge of farms and of zoos, this event was novel in its structure. Children did not have a script or a knowledge base from which to relate the experience of interacting with these animals in the fashion in which it was constructed, and there was not a script for the order of events. Previous studies have examined more familiar events, such as doctor's visits (Baker-Ward, et al, 1993), for which children already have a knowledge base and thus may not need an initial interview to aid in the consolidation of the experience in the same way the children did for such an unfamiliar event.

This interpretation is supported by the work of Tizzard-Drover and Peterson (2004) who found that an initial interview benefited younger but not older children. Given the age-related increases in knowledge about medical procedures reported in the literature (Clubb, Nida, Merritt, & Ornstein, 1993; Ornstein, Baker-Ward, Gordon, Pelphrey, Tyler, & Gramzow, 2006), it is plausible that the initial interview provided a basis for organizing and consolidating the event that that compensated for the younger children's lack of pre-existing knowledge. In contrast, the older children, with their greater pre-

existing knowledge, did not need the initial interview and hence did not benefit from its presentation.

How Did the Initial Interview Enhance Memory?

Given the efficacy of the initial interview in facilitating four-year-old children's reports of a personal experience, it is important to identify the cognitive mechanisms through which the initial interview functioned to improve remembering. Several cognitive mechanisms were proposed in explanation of the possible effects of an initial interview. The evidence for the operation of each of these mechanisms is reviewed below.

The mere testing effect. No support was found for a "mere testing effect," which would have been indicated by higher rates of false alarms to the suggestibility questions at the delayed interview among those children who had an initial interview compared with those children who did not have an initial interview. This explanation would carry because, according to the "mere testing effect," exposure to misinformation in any form (i.e. being asked questions about non-present animals) would lead the child to encode this information into his or her memory, causing false alarms in subsequent memory performances.

Because those children who did have an initial interview were no more likely to false alarm to the non-present features in the final memory assessment than the children who did not have an initial interview, the "mere testing effect" was not supported. The question format also explains the low levels of false alarms that were obtained, as similar questions in other investigations have also yielded low levels of false alarms (Brainerd & Reyna, 2004).

These findings differ in several ways from previous findings in which a “mere testing effect” was found to occur. First, the mere testing effect occurs when information is encoded as a verbatim trace and with time this trace decays, leaving only a gist trace, which may lead to a false alarm (Brainerd & Mojardin, 1998). In this study, the suggested items were animals that did not fit into either event paradigm (i. e., the target or the intervening event), and thus even with verbatim trace decay, the gist trace remaining would not include these items. Second, previous research using lists as stimuli has found that prior memory tests may act to “inoculate” memory against false memory creation on subsequent tests (Brainerd & Mojardin, 1998). The children who had been given an initial interview were probed for what did occur in the task, which may have acted to inoculate the memory (Brainerd & Ornstein, 1991). Brainerd and Ornstein (1991) explain this inoculation phenomenon as the facilitative way an interview may serve to protect the memory across delay intervals and against interfering information. Hence, the effect of strengthening the memory may have offset the potentially disruptive effect of presenting the misleading items.

A final explanation involves the relatively brief delay interval. Because children were being tested after only a 4-week delay interval, it is possible that some of the verbatim traces were still intact, which is supported by the number of elaborations given on average by the children. If children are still recalling elaborative details, hence retaining verbatim traces, then perhaps enough time had not lapsed to witness such a “mere testing effect.”

Trace strength. The cognitive mechanism of trace strength increase could be validated by comparing the amount of information retained and reported at the delayed memory assessment. An initial interview was hypothesized to provide an additional exposure to the content of to-be-remembered event, which should increase trace strength. When trace strength is increased, forgetting decreases. This mechanism was supported in that children who had an initial interview did recall more information about the target event than children who did not have an initial interview. Additionally, greater trace strength is associated with the reduced suggestibility (Principe, 2004), this was difficult to ascertain in the present study given such very low levels of suggestibility observed. Therefore, although some of the results provide support for a trace strength argument, the operation of this mechanism could not fully explain the observed phenomenon. Greater support was found for a consolidation mechanism.

