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The Influence of Postevent Misinformation on Children's
Reports of a Unique Event Versus an
Instance of a Repeated Event

by

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A Dissertation Submitted in Partial Fulfilment of the
Requirements for the Degree of

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in the Department of Psychology

We accept this dissertation as conforming
to the required standard

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ABSTRACT

Much of what is known about the influence of postevent misinformation on children's event reports is based on studies in which children were exposed to the target event once. Nelson and her colleagues (e.g., 1986) have reported a considerable array of data that demonstrates that children's reports of a routine, or of an instance of a routine, is quite different from their reports of a unique event. Based on this literature on children's script memory it seemed reasonable to speculate that prior similar experiences with the target event would mitigate and/or heighten the influence of suggestions on children's reports of an instance of a routine.

In Experiment 1, 4-, 6-, and 8-year-olds participated in one or four play sessions. Children in the 4-sessions condition (4-S) participated in play sessions on four consecutive days. During each session some target details remained the same (fixed) and some changed (variable). The single play session in the 1-session condition (1-S) was identical to the last play session in the 4-S condition.

Three days later children were asked to think about the last play session and to answer related questions. Embedded in some of the questions were suggestions that things had happened during the final play session that had not occurred during any of the play sessions. Some of the suggestions

related to fixed event details and some related to variable event details. Other questions presented neutral information about target details and served as control items. One day later, children were asked to think back to the final play session and to answer questions based on memory for it. Children were asked for free and cued recall and then to answer a set of "yes/no" recognition questions. Correct and incorrect responses were analyzed. Experiment 2 was similar to the 4-S condition of Experiment 1. Only 8-year-olds were tested and some different materials were used during the play sessions.

In Experiment 1, the proportion of incorrect responses was higher for preschoolers than for older children, but age did not enter into any important interactions. Responses to questions about fixed items were more often correct and less often incorrect among children in the 4-S condition than among children in the 1-S condition. Responses to questions about variable suggested items were more often incorrect among children in the 4-S condition than among children in the 1-S condition. There was no effect of sessions on correct responses to questions about variable control items. In Experiment 2, children's responses to questions about variable details were substantially more often incorrect when the items were suggested than when they were control. There was not a reliable suggested/control difference in responses to questions about fixed details.

Children's script memory is used to interpret these data. Scripts are hypothesized to be abstract cognitive representations of what usually happens during an instance of a routine. Fixed details of a routine are proposed to be represented as part of the script. Memory for them is strong and, in the present study, children successfully resisted related suggestions. Memory for variable components of a routine is hypothesized to be a list-like set of experienced options that may be only loosely associated with particular instances. Children had difficulty resisting suggestions related to variable details of the routine.

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I particularly want to acknowledge the very important contribution of my parents. Their weekly phone calls and constant encouragement were instrumental in keeping me motivated and committed to this research.

Dedication

This dissertation is dedicated to my daughter, Sarah.

The Influence of Postevent Misinformation on Children's
Reports of a Unique Event Versus an
Instance of a Repeated Event

In two experiments the influence of misleading suggestions on children's correct and incorrect reports of an event was studied. The target event was either a unique experience, or it was one of four similar experiences. The motivation for this research was both theoretical and applied.

The basis of the theoretical motivation is the distinction between memory reports of a unique experience and memory reports of an instance of a common routine. As discussed below, there is a substantial amount of literature to support the hypothesis that children's reports of a unique event are different, in many ways, from their reports of an instance of a routine. If it is reasonable to speculate that characteristics of children's event reports provide insight into the corresponding memory representations then it follows that children remember unique events differently from instances of routines. It may be that these differences interact with other phenomena (e.g., suggestibility) related to children's event memory.

The phenomenon of interest in this research is children's suggestibility. Suggestibility is measured in the following way. First, children are presented with a complex event. Second they are presented with postevent information that either did not occur during the target event (suggested

condition) or that is a generic description of the event (control condition). Lastly, children are asked to answer questions based on memory for the original event. If more suggestions are reported in the suggested condition than in the control condition a suggestibility effect has been observed.

In virtually all of the developmental research that has been reported to date children's suggestibility for a single event has been the focus. Some researchers have studied memory for naturally occurring repeated events (e.g., medical and dental examinations) but interest has been on the single event, and the experimental design, analyses, and interpretation reflect this interest. This research has provided us with invaluable insight into the influence of erroneous postevent suggestions on children's event reports for a unique event. However, the existing literature may not entirely generalize to inform us about the implications of erroneous suggestions on children's reports of an instance of a routine.

From an applied perspective this question is important. Children may be required to report details of an instance of repeated abuse. Children may also be questioned about details of a particular instance of a common routine (e.g., bedtime, bathtime) during which abuse is suspected to have occurred. In both hypothetical scenarios children have memory for a related routine. And, in both scenarios children are likely to be interviewed about an instance, or

a subset of instances, of the routine. During the interviews children may be exposed to misleading suggestions about details of an instance.

As reviewed in the subsequent sections, there are reasons to expect that the influence of misleading suggestions on reports of a particular episode may differ as a function of the prior similar experiences. Following is an review of the literature on suggestibility followed by a review of the literature on children's script memory that is relevant to this research.

Eyewitness Suggestibility in Children and Adults

I begin with a brief comment regarding research on children's suggestibility conducted before 1980. In the subsequent two sections, I present detailed reviews of more recent literature on the two core issues upon which research on suggestibility has focused in the last two decades: (a) whether and how postevent suggestions affect memory for the event itself and (b) whether and how misled subjects come to believe that suggested information was actually perceived in the event. In each of these sections I begin by describing studies with adult populations, then turn to research with children.

Suggestibility research prior to about the 1970's consistently found substantial age differences through early and late childhood (McConnell, 1963; Messerschmidt, 1933; Otis, 1924). As will be discussed in more detail below, in some more recent research the size and likelihood of age

differences in suggestibility has been shown to vary considerably. There are several reasons why the early research may have found such dramatic results. First, the stimuli and testing procedures were very complex, the data may have reflected age differences in comprehension and/or ability to execute the testing procedures. Second, it is likely that demand characteristics made a substantial contribution to children's responses. Most commonly, testing was done in a classroom or "orphanage" setting and children were not given "permission" to reject the suggestions. Third, testing was often done in groups and so social pressure to conform may also have contributed to age differences in suggestibility effects.

A prototypical modern misinformation study contains three phases. First, participants are presented with a complex event. Second, they are presented with postevent information that either inaccurately represents some details of the event (misled condition) or is an accurate generic description of the event (control condition). Third, participants' memory for the original event is tested with a 2-alternative forced-choice recognition test that offers the event and postevent details as options.

Using variations of this paradigm Loftus (1979a; Loftus, Miller, & Burns, 1978) reported that misled adults were significantly and substantially more likely than control adults to choose misleading details when instructed to base their test answers on memory for the event (a

misinformation effect). Moreover, Loftus and Loftus (1980) reported several unsuccessful attempts to coax misled adults to report event details. Those efforts included phrasing the final memory questions in several different ways, warning adults that some of the information in the postevent narrative may have been incorrect (Greene, Flynn, & Loftus, 1982), offering an incentive to answer with event details, and, in a multiple-alternative recognition test, having adults provide a "second guess" in case their first answer was wrong. In spite of these efforts misled adults continued to report the postevent misinformation significantly more often than control adults.

Loftus (1979a) concluded that autobiographical memory is neither permanent nor particularly resistant to modification and that postevent misinformation can irrevocably alter memory for the original event. This theory became known as "overwriting" or "destructive updating" because Loftus argued that the postevent information replaces event memory and in so doing destroys it.

Recent research on suggestibility has focused on two related but distinct issues: (a) whether and how postevent suggestions affect memory for the event itself and (b) whether and how misled participants come to believe that suggested information was actually perceived in the event. One way to think of this distinction is in terms of the contrast between errors of omission, failures to report event details about which suggestions had been presented,

and errors of commission, reports of details presented only in the postevent phase. Lindsay (1990; Lindsay, Gonzales, & Eso, 1994) argued that when experimental methods motivate participants to report from memory for what they believe occurred during the event, omission errors can be taken as evidence that memory for the event details has been affected by erroneous postevent suggestions. Similarly, commission errors indicate that participants believed that the postevent details were perceived in the event.

Clearly, Loftus' overwriting hypothesis holds that both kinds of errors occur, because it claims that a memory representation of the suggested information is integrated into the original memory of witnessing (such that participants would experience it as just another aspect of their memory of what they witnessed) and the memory representation of the event information is destroyed in the process (such that participants would not be able to remember what they actually witnessed). There is a need to study the influence of erroneous postevent suggestions on both omission (memory impairment) and commission errors (source misattributions) in event reports. In the following discussion I attempt to characterise the relevant research into experiments that have focused on one of the other of these types of errors.

Memory Impairment

The idea that erroneous postevent suggestions impair memory for the corresponding event details has been

challenged. The most compelling challenge came from McCloskey and Zaragoza (1985a, 1985b). They concluded that "postevent information has no effect on memory for the original event... misleading information neither erases original information nor renders it inaccessible" (1985a, p. 2). McCloskey and Zaragoza supported this position by arguing that methodological flaws in the standard paradigm can cause misled/control differences even if misled participants' event memory is unaffected by the suggestions.

In the standard (Loftus) recognition test participants choose between the event item and the misled item. If misinformation has no effect on memory for the event the same number of control and misled participants will remember the original event detail and choose that test option. Among participants who do not remember the event detail some other criterion will guide their test selection. In the control condition participants will guess, and half will guess correctly (assume a 2-alternative forced-choice test and proper counterbalancing). However, in the misled condition some participants will remember the postevent information and will select it at test. In short, relative to misled participants, control participants have a guessing advantage that will lead to better recognition performance.

McCloskey and Zaragoza (1985a) also argued that a response bias may operate to impair performance in the misled condition. Some misled participants will remember the event and misled details but select the misled detail

because they accept it as accurate and assume their event memory is incorrect. Finally, McCloskey and Zaragoza (1985) argued that demand characteristics may lead some misled participants to select the incorrect test option. That is, some misled participants may believe that the postevent item is the response the experimenter wants, and to be a "good" participant they select it knowing that it is wrong.

To eliminate these biases McCloskey and Zaragoza (1985a) developed the modified-test procedure. It is identical to Loftus' procedure with the important exception that participants are not given the suggested detail as a test option, they must choose between the event detail and a new detail. Accordingly, misled participants who do not remember the event detail, but do remember the misled detail, will guess on the final test and be correct with the same probability as control participants who also do not remember the event detail. Misled participants who remember both the event and the narrative details (and who might have reported the latter) will choose the event detail because the misled detail is not an option.

If presentation of the misleading information genuinely impairs event memory, then on the modified test misled participants will select the event detail less often than control participants. Alternatively, if event memory is unaffected by misleading information, misled and control participants will select the event detail with the same probability. Thus, McCloskey and Zaragoza (1985a) developed

the modified test to eliminate the confounds present in the standard testing procedure. It is, they argued, a purer test of the memory impairment hypothesis.

In six experiments McCloskey and Zaragoza (1985a) found that, with the modified procedure, misled adults' performance did not differ from control adults'. Importantly, in all six experiments they also replicated Loftus' misinformation effect using their materials and the standard test. Several other researchers have replicated this finding (listed in Belli, Windschitl, McCarthy, & Winfrey, 1992, p. 358). McCloskey and Zaragoza (1985a) concluded that postevent misinformation has no effect on event memory.

To challenge their conclusion I first describe the arguments of researchers who hold that the modified test may be an insensitive measure of memory impairment. I then describe research that uncovered memory impairing effects when methodological modifications were used.

Loftus et al. (1985; Chandler, 1989; Loftus, Hoffman, & Wagenaar, 1992) argued that the modified test is an insensitive measure of memory impairment. If postevent misinformation impairs event memory with a small yet predictable probability, more misled than control adults will guess on the modified test. Because it is a 2-alternative recognition test, half of the "memory-impaired" adults will guess correctly and so the observable effect size will be reduced by 50%.

Other researchers (Toland, Hoffman, & Loftus, 1991; Tversky & Tuchin, 1989) argued that the modified test is insensitive to subtle forms of memory impairment. If postevent misinformation degrades rather than erases event memory, misled adults may still be able to correctly reject novel items as often as control adults. In other words, misled and control performance will be equivalent even if the memory upon which misled adults based their test response is degraded.

It might be argued that although suggestions do not affect memory for event details in ways that impair recognition memory performance they may nonetheless have more subtle effects that would impair recall performance. Zaragoza, McCloskey, and Jamis (1987) devised a more sensitive modified recall procedure that they argued is sensitive to subtle forms of memory impairment and found, in two experiments, no misled/control difference, further supporting their position that postevent misleading suggestions do not impair memory for the original event.

Given the potential limitations associated with the modified test (e.g., insensitivity to small memory impairment effects and insensitivity to memory degradation) it follows that alternative procedures to measure memory impairment should be considered. Lindsay (1990) used an opposition instruction and analysis of omission errors in cued recall to study memory impairment. In the opposition instruction condition participants were told explicitly and

forcefully that any information presented in the postevent phase that was relevant to test questions was wrong and should not be reported. Accordingly, the tendencies to report postevent details to please the experimenter, or because the postevent information was accepted as accurate, were minimized. Failure to report the event details about which suggestions were presented can be attributed to genuine memory impairment with some confidence. Using this procedure Lindsay (1990) reported that misled participants reported fewer event details than control participants. He concluded that postevent misinformation sometimes impairs event memory.

Other procedural innovations that have uncovered evidence of memory impairment in an adult population include the use of: a cued recall test (Belli, Lindsay, Gales, & McCarthy, 1994), a 'yes/no' recognition test (Belli, 1989; Tversky & Tuchin, 1989), a 5- to 7-day delay between study and the presentation of misleading information (Belli et al., 1992), presentation procedures that encourage integration of the suggestions with the original event (Chandler, 1989, 1991, Exp. 1), and presentation procedures that match the encoding environments of the original and postevent experiences (Lindsay et al. 1994).

A reporting bias explanation for these data is insufficient because efforts were taken to eliminate the confounds described by McCloskey and Zaragoza (1986). In several studies participants were not given the suggested

detail as a response option (Belli, 1989; Belli et al., 1992; Chandler, 1989, 1991, Exp. 1). In the Lindsay et al. (1994) study the opposition instruction was used.

Several researchers, using diverse materials, procedures, and memory measures, have demonstrated that presentation of postevent misinformation can impair adults' event memory. There is no doubt that the size of the misinformation effect is smaller than originally reported by Loftus (1979a). This is due to methodological changes that control for the confounds identified by McCloskey and Zaragoza (1985a). Importantly, even when the confounds are controlled a significant memory impairing effect has been found with adults and so one can more confidently conclude that postevent misinformation sometimes impairs event memory.

In two laboratories the modified test has been used to study memory impairment with young children. Ceci, Ross, and Toglia (1987a) presented preschoolers and adults an illustrated story about a boy's first airplane ride. The next day half of the participants were given misleading information about two of the details and half were given no misleading information. Two days later all participants completed a modified recognition test. Ceci et al. (1987a) reported a misinformation effect with preschoolers but not with adults. They also reported no age differences in recognition memory for non-misled details (and so, they argued, no age differences in encoding, retention or

retrieval of event details, Ceci, Toglia, & Ross, 1988). Using the same testing procedures with a story about a typical morning in the life of a little girl, Toglia, Ross, Ceci, and Hembrooke (1992) also reported a memory impairment effect among 4-year-olds.

In contrast to these findings, Zaragoza (1987, 1991; Zaragoza, Dalgren, & Muench, 1992) tested very young children using the modified procedure and consistently found no misinformation effect. Procedural modifications used in their attempts to uncover a misinformation effect included introducing a delay between story presentation and test, increasing control performance by decreasing the number of filler details, increasing access to the misinformation by presenting it twice, and testing memory with cued recall. These attempts failed to detect a memory impairing effect of misleading postevent suggestions on event memory in children as young as 3 years old.