Consolidation. Children who had an initial interview were not only better in their recall of the event, but those children who had an initial interview and later experienced an intervening event were far less likely to commit source monitoring errors in their reports of the target event, indicating that the first event had become interconnected in the child's memory. Further support for a consolidation mechanism existed in these children's reports of the intervening event. Of all the children who had experienced an intervening event, those children who had also been given an initial interview reported significantly more about the intervening event when questioned about it. This demonstrates that by having an initial interview, these children were able to encapsulate this

experience to the point that when exposed to and later asked about a second event, this event was discrete in their memory. Furthermore, it is quite likely that trace strength and consolidation are not mutually exclusive and that the results reflect the joint operation of these mechanisms.

Further support for the consolidation mechanism is evident in the amount of information provided by the children who did and did not have an initial interview. While those children in the initial interview condition reported significantly more information about the target event and significantly fewer source monitoring errors, the children in the no initial interview condition reported a comparable amount of information when correct recall and source monitoring errors were combined, indicating that both groups of children had the available information about the experimenter provided events. However, it was the presence of the initial interview that aided children in consolidating the information correctly.

Individual Differences in Source Monitoring.

The issue of source monitoring errors was addressed in this study, and an attempt was made to measure children's individual differences in source monitoring ability. As previously reported, the results of the source monitoring task utilized were not bimodal as had been expected, but was more evenly spread across accuracy. This pattern is likely due to the age range of the participants in the sample. Whereas Leichtman, et al. (2000) found a bimodal distribution among 4-year-old children, this age of this sample was closer to 5 years of age, which may explain the more evenly spread distribution. Because of

the slightly older age group involved in this study, it is likely that children were gradually shifting towards mastery of the task. Nonetheless, interesting trends emerged from the data revealing that children in the higher performance range on this task had significantly fewer source monitoring errors compared with children in the lower performance range. Although the data was not truly indicative of a median split, the performance comparison from this task to source monitoring yielded interesting results. It is also important to note that source monitoring was measured after the delay interval although it was expected to influence encoding, which could have limited the sensitivity of the measure. Future exploration of the role of source monitoring ability is necessary.

Another individual difference that was serendipitously observed was the occurrence, albeit rare, of the report of details of the intervening event among a few children who did not experience the event. These results are somewhat consistent with the work of Principe, Kanaya, Ceci, and Singh (2006) in which preschool aged children were found to transfer rumors among peers given enough stimulating evidence to do so. Although the results of the given study do not replicate the intensity of the aforementioned study, no steps were taken to attempt to provoke rumors at any stage of the study. Thus, some rumors may have occurred simply due to the interaction of peers within the preschools. What individual characteristics were associated with the acceptance of such information? What contextual variables led to the transmission of rumors? Further studies should examine the extent to which these rumors spread without instigation and the circumstances under which they were conveyed.

Post hoc analyses

Children who experienced an intervening event were shown to demonstrate lower levels of recall of this event in comparison with their recall of the target event. A number of explanations are offered. One, the children were questioned about the intervening event after a fairly exhaustive interview about the target event. Thus, the children could have been experiencing fatigue. Second, it is possible that the target event served as proactive interference for the encoding of the second event. Therefore, the successful encoding of the target event may have inhibited adequate encoding of the intervening event. Third, the level of recall of the intervening event was similar to the level of recall of the target event for those children who did not experience an initial interview. Hence, this could be merely demonstrative of the deterioration of recall in the absence of a retelling opportunity.

Limitations and Future Directions

Although staged zoo and farm events are far removed from the circumstances under which children's testimony may be necessary, this study does emphasize the need to interview children as close in time to the events under investigation as is possible. Support for initial interviews was strongly supported in this study as recall and elaborations were shown to increase. Moreover, source monitoring errors and suggestibility false alarms did not increase leading to the conclusion that the initial interview served a positive role, without any negative repercussions to the report. Likewise, source monitoring

errors, which are of vital importance in a testimony setting, were shown to decrease with the application of an initial interview, another strong benefit shown.

A word of restraint should be offered, however, as to the feasibility of an initial interview in a real world setting. The opportunity to conduct an initial forensic interview is likely to be rare and to occur in only some situations (e. g., when a child was a bystander who witnessed an accident or a crime, not when a child is a victim of abuse). Most child witnesses are not interviewed immediately following an event, and often court proceedings may be delayed by significant time intervals (British Memorandum of Good Practice, 1992). Although the application of an initial interview as studied is not a common occurrence, the present results nonetheless introduce the possibility that more delayed intervening interviews might reduce source monitoring errors. Giving children the opportunity to self-generate information may aid in the preservation of the memory, be it through trace strength increase, consolidation, or both.

References

- Baddeley, A. (1999). *Essentials of Human Memory*. Taylor & Francis Group, Book News, Inc.
- Baker-Ward, L., Ornstein, P. A. and Principe, G. F. (1997). Revealing the representation: Evidence from children's reports of events. In P. van den Broek, P. Bauer and T. Bourg (Eds), *Developmental spans in event comprehension and representation: Bridging fictional and actual events* (pp. 79-107). Hillsdale, NJ: Erlbaum.
- Baker-Ward, L., Gordon, B., Ornstein, P., Larus, D., & Clubb, P. (1993). Young children's long-term retention of a pediatric examination. *Child Development, 64(5)*, 1519-1533.
- Brainerd, C. & Mojardin, A. (1998). Children's and adults' spontaneous false memories: Long-term persistence and mere-testing effects. *Child Development, 69(5)*, 1361-1377.
- Brainerd, C.J. & Ornstein, P.A. (1991). Children's memory for witnessed events: the developmental backdrop. In J. Doris (Ed.), *The Suggestibility of Children's Recollections*. American Psychological Association: Washington, D.C. (pp.10-20).
- Brainerd, C.J. & Reyna, V.F. (1998) Fuzzy-trace theory and children's false Memories. *Journal of Experimental Child Psychology, 71*, 81-129.
- Brainerd, C.J. & Reyna, V.F. (2004). Fuzzy trace theory and memory development. *Developmental Review, 24*, 396-439.
- Brainerd, C. J. & Reyna, V.F. (1996). Mere memory testing creates false

- memories in children. *Developmental Psychology*, 32, 467-478.
- Bruck, M. & Ceci, S. (1999). The suggestibility of children's memory. *Annual Review of Psychology*, 50, 419-439.
- Bruck, M. & Ceci, S. (2004). Forensic Developmental Psychology. *Current Directions in Psychological Science* 13 (6), 229-232.
- Campbell, B. A., & Jaynes, J. (1966). Reinstatement. *Psychological Review*, 73, 478-480.
- Ceci S.J. & Bruck M. (1995). *Jeopardy in the Courtroom: A Scientific Analysis of Children's Testimony*. Washington, DC: American Psychological Association.
- Ceci, S. & Huffman, M.L. (1997) How Suggestible Are Preschool Children? Cognitive and Social Factors. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36(7), 948-958.
- Clubb, P. A., Nida, R., Merritt, K. and Ornstein, P. A. (1993). Visiting the doctor: Children's knowledge and memory. *Cognitive Development*, 8, 361-372.
- Dent, H. R., Stephenson, G. M. (1979). An experimental study of the effectiveness of different techniques of questioning child witnesses. *British Journal of Social and Clinical Psychology*, 18, 41-51.
- Dewhurst, S.A., & Robinson, C.A. (2004). False memories in children: Evidence for a shift from phonological to semantic associations. *Psychological Science*, 15, 782-786.

Flin, R., Boon, J., Knox, A., & Bull, R. (1992). The effect of a five-month delay on children's and adults' eyewitness memory. *British Journal of Psychology*, *83*, 323–336.