Lindsay et al. (1994) used the opposition instruction to study developmental differences in memory impairment. In one condition 4-year-olds, 8-year-olds, and adults were presented with an illustrated story followed 3 days later by a misleading narrative and then a memory test (free recall, cued-recall, and recognition) for the original story. Immediately before the test half of the participants were given the opposition instruction and half were given no warning that the narrative contained inaccuracies. As measured by cued recall and recognition, opposition

instruction lowered, but did not eliminate, omission errors. These effects did not interact with age: The effect of misleading suggestions on omission errors was similar for all age studied and the effect of the opposition instruction on reducing omission errors was also similar across the age range studied.

That the opposition instruction lowered omission errors for participants in all age groups indicates that even the youngest children understood the instruction and attempted to follow it. This suggests that omission errors that were observed with the opposition instruction were not a consequence of misinformation acceptance but rather occurred because both children and adults suffered from genuine memory impairment.

In summary the memory impairing influence of postevent suggestions is probably small and requires carefully controlled materials and procedures to detect. However, the effect has been demonstrated in an adult population and so it is reasonable to conclude that given similar procedures children would also evidence memory impairment. It is less clear whether there are developmental differences in the phenomenon. Ceci et al. (1987a) reported a memory impairing effect of suggestions with preschoolers but not with adults', whereas Lindsay et al. (1994) reported a memory impairing effect among preschoolers and adults but found no evidence of differences with age.

Source Misattributions

Traditionally, misinformation research has centred on the influence of postevent misinformation on memory for event details. As Lindsay and Johnson (1987, 1989a; Lindsay, 1993, 1994) have argued, procedures and explanatory theories that focus exclusively on event memory neglect important effects and insights. A more complete understanding of the effect of postevent suggestions on event reports must include the study of both failures to report event details (i.e., memory impairment) and erroneous reports of suggested details (i.e., source misattributions).

The theoretical framework that is used to interpret source misattributions is Source Monitoring theory and so I begin with a brief description of the Source Monitoring Model (comprehensive reviews are available in Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981; Lindsay & Johnson, 1987, 1989a, 1989b).

Ongoing experiences take place in a context. Some experiences originate within the individual's mind (fantasies, dreams, reminiscences, etc.). Other experiences originate in the outside perceptual world (seeing, smelling, hearing, etc.). Memory, as a record of experiences, contains information about both the details of the event and the context, or source, of the experience.

Because context varies across experiences so will source information in memory. The process of attributing a memory to its source involves analyzing the relevant

information to infer how the memory was acquired. Sometimes this inference is relatively easy, as when the source relevant information is distinctive and consistent with its source (e.g., it contains a relatively large amount of perceptual information and the memory did originate in perception of the external world). Other times, the inference is more difficult, as when the contextual information is inconsistent with its source (e.g., a dream contains a lot of perceptual information but has an internal source), or when the task is to discriminate between memories from the same general class (i.e., two internal or two external sources of memories). This latter discrimination is difficult because the two memories share perceptual and/or semantic content and so the attribution process requires retrieval of additional source relevant information and/or more in-depth analysis.

Consistent with predictions from the Source Monitoring Model, when the presentation contexts of the event and postevent experiences were highly distinct (Lindsay, 1990), or when adults were directed to consider the source of their memories (Lindsay & Johnson, 1989a; Zaragoza & Koshmider, 1989), misled adults were not more likely than control adults to report that a misled detail was present in the event. Under more difficult discrimination conditions adults committed source misattributions. For instance, when the presentation of misinformation encouraged simultaneous retrieval of event memory without directing attention to

source information, as when the suggestions were embedded in questions, or when adults unscrambled a text that described the event and that contained erroneous suggestions (Zaragoza & Lane, 1994).

There are two general classes of explanations for source misattributions. Adults may experience genuine source confusions. That is, misled adults may retrieve a postevent detail and believe that it was presented in the event. Alternatively, adults may remember a detail from the postevent phase but report it as an event detail either because they accept it as correct, or because they believe it is the response the experimenter wants to hear (Zaragoza & Koshmider, 1989).

In two separate reports, Lindsay used the opposition instruction to minimize reporting biases. In both experiments he reported a reliable misattribution effect when conditions were such that discrimination between information presented in the event and postevent phases was expected to be difficult. In one study (Lindsay, 1990: For a replication see Toland, 1990, cited in Loftus, 1994) the source discrimination was made difficult by presenting the event and postevent information in the same voice, location, lighting, and time.

Are younger children more likely than older children and adults to commit source misattributions? Several researchers have demonstrated that young children (typically between the ages of 6- and 9-years) sometimes commit more

source misattributions than adults. In a typical study, participants are presented with a list of actions, one at a time, and are instructed to do some and to imagine themselves doing others (do-self/imagine-self condition), or to watch two experimenters each do some of the actions (watch/watch condition). At test participants are asked to identify the source of the study stimuli. Relative to adults, children commit more source misattributions in the do-self/imagine-self comparison. The favoured interpretation of these data was that the ability to discriminate between different kinds of self-generated actions matures late (Foley, Durso, Wilder, & Friedman, 1991; Foley, & Johnson, 1985; Foley, Johnson, & Raye, 1983; Foley, Santini, & Sopaskis, 1989; Johnson, & Foley, 1984; Johnson, Raye, Hasher, & Chromiak, 1979; Lindsay, & Johnson, 1987). Lindsay, Johnson, and Kwon (1991) compared 8-year-olds' and adults' source discriminations for actions they imagined someone else doing with actions they watched that person do. Children committed more source misattributions than adults. Lindsay et al. (1991) concluded that children are more likely to commit source misattributions whenever memories from two sources are perceptually and/or semantically similar.

Why are children more likely to err when discriminating between similar sources? Discriminating the origins of memories from sources that are perceptually or semantically similar requires retrieval and analysis of diverse source

information. Young children may lack the skills necessary to retrieve the additional source information, and/or their ability to consider several kinds of source information may be impoverished (Johnson et al., 1993).

In misinformation studies children acquire information from two sources, the event and postevent phases. The semantic content of the two memories is very similar. In fact, they are about the same event. Accordingly, one would predict age differences in source misattributions. The studies described next support this prediction.

Ceci, Crotteau-Huffman, Smith, and Loftus (1994) instructed 3- to 4-year-olds and 5- to 6-year-olds to "think really hard" about four complex events (e.g., going to the hospital for stitches, getting a finger caught in a mousetrap) and to report if each event really happened (the children were told correctly that some of the events did happen and that some did not). The children "thought hard about" the four events on seven different occasions, each separated by approximately one week. On the seventh interview one-third of the children in each age group reported that the non-events had occurred. Moreover, the children described the non-events in such a way that 109 professionals in psychology, law enforcement, psychiatry, and social work could not discriminate reports of real events from reports of non-events. The reports of non-events contained rich detail, internal consistency, low-frequency actions, and emotional markers.

Ceci, Loftus, Leichtman, and Bruck (1994) conducted a similar study with the exception that on each of 11 sessions the children were told that all of the events really had occurred. At the beginning of the 12th session the children were correctly told that some of the events had not really occurred and they were asked to describe the events that had been personally experienced. Significantly more 3- to 4-year-olds (45%) than 5-to 6-year-olds (40%) reported that at least one non-event really had occurred.

These studies demonstrate that young children sometimes erroneously report that entire, complex, emotionally-relevant and participatory events occurred. Furthermore, there was some evidence that the phenomenon is developmentally sensitive. These two studies are unique in the sense that virtually all previous source misattribution research studied the effect of misleading suggestions on memory for details of an experienced event. It seems reasonable to conclude that if young children will report that entire events occurred that had not, they will also report that suggestions about details in a real event also occurred.

Poole and Lindsay (1995) demonstrated the potentially powerful influence of novel postevent suggestions on preschoolers' event reports. Three- and 4-year-olds helped "Mr. Science" with four science demonstrations (e.g., making a telephone out of a rubber tube and two funnels). Three months later the children's parents read to them a story

about a visit with "Mr. Science". The story was read three times and contained descriptions of two experienced demonstrations and two demonstrations that the child had not experienced. Shortly after this the children were asked about two demonstrations they experienced only, two they heard only, two they experienced and heard, and two new demonstrations. Poole and Lindsay (1995) reported that children were significantly more likely to report that they experienced a heard-only demonstration (82%) than to report that they experienced a new demonstration (62%). Furthermore, when the children were asked specifically if they only heard about a heard-only demonstration only 15% of the children said "yes".

Liechtman and Ceci (1995) reported two experiments in which young children's event reports contained central details that were only suggested. In their studies a man, Sam Stone, visited day care centres and interacted for a few minutes with 3- to 4-year-olds and 5- to 6-year-olds. Following the visit all of the children were asked about Sam Stone's visit once a week for three weeks. During these interviews half of the children were told that Sam Stone soiled a teddy bear and ripped a book (neither of these things occurred) and half were given no misleading suggestions. Four weeks after Sam Stone's visit all of the children were asked up to three questions about each of the two non-events: "Did Sam Stone soil a teddy bear and rip a book?", "Did you actually see Sam Stone do these things?",

"You didn't really see Sam Stone do these things did you?". The second and third questions were asked only if the child responded "yes" to the previous question.

Children who were not presented with suggestions rarely reported that Sam Stone did these things (2.5% of the 3- to 4-year-olds and none of the 5- to 6-year-olds). Conversely, misled children were significantly more likely to report the suggested details. Moreover, 3- to 4-year-olds were more likely than 5- to 6-year-olds (12% and approximately 8% of the younger and older preschoolers respectively) to insist that Sam Stone soiled a teddy-bear and ripped a book, even when gently challenged about the validity of their reports.

Another way to study source misattributions is to examine intrusions from related personal experiences in children's reports of a target event. In Howe, Courage, and Peterson's (1995) study very young children (30-, 36-, and 48-month-olds) were interviewed about an injury that had occurred 6 months earlier and that required emergency room treatment (e.g., broken bone, dog bite). An intrusion was defined as a detail that did not occur during the target event, but was confirmed by parents as something that occurred during a related experience. Howe et al. (1995) found that over 80% of the 30-month-olds included at least one intrusion in their report, and that this was significantly greater than the number of 36- and 40-month-olds whose reports included at least one intrusion (approximately 50% and 30% of the 36- and 48-month-olds

respectively).

Young children's event reports can be seriously distorted by the introduction of misleading suggestions or related experiences. An important theoretical and practical question is whether a child would correctly attribute the source of the memory if the child felt motivated to do so. In other words, do children genuinely misattribute the sources of memories, or do they knowingly capitulate to perceived pressure to report suggestion (I will refer to the latter as misinformation acceptance).

The studies conducted in Ceci's lab included attempts to encourage the children to report only memories of personally experienced events (e.g., "Some of the events did not really happen", "You didn't really see Sam Stone soil the teddy bear or rip the book did you?"). In spite of these efforts, some young children reported that non-events really had occurred. There is probably no completely satisfactory way to discriminate genuine source misattributions from misinformation acceptance, however, stronger warning instruction might convince the more sceptical reader that children do sometimes misattribute postevent suggestions to the event.

As described in the previous section, Lindsay et al. (1994) used the opposition instruction to disentangle genuine source misattributions from misinformation acceptance. In the opposition instruction condition participants are told that any information presented in the

postevent phase relevant to test questions is wrong and should not be reported. Source misattributions that occur following the opposition instruction probably reflect genuine source memory failures.

In one condition of their study, 4-year-olds, 8-year-olds, and adults listened to a story and viewed illustrations depicting story events, followed 3 days later by a misleading narrative and then a memory test (free recall, cued-recall, and recognition) for the original story. Immediately before the test half of the participants were given the opposition instruction and half were given no warning that the narrative contained inaccuracies. On the final recognition test, 4-year-olds were marginally more likely to select the misled details more often than did 8-year-olds or adults. Importantly, opposition instruction lowered, but did not eliminate source misattributions (i.e., report of suggested details), among participants in all three age groups.

That the opposition instruction lowered source errors indicates that even the youngest children understood the instruction and attempted to follow it. This suggests that the increased source misattributions committed by 4-year-olds were not due to misinformation acceptance but rather occurred because preschoolers were more likely than adults to genuinely believe that postevent misinformation was presented in the original event.

In summary, adults sometimes come to believe that

details presented only in the postevent phase had occurred in the original event. The data described here provide convincing evidence that children also commit these errors and that the phenomenon is developmentally sensitive. Following persistent postevent suggestions young children sometimes will report that entire events occurred that did not, and following one presentation of postevent suggestions young children are sometimes more likely than adults to report that details presented only in the postevent narrative occurred in the event. This occurred in spite of their demonstrated effort to withhold reporting postevent details.

Memory Strength and Suggestibility

Strength of memory for the original event has been associated with the suggestibility effect (Brainerd & Reyna, 1988; Ceci & Bruck, 1993, 1996; Pezdek & Roe, 1995). Pezdek and Roe (1995) borrowed from Brainerd, Reyna, Howe, and Kingma (1990) to define a strong memory as one that contains many of the original components, represented elaborately, with strong internal connections, and strong associations to related knowledge. A weak memory is defined as one with few of the components retained, loose internal connections, and weak associations with related knowledge. Suggestibility effects are hypothesized to be smaller when the corresponding event memory is strong than when it is weak.

Pezdek and Roe (1995) manipulated the strength of event memory by presenting some of the target components twice and

some only once. Following presentation of misleading suggestions 4- and 10-year-olds completed a 3-alternative forced-choice recognition test. Children were more resistant to suggestions associated with the event components that were presented twice relative to those presented once.

Rudy and Goodman (1991), and Tobey and Goodman (1992) showed that children are sometimes more resistant to suggestions about events in which they participated relative to events they observed. Goodman, Aman, and Hirschman (1987) asserted that participation improves memory for details of the event and it is stronger memory that explains increases in resistance to suggestions for participatory events.

Additionally, long delays, which can be expected to weaken event memory, have been associated with high levels of suggestibility (Belli et al., 1989; Bruck, Ceci, Francoeur, & Barr, 1995; Poole & Lindsay, 1995). In short, factors that encourage strong memory for the original event are expected to increase resistance to suggestions.

Summary

Children and adults exposed to misinformation often make more errors when reporting the original event than children or adults not exposed to postevent misinformation. These errors have been described as memory impairment and/or source misattributions. Results of research on memory impairment suggest that the effect is probably small and it is not clear if it is developmentally sensitive. Conversely, source misattributions occur more often and there is

convincing evidence that source misattributions are more common among preschoolers than older children and adults. Factors that strengthen event memory have been shown to increase resistance to suggestions, but they have not eliminated age differences.

Children's Script Memory

Schema Theory

Script theory is a member of a broader class of schema theories. Schema theory is about knowledge and how knowledge influences memory for new related information. There is a family of schema theories each of which focuses on a different class of knowledge (e.g., script theory refers to knowledge about routine events, Schank & Abelson 1977; story grammar is concerned with knowledge about stories, Mandler, 1982; scene schema centres on knowledge about the spatial location of objects, Mandler, 1982). Mandler (1984, cited in Nelson, 1986) defined a schema as "an organized representation of a body of knowledge...a spatially and/or temporally organized cognitive structure in which the parts are connected on the basis of contiguities that have been experienced in time or space. A schema is formed on the basis of experience with objects, scenes, or events and consists of (usually unconscious) expectations about what things look like and what goes with what" (p. 8).

There are several important characteristics of schematic knowledge. First, it is hypothesized to be abstract. That is, the representation is not associated with

one specific episode, it is a composite of the components typically present when the stimulus is encountered. Several researchers have reported substantial agreement among subjects when they report what usually happens during particular routines (e.g., Bower, Black, & Turner, 1979; Galambos, 1983; Galambos & Rips, 1982). This has been taken as evidence that participants based their responses on an abstract representation (i.e., a script) rather than on an idiosyncratic instance of the routine.

Second, only relevant information that is often encountered during experiences with the routine (i.e., typical actions) is represented in the schema. That is, stimuli that are rarely present or that are irrelevant to the routine (i.e., atypical actions) are not represented in the hypothetical cognitive structure. Several researchers (e.g., Connolly, Hockley, & Pratt, 1996; Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Nakamura, Graesser, Smith & Graesser, 1981; Zimmerman, & Riha, 1985) have shown that participants commit substantially more errors when discriminating between presented and not-presented typical actions than when discriminating between presented and not-presented atypical actions. To explain this pattern researchers have argued that all typical actions are represented in the script and are indirectly activated whenever the script is accessed. All presented actions (typical and atypical) are also directly activated at study. The task of discriminating

between presented and not-presented typical actions involves discriminating between actions activated both directly and indirectly (i.e., presented) from actions activated indirectly only (i.e., not-presented). Atypical actions are not contained in the script and so are activated directly only. The process of discriminating between presented and not-presented atypical actions is relatively easy.

One of the most contentious hypothesis of schema theory is the integration hypothesis. In its strictest application, this hypothesis is that when new schema-consistent information is encountered, the unique instance is lost, or absorbed by the schema. Remembering is described as purely reconstructive, the schema is used to reconstruct what "probably" occurred. My reading of recent schema theorists is that most advance a partial reconstruction account of remembering (e.g., Abelson, 1981; Brewer & Nakamura, 1984; Fivush & Hudson, 1990; Nelson, 1986, Rumelhart, 1984; Smith & Graesser, 1981). That is, some information related to specific instances is undoubtedly available. Remembering is a process of combining available information related to the instance with information provided in the schema to construct a memory that has elements of both. Reiser, Black, & Abelson (1985) state "Cognition relies not only on generalizations that have been abstracted from experience, but also on countless events that are encoded in memory" (p. 90).

Several scholars have argued against the hypothesis

that memories for repeated experiences merge to form a single abstract representation and that unique instances are unavailable or inaccessible. Jacoby and Brooks (1984), and Alba and Hasher (1983) argued that encoding and retrieval environments influence the probability that participants will retrieve memory for an instance and use it to perform the test task.

To support this position Jacoby and Brooks (1984) first make a distinction between analytic and nonanalytic processing. Analytic processing is "breaking the original stimulus into stable relevant and irrelevant features" (p. 2). If study stimuli are highly similar (as when participants read several sentences all related to the same theme) participants are forced to engage in analytic processing and this results in poorer memory for instances. Nonanalytic processing is "treating similar situations analogously" (p. 3). If the study context presents stimuli that are distinct from each other (as when participants read disconnected sentences) participants are likely to engage in nonanalytic processing and this supports memory for unique instances. Jacoby and Brooks (1984) go on to argue that much of the data used to support schema theory comes from studies that used very similar stimuli. Thus, analytic processing was dictated by the experimental paradigm and evidence supporting schema theory was inevitable.

Alba and Hasher (1983) also argued that the encoding environment is central. They proposed that in many

traditional schema studies semantic aspects of the study stimuli were emphasized. Accordingly, participants would be expected to abstract the general meaning of the stimuli and accord much less attention to details that support memory for instances. They argued that abstraction may not be an inevitable consequence of exposure to several similar stimuli, it may be a consequence of the implicit or explicit study instructions.

Retrieval conditions have been shown to influence the probability that instances will be accessed and reported (Farrar & Goodman, 1992; Fivush, 1984; Hudson, 1990; Price & Goodman, 1990). For instance, when asked "what happens?" children tend to structure their report in the present tense, use third-person pronoun, and report relatively few details related to an instance. Alternatively, when asked "what happened on a particular occasion?" children tend to structure their reports in the past tense, use first person pronoun, and report relatively more details related to an instance. It seems clear that both general knowledge and memory for instances are available and the retrieval cue will guide participants to report from one or the other sources of information.

Both positions, that memory for recurring stimuli is general and abstract, and that memory for instances of recurring stimuli are retained as unique episodes have substantial empirical support. Encoding and retrieval conditions have been offered to explain conditions under

which instances and schemata may be retrieved. Another factor that may influence the probability of retrieving an instance or schema is frequency of occurrence.

A central issue studied by researchers of memory for frequency is the nature of the information participants use to judge presented frequency. Some argue for a multiple-trace hypothesis: each time a stimulus is encountered it leaves a separate and unique memory. Frequency judgements are based on a count of the number of traces retrieved at test. The alternative view, trace-strength, is that a single memory representation of the stimulus is strengthened by each exposure. When judging presented frequency participants retrieve the single trace and infer the presented frequency from its strength.

Bruce and Read (1987) reported a naturalistic study and concluded that, depending on the presented frequency, either the multiple-trace or trace-strength theories usefully describe the information used to judge frequency. During a 47-day bicycle tour one of the authors recorded the number of times his wife engaged in target events (e.g., cash cheques, mail postcards) followed 3 1/2 months later by a frequency test for the events (actual frequency range was from 1 to 47). The participant introspectively reported that her frequency judgments were based on memory for the individual episodes when the target event was experienced a few times and they were based on a more general impression when the target event was one that had been experienced

often.

Memory for instances and schematic knowledge probably coexist as reported by numerous researchers who demonstrated that participants can retrieve either kind of information depending of the encoding and retrieval conditions. However, the "default", or kind of information participants are more likely to access may be influenced by frequency. That is, when the target event has been encountered relatively few times information related to instances may be more readily retrieved. However, when the target event has been experienced often, generalized or schematic information may be more accessible.

In this research my interest is in script theory. According to script theory (Abelson, 1981) when an event is repeatedly experienced a spatially- and temporally-ordered abstract cognitive structure (script) develops that contains representations of the actors, actions, and props that are expected to occur during any given instance of the routine. In the following review I focus on two aspects of script theory that are particularly relevant to this research. First, I review research on children's reports of a unique autobiographical event and their reports of an instance of a routine. Second, I review research on children's memory for variable components of a script.

Memory for Episodes

Children's memory reports of a particular episode depend on a number of factors, I will review a subset of

them here. One useful way to think about children's memory for episodes is to first discriminate between memory for a unique novel episode and memory for an instance of a recurring event. In the former case memory reports are characterized as a complex interaction of (a) age-related developments in cognitive and linguistic skills, (b) delay, and (c) retrieval cues. In the case of memory for an instance of a recurring event the above factors are hypothesized to influence memory reports as well as (d) the amount of experience with similar episodes and (e) episodic distinctiveness.

Novel event. When an episode is novel very young children can report a substantial amount of accurate information over extensive delays. Hamond and Fivush (1991) reported that children as young as 4 1/2 years were able to provide comprehensive (an average of 40 propositions) and accurate accounts of a trip to Disneyworld that had been experienced either 6- or 18-months earlier. Ratner, Smith, and Dion (1986) reported that 5-year-olds recalled as many superordinate units of information related to a novel clay-making/clay-playing event as adults both immediately after the event and following a one-week delay. Fivush and Hamond (1990) found that 2 1/2-year-olds reported an average of 9.63 units of accurate information about several unique events. The same children were interviewed 14 months later and there was no decrease in accuracy or completeness of their reports.

Age differences are associated with the style of reports, the type of information reported, and the mnemonic support needed to elicit the information. Older children's reports of a unique episode tend to be more complex. Hamond and Fivush (1991) reported that children who were older at the time of the recall test included more elaborations (i.e., adjectives and adverbs) in their reports of a trip to Disneyworld than children who were younger at the time of recall. Hudson and Nelson (1986) asked 3-, 5-, and 7-year-olds to describe a novel event (confirmed by parents) and concluded that "age differences were found in all measures of elaboration and complexity" (p. 266).

Younger children report relatively fewer specific details in their reports of a novel event. Ratner et al. (1986) found that, compared to adults, 5-year-olds included fewer specific details (e.g., "put the flour in the bowl") in their reports of a clay-making/clay-playing event. Fivush and Hamond (1990) found that 4-year-olds' reports of several novel events contained relatively more particular details (e.g., "a monster birthday cake") than general details (e.g., "a cake"). This contrasts with their reports of the same events 14 months earlier in which there was approximately an equal proportion of general and specific details reported.

Younger children require more specific retrieval cues to support comprehensive recall. Ratner et al. (1986) reported that when children and adults were asked to free

recall what happened during a clay-making/clay-playing event one week after the episode children reported less information than adults. Hamond and Fivush (1991) also reported that children who were 3 1/2 years old at the time of the interview about a trip to Disneyworld reported less information spontaneously than children who were 5 1/2 years old when interviewed about their trip to Disneyworld. In both studies age differences were reduced (Ratner et al., 1986) or eliminated (Hamond & Fivush, 1991) when specific cues were provided.

Another important factor that influences children's reports of a novel event is the delay between the event and retrieval. The influence of delay is not a simple main effect but rather it interacts in important ways with retrieval cues. Fivush, Hudson, and Nelson (1984) reported that 5-year-olds who had visited an archaeological museum reported as much information six-weeks later as they did immediately after the event. One-year later, children required more specific verbal cues to retrieve information about the event (e.g., "remember, you dug in the sandbox?"), and even given the specific cues children's reports were less complete one-year after the event than six-weeks after the event. Fivush et al. (1984) also measured recognition memory using photographs taken during the event. They reported that children's correct recognition of the photographs was excellent immediately after the event (an average of 5.6 out of 6) and did not decline over the one-

year delay. Hamond and Fivush (1991) reported that preschoolers who were interviewed six-months after a trip to Disneyworld spontaneously reported more information than did children who were interviewed 18-months after the trip. However, when asked specific questions about the trip (e.g., "what rides did you go on?") the effect of retention interval disappeared.

Children as young as 3-years old have demonstrated impressive ability to provide comprehensive and accurate reports of a unique autobiographical event. Compared to older children younger children's reports tend to be less elaborate, contain fewer particular details, and rely more on external mnemonic support. There is evidence that the amount of information declines with increases in the delay between the event and retrieval, however this can be moderated with the use of specific retrieval cues.

Instance of a routine. Of particular interest in this research is the influence of repeated similar episodes (i.e., scripted event) on children's reports of an instance of an event. Hudson (1986) provided a starting point for this investigation. She argued that when an event is scripted instances are retained in terms of their deviations from the script. If an instance does not deviate from the script it will not contain any distinctive features and so its details will be forgotten quickly. As the number and magnitude of deviations increases so will the distinctiveness of the instance and memory for it. In the

first set of studies that I review children's memory for a relatively ordinary instance of an often-experienced routine was studied. Based on script theory, as articulated by Hudson (1986), these instances should be difficult to retrieve.

Hudson and Nelson (1986) asked 3- and 5-year-olds "what happens?" (general question), and "what happened yesterday?" (specific question) during dinner at home and snack-time at camp. The interviews occurred during the second month of a two-month camp program and so it was assumed that all children had extensive experience with snack-time at camp and had scripted the event. Both groups of children reported more information in response to the general question than to the specific question, suggesting that they had trouble accessing details about a routine instance of a well developed script.

Hudson and Nelson (1986) also asked 3-, 5-, and 7-year-olds to describe a past experience that occurred once, between two and five times, or six or more times. Five- and 7-year-olds were able to access an instance of an event that happened two or more times, but they tended to confuse instances. For example, one 5-year-old who described a trip to the zoo reported "There was a wolf there, I think ... No, that was another zoo... There wasn't no zebras ... I think there was zebras" (p. 267). Three-year-olds appeared to have difficulty reporting instances of very familiar events and opted instead to report the general event (e.g., "In summer

you go to camp. Play. And play. You play in the sandbox", p. 266).

Fivush (1984) interviewed children about the general school routine ("what happens when you go to school?") and about particular instances ("what happened yesterday at school?") on four separate occasions during the first ten weeks of kindergarten. Across interviews, fewer than half of the children were able to report any information in response to the specific question. This contrasts with responses to the general question about which an average of seven acts were reported by each child on the second day of school and an average of 12.4 acts were reported by each child on the tenth week of school. Fivush (1984) suggested that after only two experiences with the school-day routine the event had become schematized and particular common instances were difficult for children to retrieve.

Although children have difficulty retrieving an ordinary instance of a familiar routine in response to general prompts, there is evidence that with specific cues children can report some particular information. On four occasions during the first ten weeks of kindergarten Fivush (1984) asked 5-year-olds if they remembered the book that was read in school yesterday. After two weeks in school fewer than half of the children reported that they could recall yesterday's story. However, when given the title of the book over half of the children, who could not recall any information to the first question, were able to respond with

accurate information. Picariello and Pillemar (1991, cited in Hudson, Fivush, & Kuebli, 1992) replicated Hudson and Nelson's (1986) study in which 3- and 5-year-olds were asked to report what happened at dinner yesterday. When given specific cues about the particular instance children were able to provide additional particular information.

Even given very specific retrieval cues children's ability to retrieve ordinary details of a familiar routine declines with increases in retention interval. Myles-Worsley, Cromer, and Dodd (1986) showed children in preschool, kindergarten, and grades 1, 2, and 3, who attended the same day care, pictures of typical preschool activities and pictures of activities not experienced in preschool. Their task was to identify pictures of typical preschool activities. Older children were more likely than younger children to fail to recognize pictures of activities that were typical of the preschool routine. As the time between their experience and retrieval increased, correct retrieval of information about preschool activities decreased.

Fivush et al. (1984) showed that when an instance is distinctive, access to it--even following a substantial delay--is possible. In their study 5 1/2-year-olds went on a trip to a unique archaeological museum. Based on pre-trip interviews Fivush et al. (1984) reported that most children had visited museums in the past, and that the children structured their museum reports in a script-like way. The

upcoming trip was a unique museum, and one that Fivush et al. (1984) predicted would contain several distinctive features. Children were interviewed immediately after the trip and again six weeks later. Children reported an average of 8.9 actions experienced at the museum (Fivush et al. did not report the proportion of reported acts that were deviations and the proportion that were typical museum acts) in immediate reports and this did not decline over a six-week delay period.

Most researchers agree that younger children are more script dependent than older children. That is, when asked to report an instance of a routine younger children are more likely than older children to rely on scripted knowledge to guide retrieval. Hudson and Nelson (1983) presented 4- and 6-year-olds with a story about a birthday party that contained some actions presented out of sequence (e.g., eat the cake and then blow out the candles). The next day 4-year-olds were more likely than 6-year-olds to recall the story in its canonical form (e.g., blow out the candles and then eat the cake). Hudson and Nelson (1986) reported that 3-year-olds were more likely than either 5- or 7-year-olds to report general actions (e.g., "we play") when asked to recall a specific instance of a routine. (A comprehensive review of the literature on young children's script dependence is in Fivush & Slackman, 1986).

The studies described thus far investigated children's memory for an instance of a familiar routine. Recently,

researchers have studied children's memory for an instance during the early phases of script acquisition. Farrar and Goodman's (1990) schema confirmation-deployment hypothesis provided a theoretical framework for this discussion. They propose that when an instance of a routine is encountered there are two information-processing phases. In the first phase, schema confirmation, attention is focused on event components that are similar across experiences. If a script is in the early stages of formation (e.g., if the person has encountered only one other similar experience) the person will remain in the schema-confirmation stage and continue to focus attention of event components that are similar to previous experiences. Consequently, details that make an instance distinctive will receive relatively little attention and memory for a specific instance will be poor. If a script exists, the confirmation process serves to verify that the appropriate script has been activated. If the script is well-developed, as was the case in the studies described above, this process is quickly discharged and one moves to the second information-processing phase, schema-deployment.

In this phase a script has been activated, confirmed, and can be used to guide comprehension. Because the script contains all the predictable elements of the routine (i.e., those that are the same as previous experiences) attention to those components is attenuated. Instead, attention is focused on dimensions that deviate from what could be

expected from the script. That is, attention is focused on elements that make an instance distinctive. Consequently, the formation of distinct memory for instances is expected.