Follmer, A. and Furtado, E. A. (1997). Children's long-term retention: Using hierarchical linear models to estimate recall functions over time. Poster presented at the biennial meetings of the Society for Research in Child Development, Washington, DC. (see Ornstein, Baker-Ward, Gordon, & Merritt, 1997).

Gopnik, A. & Graf, P. (1988). Knowing how you know: Children's understanding of the sources of their knowledge. *Child Development*, *59*, 1366-1371.

Home Office in conjunction with Department of Health. (1992). *Memorandum of Good Practice on Video Recorded Interviews with Child Witnesses for Criminal Proceedings*. London: HMSO.

Howie, P., Sheehan, M., Mojarrad, T., & Wrzesinska, M. (2004). “Undesirable” and “desirable” shifts in children's responses to repeated questions: Age differences in the effect of providing a rationale for repetition. *Applied Cognitive Psychology*, *18*(9), 1161-1180.

Johnson, M.K., Hashtroudi, S., and Lindsay, D.S. (1993). Source monitoring. *Psychological Bulletin*, *114*, 3-28.

Jones, C. & Pipe, M. (2002). How quickly do children forget events? A systematic study of children's event reports as a function of delay. *Applied Cognitive Psychology*, *16*(7), 755-768.

- Krackow, E. & Lynn, S. J. (2003). Is there touch in the game of Twister? The effects of innocuous touch and suggestive questions on children's eyewitness memory. *Law and Human Behavior, 27*(6), 589-604.
- Lee, K., & Bussey, K. (2001). Children's susceptibility to retroactive interference: The effects of age and degree of learning. *Journal of Experimental Child Psychology, 80*, 372-391.
- Leichtman, M. D., Morse, M. B., Dixon, A., & Spiegel, R. (2000). Source-monitoring and suggestibility: An individual differences approach. In K. Roberts and M. Blade (Eds.), Children's source monitoring (pp. 257-287). New York: Routledge.
- Lindsay, D., Johnson, M., & Kwon, P. (1992). Developmental changes in memory source monitoring. *Journal of Experimental Child Psychology, 52*, 297-318.
- McGuigan, F. & Salmon, K. (2004). The time to talk: The influence of the timing of adult-child talk on children's event memory. *Child Development, 75*(3), 669-686.
- Melnyk, L. & Bruck, M. (2004). Timing moderates the effects of repeated suggestive interviewing on children's eyewitness memory. *Applied Cognitive Psychology, 18*, 613-631.
- Ornstein, P. A., Baker-Ward, L., Gordon, B. N., & Merritt, K. A. (1997). Children's memory for medical experiences: Implications for testimony. *Applied Cognitive Psychology, 11*, S87-S104.

- Ornstein, P.A., Baker-Ward, L.E., Gordon, B.N., Pelphrey, K.A., Tyler, C.S., & Gramzow, E. (2006). The influence of prior knowledge and repeated questioning on children's long-term retention of the details of a pediatric examination. *Developmental Psychology*, 42, 332-344.
- Poole, D. & Lindsay, D.S. (2001). Children's eyewitness reports after exposure to misinformation from parents. *Journal Of Experimental Child Psychology: Applied*, 7,27-50.
- Poole, D. & Lindsay, D.S. (2002). Reducing child witnesses' false reports of misinformation from parents. *Journal of Experimental Child Psychology*, 81, 17-140.
- Poole, D.A. & White, L.T. (1991). Effects of question repetition on the eyewitness testimony of children and adults. *Developmental Psychology*, 27, 975-986.
- Principe, G., Kanaya, T., Ceci, S., & Singh, M. (2006). Believing is seeing. *Psychological Science*, 17(3), 243-248.
- Principe, G. (2004). It at first you don't remember, try, try again: The role of initial encoding in children's false reports. *Journal of Cognition and Development*, 5(3), 337-358.
- Principe, G. F., Ornstein, P. A., Baker-Ward, L., & Gordon, B. N. (2000). The effects of intervening experiences on children's memory for a physical examination. *Applied Cognitive Psychology*, 14, 59-80.
- Quas, J. A., Qin, J., Schaaf, J. M., & Goodman, G. S. (1997). Individual differences in children's and adults' suggestibility and false event memory. *Learning and Individual Differences*, 9, 359-390.