Farrar and Goodman (1992) reported that increased experience with similar episodes increased older children's ability to discriminate between instances. In their study, 4- and 7-year-olds participated in two or four play sessions. In the two-sessions condition children experienced minor changes during the second experience (the first visit was called a standard visit and the second was called a deviation visit). In the four-sessions condition, children experienced three identical play sessions (standard visits) followed by one that contained minor deviations (deviation visit). One week later, children were asked to describe the deviation visit. Neither 4- nor 7-year-olds in the two-sessions condition were able to discriminate between the two experiences. That is, children were as likely to include a standard visit detail as they were to include a deviation visit detail. Conversely, older children in the four-sessions condition were more likely to include deviation visit details than to include standard visit details suggesting that they were able to discriminate between the instances. On the other hand, 4-year-olds, with four experiences, were still unable to discriminate between the visits. Farrar and Goodman (1992) speculated that 4-year-olds had not scripted the event and continued to focus on similarities across visits. Thus, details that made the

final visit distinct did not receive enough attention to support instance memory.

A seemingly contradictory result comes from Hudson (1990). She invited 4- and 5-year-olds to participate in either one or four creative movement workshops. One month later the children were asked to describe the first workshop. Children who participated in four workshops included more information in their reports than did children who participated in only the first workshop. This may mean that young children can recall details related to an instance during the early stages of script development. However, children in the four-sessions condition also reported more intrusions and generalizations than children in the one-session condition and so it is not clear whether children in the four-sessions condition were reporting from instance memory or from script memory.

In summary, children's successful retrieval of an instance of a routine is influenced by several factors. If the routine is familiar (i.e., scripted) perhaps the most important factor is the extent to which it deviates from the routine. An instance is hypothesized to be accessed from its distinctive features. Accordingly, one that deviates from the routine in many ways will have several discriminating features and so is proposed to be accessible with a variety of retrieval cues. Alternatively, successful retrieval of an instance that is very routine requires specific cues that make contact with the relatively few discriminating

features. It is also probably true that younger children are more script dependent than older children. One implication of this is that younger children are less successful than older children when asked to access an instance of a routine.

When the routine is not well-established the most important factor influencing successful retrieval may be the number of previous experiences with the routine. During the first few exposures children attend to similarities across instances and so memory for details that make an instance distinct are not allotted enough attention to support distinct instance memory. There is some evidence that younger children need more experience than older children to script an event. Accordingly, they will focus on similarities across routines for relatively more experiences and memory for instances will be relatively poor.

Effect of Variation from a Script

It is important to discriminate between two general classes of variation (Hudson et al., 1992). Variation may occur as an unpredictable deviation from an otherwise common routine. Variation may also occur as a predictable part of the routine. This is an important distinction because memory for these two classes of variation is hypothesized to be different. In the case of unpredictable variation, memory for the variation is hypothesized to be represented outside of the corresponding script and uniquely accessible. In the case of predictable variation memory for the variation is

hypothesized to be a part of the script and accessible when the script is activated.

Unpredictable variation from a script. The Script-Pointer-Plus-Tag (SPPT) hypothesis relies heavily on the typicality effect to provide a theoretical account of memory for unpredictable variation from a script (i.e., atypical details) and memory for stable details of the routine (i.e., typical details) (Graesser et al., 1979; Graesser et al., 1980; Smith & Graesser, 1981). The typicality effect is that immediate recall and old/new recognition discrimination is superior for atypical relative to typical details. On a delayed test of memory atypical actions are still discriminated better, but recall of typical details is superior. Graesser and his colleagues offer the following explanation for this pattern. When a routine is encountered the corresponding script is activated as a unit. That is, all typical details are activated and used to guide comprehension of the event. Because all typical details are activated at study, discriminating presented from not-presented typical details at test is difficult. Conversely, the script does not contain atypical details and so the comprehender attends to and uniquely encodes those details of the experience. The consequent memory is hypothesized to be a set of details that is represented outside the script with a pointer that associates the details with a particular script. Accordingly, it is relatively easy to discriminate presented from not presented atypical actions because only

presented atypical actions are activated at study.

To explain the change in memory performance over time Graesser and his colleagues argued that memory for atypical actions fades quickly. Thus, after a delay, recall memory for atypical details is poorer than recall memory for typical details. Discrimination memory for atypical details remains superior relative to typical details for the reasons outlined above.

Several researchers have reported a typicality effect in very young children. Adams and Worden (1986) demonstrated the typicality effect among preschoolers (3- to 4-year-olds) and school-age children (7- to 9-year-olds). Children listened to a story that contained both typical and atypical actions. Following a 10-minute delay, children were asked to discriminate between presented and not-presented typical and atypical actions. For both groups of children, discrimination scores were significantly higher for atypical than typical actions. Hudson (1988) reported that among 4- and 6-year-olds discrimination was superior for atypical relative to typical actions both on an immediate and a delayed (one day) memory test. Davidson and Hoe (1993) found that among 4- and 6-year-olds atypical actions were recalled better than typical actions both immediately after the event and following a 1-day delay.

In the studies described above atypical actions were embedded in stories about well-established routines. Kuebli and Fivush (1994) reported a similar pattern during early

script development. Four- and 7-year-olds participated in a four play sessions, during which some event details remained fixed and others varied during the third session (unpredictable variation). Two to four days after the final play session children were asked to free recall the event. Children were more likely to report variable items (either at a general level or by reporting one or both options) than to report fixed items.

Predictable variation from a script. Another type of variation is predictable variation. This is, event variation that children come to expect through repeated experience with new options. Early studies of children's memory for predictable variation relied heavily on well developed scripts (e.g., grocery shopping, going to McDonalds). Based on this research it was concluded that children's scripts are hierarchically organized with details of variable components represented as lists of possible actions that are subsumed under higher order main acts.

In an early study done in Nelson's lab (reported in Nelson & Gruendel, 1986) preschoolers were asked to report "what happens?" during three mealtime routines: lunch at daycare, dinner at home, and McDonald's. Children's reports rarely contained specific details of variable components (e.g., children would report that you eat at mealtime but rarely reported the kinds of food that may be eaten). Importantly, children were able to report specific details if prompted to do so.

During the second and tenth week of kindergarten Fivush (1984) interviewed children about what happens during two nodal school activities; reading and minigym. Children's reports of the options were presented as a list of things that could be done, rather than reporting specific instances with the associated options. Fivush (1984) concluded that "children's reports of these activities are essentially lists. Even the increase over time in the number of options reported for minigym reflects the list-like nature of the reports rather than an organizational change" (p. 1703).

Slackman and Nelson (1984) read to 4-, 6-, and 8-year-olds three stories about visiting-a-friend. Each story followed the same basic structure but optional details varied across stories. For instance, in all stories the main character washed-up before visiting a friend, but the particular body-part washed varied across stories (i.e., hands, hair, face). The day following presentation of the last story children were asked to recall each story. When children reported variable components of the story they were more likely to incorrectly include a detail from a different story than they were to omit the detail from their reports. This is consistent with the position that children can retrieve variable options but they have difficulty attributing each to its associated instance.

Taken together the data reported by Fivush (1984) and Slackman and Nelson (1984) are consistent with the hypothesis that children represent variable components as a

list of possible actions that is subsumed under a higher order main act.

The conclusion from these early studies is that the basic organization of memory for variation is similar across a wide developmental range. However, they did identify some dimensions that were developmentally sensitive. Generally, older children reported more optionals than younger children (Slackman, Hudson, & Fivush, 1986) and the organization of the optionals becomes more complex with age. That is the optionals are sometimes presented as conditionals, or alternatives (Slackman et al., 1986).

Recently, script theorists have studied the influence of predictable event variability on children's developing scripts. The basic paradigm is to involve children in a novel play session four times. The event structure remains constant but each experience contains some elements that vary. Memory is measured using free and cued recall and sometimes behavioral reenactment.

In the two studies that used this basic paradigm and elicited verbal measures of memory, children reported the variable items at a specific level more often than at a general level. Importantly, in neither study were children asked to recall a specific instance, they were asked to recall "what usually happens when you come to the playroom?". In the Kuebli and Fivush (1994) study, when children were asked how the puppet's hat was made, children were more likely to report, for instance, that stars were

glued onto the hat (one of the four options) than to report that decorations were glued to the hat (general activity). Fivush, Kuebli, and Clubb (1992) found, in spontaneous recall (a combination of free and cued recall, the data were not reported separately), that children were more likely to report, for instance, that a bunny was traced (one of four traced shapes) than to report that a shape was traced.

At first this appears contrary to earlier literature that suggests children represent variation as a list of options associated with a more general act. It could suggest that children ignore variability and focus on just one option. Although possible this explanation is inconsistent with other results in these studies. Fivush et al. (1992) found that children reported as much information from the variable event as from the invariant event. In the Kuebli and Fivush (1995) study children were more likely to report a variable component than to report an invariant component. If children ignored variability one would expect reports of variable components to be less, not more, complete.

Methodological issues may help to explain this effect. Hudson (1990) reported that children are more likely to report a variable act at a specific level on a delayed test of memory (in her study one-month delay) if they were also required to recall each event immediately after it was experienced. She speculated that immediate recall focuses children's attention on the details related to a variable act and this may bias children to later report details

rather than generalizations. In the Fivush et al. (1992) study children did recall each event immediately following each experience. However, Kuebli and Fivush's (1994) children did not recall the event after each experience and so this is not a comprehensive explanation.

It could be that children do represent the variable options in a list-like fashion and their reports of specific options was the result of surveying across the list and randomly selecting one to report. In neither study did the authors report the options that children reported. It would be interesting to know if there was some systematic selection (e.g., usually the first alternative suggesting that children ignored subsequent change) or if the options reported were random (suggesting that children surveyed across a list of options or instances).

Another important question is the influence of variation on children's developing scripts. Bauer and Fivush (1992) found that when 2 1/2-year-olds were provided with the same props used in a prior similar episode they were able to reproduce the sequence of a previously experienced set of actions after only one experience with the routine. Conversely, 2 1/2-year-olds required three experiences with an invariantly sequenced set of actions performed on different objects before they were able to correctly sequence the actions with novel props. Similarly, Fivush, Kuebli, and Clubb (1992) reported that after one experience 3-year-olds were unable to use new props to perform old

actions, but 5-year-olds were able to do so. If the event was experienced three times, and on each occasion new props were used to perform an invariant action sequence, 3-year-olds were able to perform the old actions with new props.

Kuebli and Fivush (1994) used children's spontaneous comments about sameness and change during a sequence of play sessions to study the influence of variation on children's developing scripts. Both 4- and 7-year-olds' spontaneous comments about sameness were more frequent during session two than during sessions four. They speculated that children had formed a general representation for the routine after two sessions and no longer needed to focus on similarities. Spontaneous remarks about change increased during session four for the 7-year-olds but remained stable across sessions two to four for 4-year-olds. They used the schema-confirmation-deployment hypothesis to interpret this. Seven-year-olds may have moved from the schema confirmation to schema deployment resulting in a predictable increase in attention to change. Four-year-olds, however, remained in the confirmation stage, as indicated by stability in spontaneous remarks about change. Perhaps younger children remained in the confirmation stage because they had more difficulty than older children integrating change into their script for the event.

Although this is clearly speculative, it is consistent with the common finding that older children report more options than younger children (e.g., Fivush et al., 1992;

Hudson, 1990; Kuebli & Fivush, 1994). If, as predicted by the schema-confirmation-deployment hypothesis children's attention to variation is impeded until a script is formed, and if younger children require more experiences to script an event, then it follows that older children should report relatively more options than younger children.

Summary. Children's memory for unpredictable variation is expected to be quite good if a script is available. Theorists have offered two complementary explanations for this phenomenon. According to the Script-pointer-plus-tag hypothesis the preexisting script functions as a kind of organizing aid for the new information. Children remember the deviations because they are associated with a well established script. According to the schema-confirmation-deployment hypothesis the existing script functions to release attentional resources from script consistent information and towards script inconsistent information. Both hypotheses predict poorer memory for unpredictable variation during early script formation, when a script is not available to help organize the variable details, and attention is focused on event similarities.

Children's memory for predictable variation associated with a well-developed script is hypothesized to be represented as a list of possible ways to execute an act. This is evidenced by the tendency for children to report variable event components at a general level rather than a specific level (Nelson & Gruendel, 1986), the high rate of

intrusions in children's reports of an instance of a routine that contains variable components (Slackman & Nelson, 1984), and the list-like language that school-age children use when reporting options (Fivush, 1984).

Researchers are beginning to study children's memory for variation during early script formation. The data reported so far are consistent with the hypothesis that options are represented as a list of possibilities that is associated with a superordinate act. However, the data are also consistent with other possibilities (e.g., ignoring variation and focusing on stable factors only). This is a fertile area for future research. It is possible that variation delays the scripting process for younger preschool children but older school age children appear to be able to integrate variability into a developing script with relative ease.

The Present Study

The primary objective of the present study was to investigate the influence of prior similar experiences (none or three) on children's suggestibility for details of a particular play session. Four-, 6-, and 8-year-olds participated in either one or four play sessions. Children in the 4-sessions condition (4-S condition) participated in the play sessions on four consecutive days. During each session, some target details remained the same (fixed) and some target details changed with each experience (predictable variation). The single play session for

children in the 1-session condition (1-S condition) was identical to the last play session in the 4-S condition. During this target play session two unpredictable changes occurred. First, the experimenter wore an apron. Second, a new person was introduced to the children and appeared to photograph the play session.

Three days after the final play session children were asked a set of questions related to the last play session. Embedded in some of the questions were suggestions about things that did not occur during any of the play sessions. Other questions presented neutral information about target details and served as control items. Erroneous suggestions related to details associated with unpredictable variation, predictable variation and fixed details. One day later the children were asked to recall the last play session, and then to answer "yes/no" recognition questions about the suggested and control target details.

As discussed above, several researchers have demonstrated that resistance to suggestions increases with improvement in memory for the corresponding event detail (e.g., Brainerd, & Reyna, 1988; Loftus et al., 1978; Marche & Howe, 1995; Pezdek & Roe, 1995). Tousignant, Hall, & Loftus (1986) suggested that comprehensive event memory provides participants with the information needed to detect and dismiss erroneous postevent suggestions. Thus, suggestibility effects are expected to be influenced by the sessions condition to the extent that prior similar

experiences enhance or inhibit retrieval of details related to a particular instance.

Memory for details of the deviation visit is expected to be better in the 4-S condition than in the 1-S condition. In the 1-S condition the photographer's visit is a peripheral component of the single event and so children's memory for it should be correspondingly poor. In the 4-S condition the deviation visit is also peripheral, but it is an unpredictable variation from the routine. According to the Script-Pointer-Plus-Tag hypothesis children will use their script to organize the peripheral details. According to the Schema Confirmation-deployment hypotheses, the script will release attentional resources from the predictable actions and attention will focus relatively more on the deviation activity. Memory for details associated with the deviation activity is predicted to be better in the 4-S condition than in the 1-S condition, and this is expected to translate into greater resistance to suggestions.

Children's memory for fixed details of the event is also expected to be better in the 4-S condition relative to the 1-S condition. Fivush et al. (1992) found that 5-year-olds recalled more information related to an invariant action sequence if they experienced four similar events than if they experienced the event once. Similarly, Hudson (1990) reported that 4- and 5-year-olds recalled more information related to a creative movements workshop if they engaged in 4 similar workshops than if they experienced one workshop.

In contrast, Farrar and Goodman (1992) did not find that 4- and 7-year-olds who experienced three identical events recalled more information than children who experienced the event once.

This discrepancy may be explained by event complexity. Fivush et al. (1992) had children participate in 3 distinct activities (i.e., making fundough, making a collage, and sand play) each of which contained 5 actions. Hudson's (1990) activity was a creative movements workshop that contained singing, dancing and movement games. In the Farrar and Goodman (1992) study children perform 4 actions each with 2 toy animals (e.g., make a frog and a rabbit jump over a fence). Children in the Farrar and Goodman study may have been able to organize the event details after one experience and did not benefit from additional exposures. In the present research the event is relatively complex and so a replication of the Fivush et al. (1992) and Hudson (1990) finding, that children in the 4-S condition will remember script details better than children in the 1-S condition, is expected. This is expected to lead to greater resistance to suggestions.

The effect of the sessions manipulation on memory for the variable components of a script is considered next. Children in the 4-S condition will have had three experiences with different options prior to the target event and memory for the variable components of a particular instance is expected to be influenced by this prior

experience. However, the direction and magnitude of the effect is less clear.

Research on children's memory for variation during script formation is relatively new. It is not clear when and how the "list-like" set of options associated with well-developed scripts develops. The few studies that investigated children's memory for variation during the early stages of script development have reported that a) children who experienced an event once were as likely to report a variable component as children who experienced the event four times (Fivush et al., 1992) b) children were more likely to report a variable than a fixed component of an event experienced four times (Kuebli & Fivush, 1994), and c) children were more likely to report a particular option than to report the variable component at a general level (Fivush et al., 1992; Kuebli & Fivush, 1994).

Based on the findings reported by Fivush et al. (1992) one would predict 1-S children's memory for variable components of the event to be similar to 4-S children's memory for the same details. However, in the Fivush et al. study children were scored as having recalled the variable component if they recalled it at a general level, or if they recalled any one of the experienced options. Memory for the option presented on a particular target occasion was not demonstrated.

The finding that children were more likely to report a variable than a fixed component of a recurring event

suggests that repeated experiences have a relatively stronger facilitative effect on memory for variable than fixed items (assuming no systematic difference after one experience). This would lead to the prediction that children in the 4-S condition will remember the variable components of the event better than children in the 1-S condition. However, it may be that children with more experience report a variable component because the variable nature of it makes the detail more interesting and worthy of reporting. It is also important to note that Kuebli and Fivush (1994) asked children about the general event, not a particular instance. Children's ability to report the variable component, or any one of the experienced options, does not demonstrate an ability to correctly attribute an option to a particular instance. Thus, this finding does not direct a prediction respecting the facilitative or inhibitive influence of multiple experiences on children's memory for the option that was presented on a particular occasion.

Children were more likely to report a variable component at a specific level than at a general (Fivush et al., 1992; Kuebli & Fivush, 1994). The reason for this is unclear. It may be that children ignored variability and focused on just one option that was later reported. Or, children may have surveyed memory for instances and selected one from which to report the corresponding option. Alternatively, children may represent options as lists of possibilities early in script development and surveyed

across the list to select one to report. The existing research does not convincingly discriminate between these possibilities.

The strength of memory for the option presented during a particular instance will depend, to some extent, on how children represent variation early in script development. If children ignore options (but are cognisant of variation in the routine) memory for the option presented during an instance, particularly a later instance, would be relatively poor. If children associate each option with an instance, memory for the option presented on a particular occasion is available and can be used to detect and dismiss suggestions. If children represent options as a list of possible ways to satisfy a component the options may be accessible however, the source information needed to attribute each to an instance will be impoverished.

To summarize, with respect to details related to the photographers visit, children in the 4-S condition are expected to have better memory and be in a better position to detect and dismiss erroneous suggestions. Similarly, relative to children in the 1-S condition those in the 4-S condition are expected to have better memory for fixed details and this will lead to smaller misinformation effects. The effect of misleading suggestions on children's reports of the variable component will depend on the effect of the sessions manipulation on their memory for the corresponding details. No clear prediction regarding this

important question can be made.

EXPERIMENT 1

Method

Participants

One-hundred and sixty-five children were invited to participate in this study. Twenty-six parents disallowed their child's participation (six 4-year-olds, six 6-year-olds, nine 8-year-olds, and five children whose ages were not identified). Twenty-eight children missed either the last play session, one of the two interviews, or two or more of the non-target play sessions (twelve 4-year-olds, seven 6-year-olds, nine 8-year-olds). Six children refused to complete the study (four 4-year-olds, one 6-year-old, and one 8-year-old). Three children were dropped because of special needs (one 4-year-old did not speak English, one 6-year-old had autism, and one 8-year-old had a hearing loss). Ninety-six children completed this experiment. There were 32 children in each of the age groups 4-years, 6-years, and 8-years who were recruited from local nursery schools and public schools in the Greater Victoria School District. Half of the children were randomly assigned to the one-session condition (1-S condition) and half to the four-sessions condition (4-S condition).

Design, Materials, & Procedure

This was a 3 (age: 4-, 6-, 8-year-olds) x 2 (sessions: one, four) x 2 (item: control, suggested) x 2 (stability: fixed, variable) mixed factorial design. The between-

subjects factors were sessions and age, the within-subjects factors were item and stability.

A questionnaire was attached to the letters sent to parents requesting permission to invite their child to participate in the study. Parents used 7-point scales to rate their child on the following: compliance to authority, fantasy play, overall memory, and predicted suggestibility. The parents' questionnaire is reproduced in Appendix A.

Children completed either six sessions (4-S condition) or three sessions (1-S condition) and each session was held on a separate day. All sessions occurred at the child's school or day care. For children in the 4-S condition the first four sessions were play days held either Monday to Thursday or Tuesday to Friday, depending on the school's schedule. For children in the 1-S condition the first session was a play day held either on a Thursday or a Friday. The next session was a biasing interview that was completed the following Monday if the play sessions ended on Thursday, or Tuesday if the play sessions ended on Friday. The day after the biasing interview a final memory interview was completed.

Play Sessions

Children participated in the play sessions in groups of between two and four children. During each session the children played three games: smelling, paper-folding, and magic. The first activity was always the smelling game. Children sat on the floor in a strait line. The experimenter

showed the children a bottle of water tinted with yellow food-colouring and explained that it was "smelly stuff". The object of the game was to see how long children needed to notice the smell. The children were instructed to close their eyes and to remain quiet. The experimenter then verbalized the following procedure. The lid was removed from the bottle, a small amount of liquid was poured onto a piece of cotton batten, and the moistened cotton batten was raised into the air. The children were instructed to raise their hand as soon as they noticed the smell, but to keep their eyes closed and to remain quiet until the experimenter instructed them to lower their hand and open their eyes. The game continued for 30 seconds or until all the children raised their hands. The experimenter recorded the approximate number of seconds it took for each child to raise his\her hand.

The second and third activities were a magic game and a paper-folding game. These are referred to as focal activities because it was within these activities that items were manipulated as fixed or variable. Included in each focal activity were four target items: location, prop color, word-phrase, and paper model/magic trick. Location and prop color were fixed (i.e., details were the same on each play day), word phrase and model/trick were variable. Five different options were generated for each variable item and, for children in the 4-S condition, a different option was presented on each of the four play days. Children in the 1-S

condition were presented with the day 4 option. Appendix B presents the critical items associated with the focal activities. Appendix C contains tables of the daily presentation order of the critical items.

Order of the focal activities was fully counterbalanced so that half of the children played the paper-folding game first and half of the children played the magic game first. During the paper-folding game the children sat in a circle on the floor and were given a blue/green paper hat to wear (some children opted to place the hat on the floor beside them). Next the children were supplied with all materials needed to create a paper model. There were five paper-model options: book, kite, sail boat, house, or envelope. The experimenter explained and demonstrated each step in creating the paper model and offered assistance if required.

Each paper model was constructed from an 8 1/2" x 8 1/2" (21 1/2 cm x 21 1/2 cm) piece of white paper. The completed model was taped to a 9" x 12" (23 cm x 30 cm) piece of coloured construction paper. For each model, except the envelope, 1/2" (1 cm) round green, red, blue, and yellow stickers were used for decoration. The paper envelope was decorated with a 1 cent stamp. Additionally, the kite was completed with a 12" (30 cm) piece of burgundy yarn for the tail.

When the paper model was completed the children repeated a phrase (e.g., "Folding paper is a good thing to learn"). Five phrase options were generated and one was

randomly assigned to each paper model. Thus, once a phrase was assigned it always accompanied that model. Appendix D lists the materials, procedures, and accompanying phrases associated with each paper model.

To partially counterbalance option order, the paper models and associated phrases were randomly assigned a number between 1 and 5. Assignment to numbers 1, 2, 3, 4, and 5 were book, kite, boat, house, and envelope, respectively. In the 4-S condition half of the children created models 1, 2, 3, and 4 on days 1, 2, 3, and 4, respectively, and half of the children created models 5, 4, 2, 3, on days 1 to 4 respectively. In the 1-S condition half of the children created model 4 and half of the children created model 3. Thus, the target day was identical for all children in a given condition.

When the paper models were completed the children wrote their names on them and then the experimenter collected the models. They were returned to the children a few days after the final memory interview.

The props used for the magic tricks were common children's magic tricks purchased at a local joke-and-trick store. A magic wand was created by attaching a 2 1/4 " (5 1/2 cm) cardboard star to the top of a 9 1/2" (23 1/2 cm) long straw and covering the entire wand with silver tin foil. During each play session the children stood around a table to learn one of five different magic tricks (listed here in order from number 1 to number 5): ball and vase,

spikes through a coin, pencil through a plastic frame, penny into a dime, and tilting vase. After receiving the props needed to perform the trick the children were given instructions and assistance (if required) to perform the magic. Just before demonstrating the magic the children waved their magic wands over the prop and said magic words. Five magic-word options (e.g., "abra cadabra") were generated. Using the procedures outlined in the assignment of word phrases in the paper-folding game, one magic word phrase was randomly assigned to each magic trick. Appendix E lists the materials, procedures, and accompanying magic words used for each magic trick. The option order of magic tricks and magic words was partially counterbalanced as outlined in the paper-folding game.

On the target day (the last play-day for children in the 4-S condition and the only play day for children in the 1-S condition) two novel events occurred. First, the experimenter wore an apron during the session. The apron was a standard apron with a bib purchased at a local department store. The experimenter introduced the play session as apron day, displayed the apron to all the children, asked each one if he/she liked it, and then asked how the children thought the apron should be worn (bib up or bib down). Second, a new person attended the session. The person arrived at the beginning of the session, was introduced to the children (no explanation for the person's presence was offered), and appeared to photograph the session as unobtrusively as

possible (no photographs were actually taken). Just before the third activity began the photographer said "good-bye", and left. The photographer had no other contact with the children.

Biasing Interview

On the fourth day after the final play session a new experimenter (biaser) conducted a biasing interview with each child individually. The interview began with general conversation intended to help the child to feel comfortable talking to the biaser. The biaser then told the child that the questions she would ask related to the last play session, the day the experimenter wore a special apron. The biaser reminded the child that she was not there when the child played the games and said that she hoped the child could help her to learn what happened that day.

Each child was asked 15 questions about the final play session: four questions about each focal activity (all target), three questions about the photographer's visit (2 target and 1 filler question), three questions about the smelling game (1 target, 1 general, and 1 filler question), and one question about an activity that did not occur (i.e., temperature taking).

The target items associated with the focal activities were: location of the games, color of the props (magic wand, paper hat), trick learned/paper model created, and words the child repeated (magic words or phrase repeated at the end of the paper-folding game). For children in the 4-S condition

four target items related to details that were fixed across sessions (location of the game, and color of the props), and four target items related to details that were variable across sessions (magic trick/ paper model, and words repeated).

There were two target items related to the photographer's visit: what the person did during the visit, and how the person departed. The general question asked children to describe the color of the photographer's hair.

The target item associated with the smelling game was the material onto which the liquid was poured. In the general question children were asked to describe the smell of the liquid, and the filler question related to the children closing their eyes during the game. In the final question it was suggested to all of the children that their temperature had been taken during the final play session.

There were a total of 11 questions related to target items. Due to an oversight, the target question related to the smelling game was always suggestive (suggested that the liquid was poured onto a kleenex or onto a face cloth). Consequently, this item was dropped from the study. Half of the remaining 10 target items were suggestive and half were control. This was counterbalanced so that a group of items was control for half of the children and suggestive for the other children.

Suggestive questions presented details that were not experienced during any of the play days and that

contradicted event details (e.g., suggested that the child made a paper kite when in fact a paper boat was made and the child had not made a paper kite during any of the play sessions). The suggestive questions were generated by embedding the erroneous details into innocuous questions. For instance, in the question that incorrectly suggested that the magic wand was yellow, the question was "During the magic game you used a yellow magic wand, do you think that most magicians really use a yellow magic wand?". The child's response to this question was neither acquiescence to, nor rejection of the suggestion, it was his/her opinion about the color of wand used by most magicians. Questions about control items were asked in a neutral way. Details relevant to the questions asked in the final memory test were not offered.

Because there were two ways that variable options were ordered across play days there were two sets of biasing questions that presented different suggestions. Children who, on day four, engaged in magic and paper-folding options four were presented with suggestions related to options five. Children who engaged in magic and paper-folding options three on day four were given suggestions related to options one.

Each child was presented with two suggestions about each focal activity. Half of the children were presented with suggestions about the paper model they made (variable), the phrase they repeated after making the paper model

(variable), the location of the magic game (fixed), and the color of the magic wand (fixed). Half of the children were presented with suggestions about the magic trick they performed (variable), the magic words they used (variable), the location of the paper-folding game (fixed), and the color of the paper hat (fixed). Related to the photographer's visit it was suggested to half of the children that the photographer watered the plants, and to the other children it was suggested that the photographer shook their hand before leaving.

The biasing questions were blocked by activity. Before each block of questions the biaser briefly introduced the target activity and the suggestions that would be presupposed in the questions. For all of the children the first block of questions related to the photographer's visit, the second to last block of questions related to the smelling game and the last question suggested that the children's temperature had been taken. The second and third blocks of questions were about paper-folding then magic tricks, respectively, for half of the children. The order was reversed for the remaining children.

After completing testing with two 8-year-olds, one 6-year-old, and four 4-year-olds, it became evident that two of the suggestions were confusing, especially for the younger children. Those suggestions were that the color of the paper hat was blue (it was green) and the magic wand was gold (it was silver). In response to this the suggestions

were changed to the following: a red paper hat and a yellow magic wand.¹

To summarize counterbalancing there were eight biasing question sets developed. Each began with questions about the photographer and ended with questions about the smelling game and then about temperature taking. Questions related to paper-folding and magic tricks (the second and third groups of questions) were counterbalanced so that each was in the second and third positions an equal number of times. Within each of those conditions half of the question sets presented inaccurate suggestions about the magic trick performed, the magic words, the location of the paper-folding game, and the color of the paper hat. Half of the question sets presented inaccurate suggestions about the paper model that was made, the words repeated after creating the paper model, the location of the magic game, and the color of the magic wand. Suggestions related to the magic trick learned, the paper model created and the corresponding word phrases were counterbalanced. Suggestions related to option five were presented to half of the children and suggestions related to option one were presented to the remaining children. A sample biasing interview is in Appendix F.

The biasing interview was audiotaped and videotaped.

¹ In the final memory interview one 4-year-old responded "no" to all related questions; 3 4-year-olds, the 6-year-old, and 1 8-year-old responded correctly to all related questions; and 1 8-year-old reported that the wand was gold, and that the paper hat was neither green nor blue. There does not seem to be a systematic bias in these responses and so the children were not replaced.

The audiotape was an unobtrusive handheld machine that was positioned between the biaser and the child. The videotape recorder was placed on a tripod in a corner of the interview room. It was activated at the beginning of the session and remained stationary throughout the interview.

Final Memory Interview

One day after the biasing interview, a second interviewer (tester) administered the final memory test to each child individually. The tester began by introducing herself and asking the child general questions unrelated to the play sessions. Next, the tester told the child that he/she should answer the following questions from what they remember about the last play day, apron day. She reminded the child that she was not there when the games were played and said she hoped the child could help her to learn what happened. Just before the questions were asked the child was told that he/she could say "no" to some of the questions. The child was then asked a question for which the correct answer was "no": "On the last day did Debbie fly across the room?". If the child responded "yes" the tester gently told the child that Debbie did not fly across the room and that "no" was the correct response to that question.