Tizzard-Drover, T. & Peterson, C. (2004). The influence of an early interview on long-term recall: A comparative analysis. *Applied Cognitive Psychology*, 18(6), 727-743.

Westcott, H.L., Davies, G.M., & Bull, R. (2002) *Children's Testimony: A Handbook of Psychological Research and Forensic Practice*. John Wiley and Sons, Inc. New York, New York.

LIST OF APPENDICES

	Page
Appendix A. Parental consent form and NCSU consent form	61
Appendix B. Materials Used.....	64
Appendix C. Interview Scripts	70

Appendix A: Parental consent form and NCSU consent form

Dear Parents,

Chesterbrook Academy is cooperating with NCSU in a research project and we would like for your child to participate. **The purpose of this study is to examine normal memory development in pre-Kindergarten aged children.** In the study, your child will play a pretend zoo game and/or a pretend farm game, will be asked questions about what they remember from this game immediately following its completion, and then will be asked questions again about the game after a 4 week delay interval.

All activities will take place at Chesterbrook Academy during school hours.

The study's procedures have been approved by the NCSU Human Subjects in Research Committee and by the staff at Chesterbrook Academy. Please fill out the section below, letting us know whether or not your child may participate in the study by Friday, December 16. **Also, please sign our university's official consent form.** If you have questions, please contact Lauren Pierce (919.619.4943) or my advisor, Dr. Lynne Baker-Ward (919.515.1731). Thank you for considering this request.

Sincerely,

Lauren Pierce
Graduate Student in Psychology

I give permission for my child, _____, to participate in the study described above.

Child's Date of Birth (MM/DD/YYYY) _____

I do not wish for my child, _____, to take part in this research project.

Parent or Guardian Signature

Date

North Carolina State University
INFORMED CONSENT FORM for RESEARCH

Can young children remember a personally experienced event across a time delay when faced with a similar intervening event?

Lauren Pierce, Graduate Student
Ph.D.

Lynne Baker-Ward.

We are asking you to give permission for your child to participate in a research study. The purpose of this study is to investigate the development of memory in pre-Kindergarten aged children.

INFORMATION

If you agree to participate in this study, your child will be asked to play a pretend zoo or a pretend farm game and will be asked questions following the event. The child will be asked to remember the pretend zoo or pretend farm game 4 weeks later. Some children will play a pretend farm or pretend zoo game 2 weeks into the study as a distracter task. We are interested in whether or not children can remember a personally experienced event after being questioned about it, even in the face of a similar intervening event.

RISKS

If your child becomes distressed while playing the pretend zoo or farm game or when he/she is being asked questions about what he or she did in the game, the game or questions will be stopped immediately and he/she will be reassured and returned to his/her classroom.

BENEFITS

Your child will be able to play a fun pretend zoo or pretend farm game with extra large stuffed animals. Additionally, the data from this study can potentially provide information that will answer questions about the benefits of an initial interview with child witnesses and the development of children's memory.

CONFIDENTIALITY

The information in the study records will be kept strictly confidential. Data will be stored securely and only identified by an anonymous identification number. No reference will be made in oral or written reports which could link you to the study.

CONTACT

If you have questions at any time about the study or the procedures, you may contact the researcher, Lauren Pierce, at Dept. of Psychology, Campus Box 7801, Raleigh, NC 27695-7801, or (919) 619-4943. If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. Matthew Zingraff, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7514, NCSU Campus (919/513-1834) or Mr. Matthew Ronning, Assistant Vice Chancellor, Research Administration, Box 7514, NCSU Campus, (919/513-2148)

PARTICIPATION

Your child's participation in this study is voluntary; you may decline to allow him/her to participate without penalty. If you decide to allow his/her participation, you may withdraw him/her from the study at any time without penalty and without loss of benefits to which your child is otherwise entitled. If you withdraw from the study before data collection is completed his/her data will be returned to you or destroyed at your request.