The interview began with free recall. A sample free recall protocol is in Appendix G. The child was asked to recall as much as he/she could about the last play day. General, non-directive prompts were used to assist the child (e.g., "Can you tell me what things looked like?", "Do you

remember what people said?"). When the child provided any information non-leading prompts were used to encourage further reporting (e.g., "Did something else happen?"). When it appeared that the child had reported all that he/she could in free recall the tester administered the cued recall test, a sample of the protocol is in Appendix H.

The child was given the name of the each activity, one at a time, and asked if he/she remembered playing that game. The child was then asked to recall as much as he/she could about each game. If the child did not provide any information in response to the activity name the tester presented general non-directive prompts (i.e., "What paper model did you make, what magic trick did you learn?", "Where did you play that game?"). The order in which activities were cued followed the order of question blocks in the biasing interview. In the final cued recall question the child was asked to describe what happened when the experimenter took some of the children's temperatures.

When the child appeared to have reported all that he/she could in cued recall the recognition test was administered. Twenty-two "yes/no" questions were created by generating two questions for each of the 11 target items (one with the correct information and one with the suggested information). As a reminder, the 11 target items were comprised of four targets for each of the focal activities (what the child did, the location of the game, what the child said, the color of a prop), two targets related to the

photographers visit (what she did, how she left), and one target associated with the smelling game (onto what the liquid was poured). In the final two questions the child was asked to describe the odour of the liquid, and then if his/her temperature had been taken.

Recognition questions were grouped by activity. Questions related to the photographer's visit were always first, and questions related to the smelling game and temperature taking were always second to last and last, respectively. Half of the children were questioned about the magic tricks then paper-folding and half were questioned about paper-folding then the magic tricks. Within each question pair the suggested and correct details were in the first or second position an equal number of times. A final recognition interview protocol is in Appendix I.

After the recognition test the tester debriefed each child. As part of the debriefing she introduced the idea that the biaser may have made some mistakes when she asked questions the previous day, and asked the child if he/she thought that the biaser made some mistakes. If the child said "no" the issue was not pursued. If the child said "yes" he/she was asked what mistakes were made and then was reminded that the biaser had not attended any of the play sessions and that is probably why mistakes were made. The child was then invited to ask questions about the study. Finally, the child was thanked for his/her participation. A debriefing protocol is in Appendix J.

The final memory interview was audiotaped and videotaped as outlined in the description of the biasing interview.

Free and Cued Recall Coding

Free and cued recall were transcribed from audiotapes of the children's final memory interview. Discourse relevant to the experiment was transcribed verbatim by a trained research assistant. If a child described experiences that were clearly extra-experimental (e.g., a trip to McDonalds, a car ride with Grandma) the discourse was not transcribed. The accuracy of twelve protocols was inspected. In my judgement no relevant discourse was omitted and the transcription of relevant discourse was verbatim.

Each child's free and cued recall was coded separately. The coding protocols were identical except that the free recall coding protocol also included coding for verb tense, type of pronoun, and temporal markers. On the coding protocol each target item was listed and followed by the appropriate options: the suggested and correct options for fixed details, and the five options related to variable items. This procedure provided the information needed to study intrusions (i.e., reporting a non-target day detail).

The language used in free recall was coded for pronoun type (first person, third person, impersonal), temporal markers, and verb tense (past, present, future). These dimensions were selected because the literature on children's script memory suggests that, compared to

reporting a unique event, children's reports of a scripted event contain relatively more impersonal pronouns, present tense, and temporal markers. Interest was in language used to report a unique versus repeated event and so language that described a current state (e.g., I remember, I think etc.) and language contained in a quote from the event (e.g., "folding paper can be fun") were not coded. Repetition of phrases was coded only once (e.g., "you do...you do" was coded as one use of impersonal pronoun, and one present tense). Language coding of the children's reports of the photographer's visit was not done because it was a single event for all of the children and there was no theoretical reason to expect that language should be different across conditions. A sample of the coding protocol is in Appendix K.

Protocols were coded by two persons and percentage agreement was calculated as $\text{agreements} / (\text{agreements} + \text{disagreements})$. Generally, agreements were computed from details children reported, and did not include details children did not report. That is, if a child did not report making a paper house and neither coder recorded it as a response it was not included in the computation of agreements. However, if one coder recorded that the child reported making a paper house it was included in the computation of disagreements. Twelve protocols were coded independently by two coders followed by consultation on disagreements. Eighteen new protocols were then coded. Each

protocol was coded independently, followed by consultation on the results. Based on these eighteen protocols intercoder agreement was 93.75% for cued recall, 90% for free recall, 92% for verb tense, 86.44% for pronouns, and 100% for temporal markers. The remaining protocols were then scored by one coder.

Results

The data are reported in three sections. First, descriptive statistics of the covariates are presented. Next, the results of free and cued recall are presented in four subsections. In the first subsection the language children used in free recall is reported. In the second subsection analyses of the content of free and cued recall related to the focal activities is presented. This section includes analyses of incorrect reports of suggestions, incorrect intrusions, and correct reports of target details. In the third subsection, children's incorrect and correct reports of details relevant to the deviation visit are presented. In the fourth subsection, children's responses to the temperature-taking question are described.

Analyses of the recognition data are reported in the third section. This section is divided into five subsections. In the first subsection, tests of the assumptions of ANCOVA are described. The second subsection describes the analyses of children's responses to questions about the focal activities. Contained herein are children's incorrect "yes" responses to suggested items, their correct

responses to questions about target details, and a report of signal detection analysis. The third subsection deals with children's responses to questions about the deviation visit. This includes children's incorrect responses to questions about suggested details, their correct responses to questions about target details, and signal detection analysis. In the final subsection children's responses to the temperature-taking question, which followed the recognition questions, are reported.

There were too few observations per subject to perform parametric signal detection analysis (related to the focal activities, in each condition there were two questions about new items and two about old items, related to the deviation visit, in each condition there was one question about an old item and one about a new item). Accordingly, a non-parametric model of signal detection was used (Donaldson, 1992). Hits were computed as $(\#hits + .5)/(\#old + 1)$, and false alarms were computed as $(\#fa + .5)/(\#new + 1)$ (Snodgrass & Corwin, 1988). A' was computed as $.5 + [(hits - false\ alarms)(1 + hits - false\ alarms)]/[(4hits(1 - false\ alarms))]$ (Donaldson, 1992). When hits are equal to or exceed false alarms, A' scores range from .5 (chance discrimination) to 1.0 (perfect discrimination). When there are fewer hits than false alarms A' values are less than .5 (chance performance). For the focal activities, there were two new and two old items per child and so the largest A' value observed in these data is .90 (when children correctly

rejected both new items and correctly accepted both old items). There was one old and one new item related to the deviation visit and so the largest A' value observed in these data is .83.

Snodgrass and Corwin (1988) demonstrated that non-parametric measures of bias were not independent of discrimination scores and so argued that the model was deficient. Donaldson (1988) showed that B''_d , $[(1 - \text{hits})(1 - \text{false alarms}) - (\text{hits} * \text{false alarms})] / [(1 - \text{hits})(1 - \text{false alarms}) + (\text{hits} * \text{false alarms})]$, is independent of discrimination scores, and so this measure of bias was used in the analysis. A B''_d score of 0 represents no bias, a negative value represents a liberal bias and a positive B''_d score represents a conservative bias. Using these formulae analyses of discrimination and bias were performed on responses to questions about the focal activities and the deviation visit separately.

Analyses of variance that included age as a variable were followed-up with analyses of the linear and quadratic effects of age. Hale (1977) argued that when three or more levels of a naturally ordered, roughly monotonic, variable are measured the ANOVA test of the overall effect of the ordered variable can lose power. This occurs because the intermediate group adds little to the sums of squares estimate (if the function is monotonic, data from the intermediate groups are close to the grand mean), however, it adds one degree of freedom thereby reducing the mean

square estimate and decreasing the F ratio. Consequently, the overall test is more conservative than the nominal alpha level, and type II errors may be excessive. To protect against an inflated type II error rate Hale (1977) recommended trend analyses of the ordered variable. In the present research analyses of variance that included the age variable were also analyzed with trend analyses. Tukey's post hoc tests were used to follow-up reliable effects of age in the omnibus ANOVA. The results of trend analyses will be reported when they uncover effects not revealed in the omnibus ANOVA test.

The alpha level for all main analyses and follow-up tests was set at .05. Reliable effects are reported at that level unless otherwise stated.

Descriptive Statistics of Covariates

Parents' ratings of their child's compliance, fantasy play, fantasy games, memory, and suggestibility, relative to same-age peers, were gathered on 7-point scales (ratings of fantasy games asked parents to rate 6 activities, one of which was fantasy play, in order from least to most enjoyable). Ratings were coded so that larger values represent more of the construct. That is, a high score for compliance indicates parents rated their child as more compliant than same-age children, a low score on suggestibility indicates that parents predicted that their child would report fewer suggestions than same-age peers, etc. Means and standard deviations for parental ratings are

reported in Table 1.

Table 1

Mean Parental Ratings (SDs in parenthesis) of Children's Compliance, Fantasy Play, Fantasy Games, Memory, and Suggestibility by Age.

	4 years	6 years	8 years	Overall
Compliance	4.24 (1.27)	5.00 (1.11)	4.92 (1.13)	4.71 (1.21)
Fantasy Play	3.97 (1.52)	4.02 (1.28)	3.87 (1.48)	3.95 (1.42)
Fantasy Games	3.87 (1.84)	3.82 (1.77)	3.43 (1.83)	3.71 (1.80)
Memory	6.10 (0.80)	5.43 (1.17)	5.80 (1.06)	5.79 (1.04)
Suggestions	4.29 (1.42)	4.86 (1.27)	5.00 (1.55)	4.71 (1.44)

Note: Parents of 31 4-year-olds and 28 6-year-olds answered all of the questions. Parents of 31 8-year-olds answered the compliance and fantasy play questions and 30 parents of 8-year-olds answered the questions about fantasy games, memory, and suggestibility.

Each of the five covariates was the dependent measure in a 2 x 2 ANOVA with age and sessions as between-subjects factors. There was a main effect of age on compliance, $F(2, 84) = 3.45$, $MSe = 1.34$. Six-year-olds were given higher compliance ratings than 4-year-olds. Compliance ratings for 8-year-olds were intermediate and did not differ from the ratings of either 4- or 6-year-olds.

There was also a main effect of age on memory ratings, $F(2, 83) = 3.55$, $MSe = .98$, and a reliable interaction between age and sessions, $F(2, 83) = 3.25$ on memory ratings.

Separate one-way ANOVA's were performed on memory ratings for each sessions condition separately. In the 1-S condition age was not a reliable variable, $F(2, 44) = 2.54$. However, when single df polynomial contrasts were used the linear effect of age was reliable, $F(1, 44) = 4.74$, $MSe = 1.02$. The mean (standard deviations in parentheses) memory ratings for 4-, 6-, and 8-year-olds in the 1-S condition were 6.13 (.89), 5.56 (.96), and 5.33 (1.18), respectively. In the 4-S condition the main effect of age was reliable, $F(2, 39) = 4.05$, $MSe = .93$. Eight-year-olds were granted higher ratings ($M = 6.27$, $SD = .70$) than 6-year-olds ($M = 5.25$, $SD = 1.42$). Four-year-olds' memory ratings ($M = 6.06$, $SD = .70$) did not differ from older children's.

During the play sessions children were asked to raise their hand when they noticed the smell from a cotton ball that had been moistened with yellow coloured water (described to the children as "smelly stuff"). Children in the 4-S condition played the game four times and children in the 1-S condition played the game once. To yield comparable data children's responses from the first session are reported. Sixty-nine children raised their hands to indicate that they noticed the odour, on average, 9 seconds ($SD = 6.81$) after the moistened cotton ball had been raised in the air. Of those who raised their hands, 4-year-olds ($N = 23$) did so after an average of 8.52 seconds ($SD = 7.65$), 6-year-olds ($N = 21$) after an average of 8.38 seconds ($SD = 7.22$)

and 8-year-olds (N= 25) waited an average of 9.96 seconds (SD = 5.72) before raising their hands. Children in the 1-S and 4-S conditions raised their hands to indicate that they noticed the smell after an average of 9.03 (SD = 6.84) and 8.97 (SD = 6.88) seconds respectively. There was not a significant effect of age or sessions, nor was the interaction reliable, F's < 1.

In summary, for the most part the covariates did not vary as a function of age or sessions. There were two notable exceptions. Compliance scores were higher for 6-year-olds than 4-year-olds. There was a negative linear effect of age on memory ratings for children in the 1-S condition, and in the 4-S condition the effect of age was a quadratic function. These effects are interesting because parent's task was to rate their child relative to same-age peers. There was no reason to expect that any group of children in this study would be more compliant or have better memories than same-age peers. It is important to note that although the effects were significant, the effect sizes were quite small. The eta² associated with the main effect of age on compliance ratings was .07. Similarly, the interaction of Age x Sessions on memory ratings accounted for only 7% of the variability in memory ratings.

Free and Cued Recall

Language in Free Recall

As a means of assessing scripting, three dimensions of

children's free recall language were evaluated: verb tense, temporal markers, and pronouns. These measures have been taken as evidence of scripting (Kuebli & Fivush, 1994; Nelson, 1986). Age and sessions were between-subjects factors in each of the three 3 x 2 analyses of variance.

In the first analysis the use of present verb tense, as a proportion of present and past verb tense, was the dependent variable. There was a main effect of age, $F(2, 82) = 4.40$, $MSe = .04$. Six-year-olds were more likely to use the present tense ($M = .20$, $SD = .28$) than were 4-year-olds ($M = .11$, $SD = .22$) or 8-year-olds ($M = .05$, $SD = .09$) and the latter two groups did not differ from each other. There was also a reliable main effect of sessions, $F(1, 82) = 10.21$, $p < .01$. As predicted, the proportional use of present tense was higher for children in the 4-S condition ($M = .18$, $SD = .27$) than for children in the 1-S condition ($M = .05$, $SD = .10$). The interaction between age and sessions was not significant, $F(2, 82) = 1.16$, $p = .32$.

The absolute number of temporal markers was the dependent measure in the second analysis. There was a main effect of age, $F(2, 87) = 4.92$, $MSe = 4.32$, $p < .01$. Eight-year-olds were more likely to use temporal markers ($M = 2.16$, $SD = 2.68$) than were 4-year-olds ($M = .48$, $SD = 1.0$). Six-year-olds' use of temporal markers was intermediate ($M = 1.26$, $SD = 2.25$) and did not differ from older or younger children. The main effect of sessions approached

significance, $F(1, 87) = 3.61$, $p = .06$. Children in the 4-S condition were more likely to use temporal markers ($M = 1.72$, $SD = 2.64$) than were children in the 1-S condition ($M = .87$, $SD = 1.53$). There was not a significant interaction of age and sessions, $F < 1$.

In the third analysis the impersonal pronoun (i.e., "you"), as a proportion of impersonal and first-person pronouns, was the dependent measure. There was a main effect of age, $F(2, 76) = 3.15$, $MSe = .03$. Six-year-olds were more likely to use the impersonal pronoun ($M = .12$, $SD = .22$) than were 4-year-olds ($M = .01$, $SD = .05$). Eight-year-olds' use of the impersonal pronoun ($M = .08$, $SD = .16$) was intermediate and did not differ from either 4- or 6-year-olds'. The main effect of sessions was not significant, nor was the interaction of sessions with age, both F 's > 1 .

The analyses of use of present verb tense and temporal markers support the prediction that children in the 4-S condition scripted the event. Compared to the language used by children in the 1-S condition, children in the 4-S condition used proportionately more present verb tense, and more temporal markers in their description of the event. Contrary to expectations, children in the 4-S condition were not more likely to use proportionately more impersonal pronouns than children in the 1-S condition.

Content of Focal Activities

Consistent with a considerable amount of research,

children's free recall reports were very brief. For instance, only 11% of the target details were reported by children in the 4-S condition, and among those only 2% of the fixed target details were reported. Overall, only four suggestions were reported in free recall. Not surprisingly, children's reports were more complete when given retrieval cues (given the substantial amount of literature that supports the facilitative effect of retrieval cues on children's event reports another demonstration of the phenomenon is not necessary). Thus, to reduce the interpretive ambiguity associated with floor effects, data from free and cued recall were collapsed.