CONSENT

"I have read and understand the above information. I have received a copy of this form. I agree to allow my child to participate in this study with the understanding that I may withdraw at any time."

Child's name _____ **Child's Date of Birth** _____

Parent's signature _____ **Date** _____

Appendix B: Materials Used

Materials

Mock Zoo Event. The stuffed animal giraffe used in this experiment is manufactured by Melissa and Doug Products. It stands approximately 5 feet and is made of soft plush material. It has safety approval for ages 3 and older.

The stuffed animal lion used in this experiment is also manufactured by Melissa and Doug Products. It is approximately 3 feet in height and is approximately 5 feet in length. It has safety approval for ages 3 and older.

The stuffed animal monkey used in this experiment is manufactured by Folkmanis Puppets. It is 2 feet in height and is made of soft plush and synthetic fur material. It has safety approval for ages 2 and older.

The stuffed animal parrot used in this experiment is just over 2 feet tall and is 1 foot in width. It is manufactured by Stuffed Toys Unlimited and made entirely of soft plush material. The parrot is attached to a plastic perch and has safety approval for ages 2 and older.

The stuffed animal baby elephant used in this experiment measures 2.5 feet from tip of tail to trunk and is 2 feet tall. It has safety approval for ages 2 and older.

The brush used in this experiment is a large plastic brush with soft bristles.

The bubbles used in this experiment are non-toxic and approved for children 3 years of age and up.

The ribbon used in this experiment is a 15 inch piece of satin ribbon.

The bowl used in this experiment is a large plastic bowl approximately 35 inches in diameter.

The “lion food” used in this experiment is plastic pretend food with safety approval for children 18 months and older.

The bananas used in this experiment are plastic bananas, approximately 12 inches in length, and have safety approval for children ages 2 and older.

The box used in this experiment is a large cardboard box with a hard cardboard lid.

The bow used in this experiment is a self-adhesive paper bow.

The thermometer used in this experiment is a plastic Fisher Price thermometer with safety approval for children ages 2 and older.

The “medicine” in this experiment will be water dyed with blue food coloring and will be in a plastic bottle with a lid.

The water bowl in this experiment is a small plastic bowl approximately 10 inches in diameter.

The tissues used in this experiment are Kleenex brand tissues.

The blanket used in this experiment is a small blue fleece blanket.

Mock Farm Materials. The rocking horse used in this experiment is a chestnut wood rocking horse with handles on each side for safe riding, three durable slats for stability, and a non-toxic chestnut finish. It stands approximately 25” in height, is 30” in length, and the seat of the rocking horse is 18” from the ground. It is recommended for children between the ages of 2 and 8.

The baby stuffed pig used in this experiment is manufactured by Folkmanis Puppets. It measures 20” in length from tip of tail to end of snout and is 20” tall. It has safety approval for ages 3 and older.

The two stuffed chickens in this experiment are manufactured by Audobon Stuffed Animals. Each chicken measures 8" in length and stands 6" in height. It has a built in cackle and has safety approval for ages 2 and older.

The stuffed sheep in this experiment is manufactured by Hensa Toys. It is 2 feet 4 inches in length and stands just under 2 feet tall. It has safety approval for ages 3 and older.

The stuffed dog in this experiment is manufactured by Melissa and Doug Products. It stands upright at 3 feet tall and 1 foot 6 inches in length. It has safety approval for ages 3 and older.

The saddle used in this experiment is a child's plastic pretend saddle with safety approval for children 3 years and older.

The 1st place ribbon used in this experiment is a satin ribbon with the words "First Place" written on it.

The blanket used in this experiment is a small white cotton blanket.

The nests used in this experiment are small brown plastic nests.