Each of the two focal activities (paper-folding and magic) included four critical details, two of which were fixed and two of which varied across sessions in the 4-S condition. Half of the critical details of each type served as targets of misleading suggestions.

Incorrect reports of suggested details. Overall, children reported only seven suggestions out of 380 opportunities (95 children provided free and cued recall data and each child was presented with four suggestions). Four-year-olds did not report any suggestions, 6-year-olds reported only two suggestions, and 8-year-olds reported five suggestions. All of the reported suggestions corresponded to variable details. Of the seven suggestions reported, two were from children in the 1-S condition and five were from

children in the 4-S condition. There was not a reliable relationship between the sessions condition and number of suggestions reported, $p = .45$, two-tailed binomial test).

The most notable aspect of these data is that children rarely reported suggestions in free and cued recall. This is entirely consistent with a considerable array of literature that children's free recall reports are generally quite accurate--when accuracy is defined as an absence of commission errors (e.g., Goodman, 1991--but see the next section on children's intrusions for an important qualification to this general belief).

Intrusions. An intrusion was defined as a report of a detail that the child experienced on a non-target day. It was only among variable items that intrusions could be observed and so the fixed/variable manipulation was not entered into the analyses. Also, intrusions could not vary as a function of suggested/control because, by definition, they are items that did not occur. The number of intrusions was analyzed in a 3 x 2 analysis of variance with age and sessions as between-subjects variables. Table 2 presents the relevant means.

Table 2

Mean number of intrusions (SDs in parentheses) reported in free and cued recall as a function of age and sessions.

	1 Session	4 Sessions
4-year-olds	0.00 (0.00)	1.67 (1.29)
6-year-olds	0.06 (0.25)	1.06 (0.85)
8-year-olds	0.19 (0.40)	0.75 (1.29)

The main effect of age was not significant, $F(2, 89) = 1.60$, $p = .21$. There was a significant main effect of sessions, $F(1, 89) = 39.07$, $MSe = .70$, $p < .001$, and a significant Age x Sessions interaction, $F(2, 89) = 3.45$. Children in the 4-S condition were more likely to report an intrusion ($M = 1.15$, $SD = 1.20$) than were children in the 1-S condition ($M = .08$, $SD = .28$). In the 1-S condition an intrusion would occur if the child guessed a non-target day detail, or if the child discussed the experimental activities with a peer who was in the 4-S condition and reported a detail the peer had related.

To interpret the Age x Sessions interaction one-way analyses of variance were performed on intrusions reported in the 1- and 4-S conditions separately. In the 1-S condition the main effect of age was not reliable, $F(2, 45) = 1.94$, $p = .16$. In the analysis of data from the 4-S condition the main effect of age was not significant, $F(2,$

44) = 2.48, $p = .1$. However, the linear effect of age was reliable, $F(1, 44) = 4.83$, $MSe = 1.35$.

Not surprisingly, children in the 1-S condition included very few intrusions in their reports, an average of .08 per child. Conversely, children in the 4-S condition included an average of 1.15 intrusions in their reports of the target day, and there was a reliable decrease with age in the number of intrusions reported. If accuracy is defined as correct reports of details that occurred on the target day then this finding may place an important qualification on the generally accepted belief that children's free recall is extremely accurate.

Correct reports of event details. The proportion of correct reports of event details were analyzed in a 3 x 2 x 2 x 2 mixed factorial analysis of variance with age and sessions as between-subjects variables and fixed/variable and target/control as within-subjects variables. A target is an event detail about which a suggestion had been presented in the biasing interview, and a control detail corresponded to an item about which no suggestion had been offered.

The reliable main effects of age, $F(2, 89) = 5.82$, $MSe = .08$, $p < .01$, sessions, $F(1, 89) = 11.63$, $p < .01$, and fixed/variable, $F(1, 89) = 126.64$, $MSe = .05$, $p < .001$, were qualified by the interactions: Fixed/variable x Age, $F(2, 89) = 4.37$, and Fixed/variable x Sessions, $F(1, 89) = 8.83$, $p < .01$. The target/control main effect was not significant,

$F(1, 89) = 1.62, p = .21$, nor did it enter into any interactions. Thus, the relevant means, in Tables 3 and 4, are collapsed across the target/control variable.

Table 3.

Mean proportion of fixed and variable items (SDs in parentheses) reported in free and cued recall by age.

	Fixed	Variable
4-year-olds	.08 (.15)	.27 (.20)
6-year-olds	.10 (.17)	.45 (.20)
8-year-olds	.15 (.25)	.41 (.18)

The Fixed/Variable x Age interaction indicates that the difference between correct reports of fixed and variable details varies across ages. Interest was in the effect of age on correct responses to fixed and variable items separately. To analyze this two one-way ANOVAs with age as the between-subjects variable were performed on correct responses to fixed and variable items separately. In the analysis of fixed items the main effect of age was not significant, $F(2, 92) = 1.04, p = .36$. In the analysis of variable items the main effect of age was significant, $F(2, 92) = 8.06, MSe = .04, p < .01$. Four-year-olds reported fewer variable details than did either 6-year-olds or 8-year-olds, and the older two groups of children did not differ from each other.

The Fixed/variable x Sessions interaction indicates

that the fixed/variable difference varies across the sessions condition. To investigate the effect of interest in the present study independent samples t-tests compared correct reports of fixed and then variable items across the sessions condition. The relevant means are in Table 4. Fixed items were reported as often in the 1-S condition as in the 4-S condition, $t(93) = .74$, $p = .46$. Conversely, variable items were reported more often in the 1-S condition than in the 4-S condition, $t(93) = 4.27$, $p < .001$.

Table 4.

Mean proportion of fixed and variable items (SDs in parentheses) reported in free and cued recall by sessions.

	Fixed	Variable
1 Session	.13 (.21)	.46 (.14)
4 Sessions	.10 (.18)	.29 (.23)

In summary, reports of variable items were influenced by the age and sessions variables. Four-year-olds reported fewer variable items than did either 6- or 8-year-olds, and children in the 4-S condition reported fewer variable items than did children in the 1-S condition. Overall low performance on fixed items makes it difficult to interpret the effect of age and sessions on correct reports.

Deviation Visit

As a reminder, the deviation visit occurred during the target play session. A new experimenter was introduced to the children at the beginning of the play session and

appeared to photograph the session. Before the play session ended the "photographer" said "good-bye" to the children and left.

Incorrect reports of suggested details. Overall, 16 suggestions were reported out of a possible 95 (1 suggestion presented to each of 95 children). Four-year-olds reported four suggestions, 6-year-olds reported seven suggestions, and 8-year-olds reported five suggestions. Seven suggestions were reported by children in the 1-S condition and nine suggestions were reported by children in the 4-S condition. There was no relationship between sessions and number of suggestions reported, $\chi^2 (1, N = 16) = .06, p = .80$.

In contrast to children's reports of the focal activities, children's reports of the deviation visit contained relatively more suggestions: 16.8% of the suggestions associated with the deviation visit were reported, compared with 1.8% of the suggestions related to the focal activities. The deviation visit was clearly peripheral and so, consistent with a substantial amount of literature (e.g., Goodman, Rudy, Bottoms, & Aman, 1990) children's reports reflected a greater influence of suggestions.

Correct reports of event details. A 3 x 2 x 2 mixed factorial analysis of variance was used to analyze these data. Age and sessions were between-subjects variables and target/control was a within-subjects variable. Targets are

event details about which suggestions had been presented, and control details are event details about which no suggestions had been presented. The reliable main effects of age, $F(2, 89) = 4.47$, $MSe = .19$, and target/control, $F(1, 89) = 8.11$, $MSe = .24$, $p < .01$, were qualified by a reliable three-way interaction between target/control, age, and sessions, $F(2, 89) = 3.84$, indicating that the target/control difference scores varied as a function of age and sessions.

To test the effects of interest three 2 x 2 mixed factorial ANOVAs with sessions as the between-subjects variable, and target/control as the within-subjects variable were performed on data from children in each age group separately. The means are in Table 5.

Table 5.

Mean proportion of correct reports of deviation visit details by sessions, target/control, and age.

	1 Session		4 Sessions	
	Target	Control	Target	Control
4 years	.31 (.48)	.19 (.40)	.00 (.00)	.47 (.52)
6 years	.19 (.40)	.63 (.50)	.31 (.48)	.50 (.52)
8 years	.38 (.50)	.63 (.50)	.44 (.51)	.44 (.51)

In the analysis of data from 4-year-olds there was a significant Target/control x Sessions interaction, $F(1, 29) = 8.29$, $MSe = .16$, $p < .01$. Paired-samples t-tests revealed

that in the 1-S condition 4-year-olds were as likely to report control details as to report target details, $t(15) = .81$, $p = .43$. In the 4-S condition 4-year-olds were more likely to report control details than target details, $t(14) = 3.50$, $p < .01$.

In the analysis of data from 6-year-olds there was a main effect of target/control, $F(1, 30) = 6.52$, $MSe = .24$. Six-year-olds reported more control details ($M = .56$, $SD = .50$) than target details ($M = .25$, $SD = .44$). This effect did not interact with sessions, $F(1, 30) = 1.04$, $p = .32$.

In the analysis 8-year-olds' responses there were no significant main effects or interactions. Eight-year-olds reported comparable proportions of control details ($M = .53$, $SD = .51$) and target details ($M = .41$, $SD = .50$).

In summary, 4-year-olds in the 4-S condition, and 6-year-olds in both the sessions conditions were less likely to report event details about which suggestions had been presented than to report event details about which no suggestions had been offered. The presentation of postevent suggestions impaired these children's ability, or willingness, to report the corresponding event details. Conversely, correct reports from 4-year-olds in the 1-S condition and 8-year-olds in both sessions conditions were unaffected by the presentation of erroneous postevent suggestions.

Temperature-taking Question

Following cued recall children were asked to describe "what happened when the experimenter took some of the children's temperature?". Children's temperature had not been taken. Five 4-year-olds in the 1-S condition reported that someone's temperature had been taken (four reported that another child's temperature had been taken, and one child reported that his/her own temperature had been taken), and four 4-year-olds in the 4-S condition reported that another child's temperature had been taken. Three 6-year-olds in the 1-S condition reported that someone's temperature had been taken (two of these children reported that another child's temperature had been taken). None of the 6-year-olds in the 4-S condition, and none of the 8-year-olds in either sessions condition reported that a child's temperature had been taken. There was not a reliable relationship between sessions and reports of temperature taking, $\chi^2 (1, N = 12) = .75, p = .39$.

Recognition

ANCOVA

Before using ANCOVA one assumption and one logical condition were evaluated. The assumption was that the covariates not interact with the between-subjects variables (null interactions with the within-subjects factors is not an assumption of ANCOVA). The logical condition was that the covariates explain some of the variance in the dependent

measures.

When there is an interaction between a covariate and a between-subjects variable the size of the adjustment that ANCOVA applies to the DV should vary depending on the level of the IV. However, ANCOVA adjusts by a constant, rendering the procedure inappropriate.

To test the first assumption an interaction term involving each of the six covariates with age, sessions, and Age x Sessions was regressed on each of the 12 dependent variables. An alpha level of .01 was set to partially offset the inflated type I error rate that follows from multiple comparisons on the same data. Only two interaction terms were reliable. When Age x Suggestibility predictions was regressed on correct recognition responses to variable control items the interaction was reliable, $F(2, 79) = 5.93$, $MSe = .05$, $\eta^2 = .11$. The Age x Memory prediction interaction was reliable when regressed on incorrect recognition responses to control items associated with the deviation visit, $F(2, 79) = 6.07$, $MSe = .07$, $\eta^2 = .10$. In both cases the amount of variance accounted for by the interactions was relatively small.

To test if the covariates explain any of the variance, each dependent measure was regressed on the six covariates. Alpha of .01 was set to reduce the likelihood of type I errors. None of the R^2 values were reliable. Because the covariates do not explain a reliable amount of variance in

the dependent measures ANCOVA was not expected to increase the power of the tests and will not be reported. (ANCOVA was performed on incorrect recognition responses and the results did not lead to any changes in the statistical conclusions).

Focal Activities

Incorrect "yes" responses to suggested details. These data were analyzed in a 3 x 2 x 2 x 2 mixed factorial analysis of variance with age and sessions as between-subjects variables and suggested/control and fixed/variable as within-subjects variables.

There was a main effect of age, $F(2,90) = 5.23$, $MSe = .15$, $p < .01$. Four-year-olds were more likely to say "yes" ($M = .35$, $SD = .25$) than were eight-year-olds ($M = .20$, $SD = .16$). The mean proportion of incorrect "yes" responses provided by six-year-olds ($M = .24$, $SD = .16$) did not differ from those given by older or younger children. Age did not enter into any interactions.

The main effects of fixed/variable, $F(1,90) = 70.03$, $MSe = .08$, $p < .001$, and suggested/control, $F(1,90) = 41.87$, $MSe = .06$, $p < .001$, and the two-way interactions of Fixed/variable x Sessions, $F(1,90) = 11.80$, $p < .01$, and Fixed/variable x Suggested/control, $F(1,90) = 10.50$, $MSe = .05$, $p < .01$ were qualified by the three-way interaction between fixed/variable, suggested/control, and sessions, $F(1,90) = 5.20$.

To follow-up the three-way interaction two 2 x 2 mixed factorial analyses of variance with suggested/control as the within-subjects variable and sessions as the between-subjects variable were performed on fixed and variable items separately. The pattern of responses is illustrated in Figure 1.

In the analysis of responses to questions about fixed items there was a main effect of sessions, $F(1, 94) = 7.59$, $MSe = .09$, $p < .01$, and a main effect of suggested/control, $F(1, 94) = 7.98$, $MSe = .05$, $p < .01$. The interaction of Sessions x Suggested/control was not reliable, $F(1, 94) = 1.35$, $p = .25$. Children in the 1-S condition incorrectly responded "yes" ($M = .20$, $SD = .25$) more often than children in the 4-S condition ($M = .08$, $SD = .17$). And, children in both sessions conditions responded "yes" more often to suggested ($M = .18$, $SD = .29$) than to control items ($M = .10$, $SD = .32$).

In the analysis of responses to variable items there was a reliable effect of suggested/control, $F(1, 94) = 47.00$, $MSe = .05$. Children responded "yes" reliably more often to questions about suggested items ($M = .50$, $SD = .32$) than to questions about control items ($M = .18$, $SD = .29$). There was not a reliable main effect of sessions, $F(1, 94) = 2.18$, $MSe = .15$. However, the interaction of Suggested/control x Sessions neared the conventional level of significance, $F(1, 94) = 3.50$, $MSe = .05$, $p = .07$.

Paired-samples t-tests revealed that children in the 4-S condition committed more errors when responding to suggested items ($M = .57$, $SD = .34$) than children in the 1-S condition ($M = .43$, $SD = .29$), $t(94) = 2.25$. There were no reliable difference between children in the 1- and 4-S conditions in incorrect responses to control items (M 's = .26, .28, SD 's = .31, .34 for the 1- and 4-S conditions, respectively), $t(94) = .31$, $p = .75$.

Importantly, children in the 1-S condition were considerably less accurate than children in the 4-S condition when responding to questions about fixed items. Conversely, children in the 4-S condition committed more errors than children in the 1-S condition when responding to variable suggested items.

Correct "yes" responses to event details. A 3 x 2 x 2 x 2 mixed factorial analysis of variance with age and sessions as between-subjects factors and fixed/variable and target/control as within-subjects factors was used to analyze these data. The target/control manipulation was defined as an event detail about which a suggestion had been presented (target), and an event detail about which no suggestion had been presented (control).