The eggs used in this experiment are plastic eggs with safety approval for children ages 2 and older.

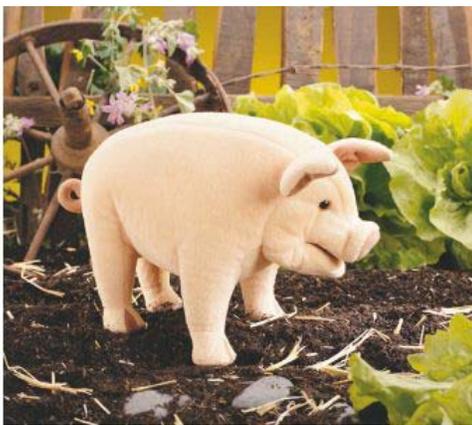
The wool to be sheared from the sheep used in this experiment is obtained from a wool duster and will be attached with Velcro.

The basket used in this experiment is a large oversized tan plastic basket with a large handle.

The shears used in this experiment are a child's plastic pretend razor with safety approval for children ages 2 and older.

The bone used in this experiment is a rubber dog bone approximately 10 inches in length.







Appendix C. Interview scripts

Initial Interview Script:

Hi, (child's name), my name is (interviewer's name), and I wanted to ask you a few questions. Is it ok if I ask you some questions?

My friend (guide's name) told me that you just played a really fun zoo/farm game and I want to know all about it. It sounds like it was a lot of fun. Did you have a good time?

I didn't get to play the zoo/farm game so I was wondering if you could tell me all about it. Can you tell me everything you did today in the zoo/farm game?

Interspersed as child talks

Oh! What else did you do?

What else did you see?

Was there anything else?

Tell me more about that.

What was that like?

Did you see a goldfish?

Did you see a squirrel?

Did you see a cat?

Did you see a hamster?

When child has ceased to produce anything else with prompts

Is there anything else?

Well, thank you for telling me about that. I have a sticker for you to helping
me
today. Thank you (child's name).

Child picks sticker and interviewer walks child back to the classroom.

Final Memory Assessment Interview Script:

Hi, (child's name), my name is (interviewer's name), and I wanted to ask you a few questions. Is it ok if I ask you some questions?

Your teacher told me that a few weeks ago you played a very fun zoo/farm game with my friend (guide's name). Do you remember playing the zoo/farm game with (guide's name)?

Interviewer shows child a picture of the guide from the target event in question

(S)he told me that you played this game with her and I was wondering if you could tell me about it. Can you tell me everything you remember about playing the zoo/farm game? I only want to know about just this game that you played with (guide's name).

Again a gesture towards the picture

Interspersed as child talks

Oh! What else did you do?

What else did you see?

Was there anything else?

Tell me more about that.

What was that like?

When the child has ceased freely generating information about the task

Do you remember anything else about that?

The following direct questions to be asked in no particular order

Did you see a (animals from the target event not freely generated)? For example, did you see a giraffe?

Did you see a (animals from the opposite event which the child may or may not have had dependent upon condition)? For example, did you see a horse?

Did you see a goldfish?

Did you see a squirrel?

Did you see a cat?

Did you see a hamster?

You saw a lot of animals. Thank you for telling me about that.

If child was in the intervening event condition

Now I was wondering if you also played another game. Did you play a farm/zoo game with friend (guide's name). Do you remember playing the zoo/farm game with (guide's name)?

Interviewer shows child a picture of the guide from the target event in question

(S)he told me that you played this game with her and I was wondering if you could tell me about it. Can you tell me everything you remember about playing the zoo/farm game? I only want to know about just this game that you played with (guide's name).

Again a gesture towards the picture

Interspersed as child talks

Oh! What else did you do?

What else did you see?

Was there anything else?

Tell me more about that.

What was that like?

When the child has ceased freely generating information about the task.

Thank you very much for telling me all about the game.

All children will be allowed to pick a sticker after the completion of the interview and will be walked back to the classroom.