There was a main effect of sessions, $F(1, 90) = 4.12$, $MSe = .07$, and an interaction between fixed/variable and sessions, $F(1,90) = 4.66$, $MSe = .06$. As illustrated in Figure 2, in the 1-S condition the proportion of correct

"yes" responses was the same for fixed and variable items, $t(47) = .42$, $p = .68$. Conversely, children in the 4-S condition were more likely to say "yes" to fixed than variable items, $t(47) = 2.77$, $p < .01$.

There was also a reliable main effect of target/control, $F(1,90) = 6.72$, $MSe = .04$, $p < .02$, and the interaction between target/control and age was significant, $F(2,90) = 3.06$, $p = .05$. Paired-samples t-tests revealed that there was not a reliable difference between target and control items for 4-year-olds ($M = .88$, $SD = .17$, for target and $M = .86$, $SD = .17$, for control), $t(31) = .44$, $p = .66$. Among 6- and 8-year-olds target items were answered correctly less often ($M = .81$, $SD = .19$ and $M = .81$, $SD = .20$ for 6- and 8-year-olds respectively) than control items ($M = .92$, $SD = .12$ and $M = .88$, $SD = .16$ for 6- and 8-year-olds respectively), $t(31) = 2.82$, $p < .01$ for 6-year-olds and $t(31) = 2.06$ for 8-year-olds.

In summary, children in the 1-S condition were as likely to say "yes" to questions about fixed items as to questions about variable items. This is as expected because there was not a real fixed/variable difference in the 1-S condition. Conversely, children in the 4-S condition were correct more often when responding to questions about items that remained fixed across play sessions compared to questions about items that changed during every play session. Importantly, the presentation of erroneous

postevent suggestions did depress 6- and 8-year-olds' correct responses, although it had no effect on 4-year-olds' correct responses.

Signal detection. A' scores were analyzed with a 3 x 2 x 2 mixed factorial analysis of variance. The between-subjects variables were age and sessions and the within-subjects variables were suggested/control and fixed/variable.

Table 6
Mean A' scores (SDs in parentheses) for focal activities as a function of age and suggested/control

Age	Suggested	Control
4-year-olds	.70 (.15)	.73 (.19)
6-year-olds	.66 (.26)	.82 (.12)
8-year-olds	.68 (.26)	.80 (.22)

There was a main effect of suggested/control, $F(1, 90) = 21.78$, $MSe = .05$, $p < .001$, and an interaction between age and suggested/control, $F(2, 90) = 3.18$. Paired-samples t-tests compared A' scores from suggested and control items for each age group separately. As can be seen in Table 6, 4-year-olds' discriminated between old and new suggested items as well as they discriminated between old and new control items, $t(31) = .76$, $p = .46$. Six- and 8-year-olds' A' scores were higher for control items than for suggested items, $t(31) = 3.32$, $p < .01$ for 6-year-olds and $t(31) = 4.37$, $p < .001$ for 8-year-olds. There were no other effects of age.

The main effect of fixed/variable, $F(1, 90) = 9.84$, MSe

= .11, and the interaction between fixed/variable and sessions, $F(1, 90) = 10.10$, $p < .01$, were qualified by a three-way interaction of Sessions x Fixed/variable x Suggested/control, $F(1, 90) = 6.56$, $MSe = .04$. Follow-up tests on children's discriminability for fixed and variable items were executed in two 2 x 2 ANOVA's with sessions as a between-subjects variable and suggested/control as a within-subjects variable. The results of specific interest were a main effect of sessions in the analysis of fixed items, $F(1, 94) = 10.75$, $MSe = .08$, $p < .01$, and an interaction of Suggested/control x Sessions in the analysis of variable items, $F(1, 94) = 5.03$, $MSe = .03$. As illustrated in Figure 3, children in the 4-S condition discriminated between old and new fixed items ($M = .85$, $SD = .10$) better than children in the 1-S condition ($M = .72$, $SD = .27$). Conversely, children in the 1-S condition discriminated between old and new suggested variable items ($M = .68$, $SD = .16$) better than children in the 4-S condition ($M = .54$, $SD = .40$). There was no effect of sessions on discrimination of variable control items (M 's for children in the 1- and 4-S conditions .76 and .74, SD 's = .20 and .36, respectively).

To summarize, erroneous postevent suggestions reduced 6- and 8-year-olds' ability to discriminate between old and new items. Furthermore, three prior experiences increased children's ability to discriminate between old and new fixed items, but reduced discriminability for suggested variable

items.

B''_D scores were analyzed with a 3 x 2 x 2 x 2 mixed factorial analysis of variance. The between-subjects variables were age and sessions and the within-subjects variables were suggested/control and fixed/variable.

There was a main effect of age, $F(2, 90) = 4.19$, $MSe = .27$. Four-year-olds used a more liberal bias ($M = -.30$, $SD = .31$) than either 6-year-olds' ($M = -.08$, $SD = .24$) or 8-year-olds' ($M = -.06$, $SD = .19$). The two older groups did not differ from each other.

The main effects of suggested/control, $F(1, 90) = 5.61$, $MSe = .13$, and of fixed/variable, $F(1, 90) = 34.76$, $MSe = .16$, $p < .001$, were qualified by an interaction between them, $F(1, 90) = 4.38$, $MSe = .13$ indicating that the fixed/variable difference varied as a function of the suggested/control variable. The means associated with this interaction are in Table 7.

Table 7.

Mean B''_D scores as a function of fixed/variable and suggested/control.

	Fixed	Variable
Suggested	-.02 (.40)	-.33 (.48)
Control	-.01 (.31)	-.17 (.46)

Paired-samples t-tests revealed that for fixed items the B''_D scores were not reliably different across suggested and control items, $t(95) = .20$, $p = .84$: Conversely, for variable items bias scores were reliably more liberal for

suggested items compared to control items, $t(95) = 3.01$, $p < .01$.

To summarize, 4-year-olds operated with a more liberal response criteria than did either 6- or 8-year-olds. Postevent suggestions served to increase the strength of children's liberal bias for variable items but did not change their bias when responding to fixed items. These effects did not interact with sessions and so the response criterion that children set was not influenced by frequency of experience.

Deviation Visit

Incorrect "yes" responses. A 3 x 2 x 2 mixed factorial analysis of variance with age and sessions as between subjects factors and suggested/control as the within-subjects factor was used to analyze these data. There was a main effect of age, $F(2, 90) = 7.0$, $MSe = .19$, $p < .01$. Four-year-olds were more likely to say "yes" to new items ($M = .44$, $SD = .38$) than were 8-year-olds ($M = .16$, $SD = .24$). Mean proportion of "yes" responses from 6-year-olds was intermediate ($M = .25$, $SD = .28$) and did not differ from either 4- or 8-year-olds'.

The main effect of suggested/control was significant, $F(1, 90) = 51.70$, $MSe = .13$, $p < .001$, because children were more likely to incorrectly say "yes" to suggested items ($M = .47$, $SD = .50$) than to control items ($M = .09$, $SD = .29$).

The main effect of sessions and the interaction between

age and sessions were not significant, F 's < 1.

Correct "yes" responses. These data were analyzed in a 3 x 2 x 2 mixed factorial ANOVA with age and sessions as between-subjects variables and target/control as the within-subjects variable. There were no significant main effects or interactions. However, there was a significant linear effect of age when responses to control items were analyzed, $F(1, 93) = 4.74$, $MSe = .21$. The means (standard deviations in parentheses) of 4-, 6-, and 8-year-olds' correct responses to control items were .56 (.50), .69 (.47), .81 (.47), respectively.

Signal detection. A' scores were analyzed in a 3 x 2 x 2 mixed factorial analysis of variance with age and sessions as between-subjects variables and suggested/control as the within-subjects variable. There was a main effect of age, $F(2, 90) = 4.52$, $MSe = .10$. Four-year-olds' discrimination scores were reliably lower ($M = .50$, $SD = .26$) than 8-year-olds' ($M = .66$, $SD = .18$). Six-year-olds' discrimination scores were intermediate ($M = .61$, $SD = .23$) and did not differ from either older or younger children's. Overall, children discriminated between old and new control items ($M = .69$, $SD = .20$) reliably better than they discriminated between old and new suggested items ($M = .49$, $SD = .39$), $F(1, 90) = 23.51$, $MSe = .09$, $p < .001$.

A 3 x 2 x 2 mixed factorial analysis of variance was used to analyze the B_0 scores from the deviation visit. Age

and sessions were between-subjects variables and suggested/control was the within-subjects variable. Only the main effect of suggested/control was reliable, $F(1, 90) = 10.47$, $MSe = .31$, $p < .01$. When responding to suggested items children used a moderately liberal bias ($M = -.10$, $SD = .61$), and they employed a moderately conservative bias when responding to control items ($M = .16$, $SD = .47$).

To summarize the results of the analyses of responses to recognition questions about the deviation visit, there was a developmental improvement in: incorrect "yes" responses, correct "yes" responses to questions about event details when no suggestions were given, and discrimination scores. The presentation of postevent suggestions decreased discrimination scores, and moved children's response bias from moderately conservative to moderately liberal. The effects did not interact with sessions suggesting that a unique activity, whether it occurs in the context of an event experienced once or four times, has similar response patterns, at least to "yes/no" recognition questions.

Temperature-taking Question

"Was your temperature taken on apron day?" was asked after children answered the recognition questions. Six 4-year-olds, one 6-year-old, and zero 8-year-olds responded "yes". Of the seven children who responded "yes", four were in the 4-S condition and 3 were in the 1-S condition. The relationship between the sessions condition and incorrect

reports of temperature-taking was not reliable, $p = 1.0$, two-tailed binomial test.

Discussion

The effects of four independent variables on children's correct and incorrect reports of a recently experienced play session were studied. In this summary each independent variable is considered separately, and a summary of its main and interactive effects is reported for the focal activities and deviation activity separately. Within each activity, incorrect then correct reports in recall are summarized first, followed by a summary of children's incorrect then correct responses to the recognition questions.

Age

Focal Activities

In recall, children's incorrect reports of suggested details were rare and did not vary as a function of age. However, intrusions were surprisingly common among children in the 4-S condition, and the number of intrusions decreased with age. Relative to 6- and 8-year-olds', 4-year-olds' recall reports contained fewer correct variable (not fewer fixed) details.

In recognition, 4-year-olds incorrectly said "yes" to questions about suggested and control details more often than 8-year-olds, but there were no age differences in children's correct recognition responses. These differences may be attributable to response biases rather than to age

differences in children's ability to discriminate between old and new items. Old/new recognition memory discrimination scores did not vary across the ages studied. However, 4-year-olds used a more liberal response criterion than older children.

Deviation Visit

Four-year-olds responded to the recognition questions incorrectly more often than 8-year-olds, and there was a linear increase in correct responses to recognition questions about control items. Given this pattern of responses it is not surprising that 4-year-olds' discrimination scores were lower than 8-year-olds'. Bias scores did not vary as a function of age.

Suggested/Control

Focal Activities

There was no effect of this manipulation on the proportion of correct details included in children's recall reports.

The proportion of incorrect responses to questions about suggested details was higher than the proportion of incorrect responses to questions about control details. Six- and 8-year-olds were more often correct in their responses to recognition questions about control details than target details. Conversely, there was not a reliable target/control difference in correct responses to recognition questions among 4-year-olds.

Deviation Visit

Correct recall of event details varied as a function of the suggested/control manipulation. Six-year-olds in both sessions conditions, and 4-year-olds in the 1-S condition, were more likely to include control details than to include target details in their recall reports.

Children incorrectly recognized more suggested details than control details. Correct responses to recognition questions did not vary as a function of this manipulation. Discrimination scores were lower and response criterion was more liberal when responding to questions about suggested items relative to control items.

Sessions

Children in the 4-S condition used relatively more present verb tense and temporal markers than did children in the 1-S condition. The expectation that children in the 4-S condition would script the play session was supported.

Focal Activities

Children in the 4-S condition included more intrusions and fewer target variable details in their recall reports than children in the 1-S condition. Correct recall of fixed items did not vary across the sessions condition.

The sessions condition also affected children's responses to recognition questions. Children in the 1-S condition were incorrect more often than children in the 4-S condition when responding to questions about fixed items.

Conversely, when responding to questions about variable suggested items children in the 4-S condition were incorrect more often than children in the 1-S condition.

A' scores were higher in the 4-S condition than in the 1-S condition when the items were fixed. Conversely, when the items were variable and suggested, children in the 1-S condition had higher A' scores than children in the 4-S condition. Bias scores were unaffected by the sessions condition.

Deviation Visit

Four-year-olds in the 1-S condition were more likely than 4-year-olds in the 4-S condition to correctly report a detail about which a suggestion was presented. There were no other effects attributable to the sessions manipulation.

Temperature-taking Question

There was no effect of sessions on the number of children who reported having their temperature taken.

Fixed/Variable

Focal activities

Overall, children were incorrect more often in their recognition responses to questions about variable than fixed items. Children in the 4-S condition were correct more often in their responses to fixed items than in their responses to variable items, but there was no difference in correct responses to fixed and variable items among children in the 1-S condition.

In the 1-S condition A' scores did not vary as a function of this manipulation. On the other hand, children in the 4-S condition were better able to discriminate between old and new fixed items than to discriminate between old and new variable items. Overall, B''_D scores were relatively more liberal for variable items than for fixed items.

Introduction to Experiment 2

The most intriguing outcome from Experiment 1 was that children who experienced four play sessions were more suggestible about variable details than children who experienced one play session. This is consistent with script memory theory, and has important practical implications.

Even the most routine and scripted events are rarely wholly invariant. That is, most recurring events contain some elements, like the variable details of Experiment 1, that change across occasions. Script memory theorists propose that memory for the variable components of a routine are represented as part of the script, but at a relatively more general level than fixed components. Associated with this general representation is a list-like set of options that are valid expressions of the variable component. Importantly, it is hypothesized that particular options in this "list" are not closely associated with specific experiences. Rather, children think about them as different expressions of the variable component, with little regard

for when an option was encountered. Support for this theory comes from studies that reported children have considerable difficulty reporting the particular instance during which a target variable option occurred (Hudson, 1990; Hudson & Nelson, 1986; Slackman & Nelson, 1984). Additional evidence was provided in the present study in the analysis of intrusions. Children in the 4-S condition reported, on average, 1.15 intrusions in their reports. In spite of considerable effort to target the children's memory search on the last play day, they appeared to have difficulty distinguishing which variable options occurred on apron day.

This study extends the implications of this component of script memory theory. Compared to children in the 1-S condition, children in the 4-S condition were more likely to report a detail that was only suggested to have occurred if the corresponding event detail was variable. It may be that the list-like set of options is malleable. That is, suggested options that are legitimate expressions of the variable components may be integrated into the "list" and later reported as having occurred.

This has important implications for interviewers of children. If the child experienced the event often, misleading questions that suggest details concerning a variable component may be more readily accepted than if the same suggestion is presented to a child who experienced the event once.

Thus, the central finding of Experiment 1, that scripting of an event actually increased susceptibility to suggestions about variable details in the routine, fits well with script theory and has important practical implications. The assignment of items to the fixed versus variable conditions was not counterbalanced. It is conceivable that the items assigned to be variable were intrinsically more suggestible. It could be argued that the inclusion of a group of 1-S children provided a control condition against which to compare 4-S children's responses. Given identical experiences and the same suggestions, children in the 4-S condition expressed higher levels of suggestibility for variable items than did children in the 1-S condition. This certainly supports the conclusion that the sessions manipulation explains the difference. It is, though, possible that there was an Item x Sessions interaction that was expressed in greater suggestibility for frequently experienced variable items but not frequently experienced fixed items.

Experiment 2 was a replication of the most interesting conditions of Experiment 1 in a design in which assignment of items to fixed and variable conditions was counterbalanced. Because there were few theoretically interesting main effects or interactions involving age, only 8-year-olds participated in Experiment 2.

EXPERIMENT 2

Method

Participants

Twenty-one third grade children were recruited from area schools. Five children were absent for session 5 and were replaced. The mean age of the 16 children who completed this study was 8.3 years ($SD = .75$).

Design, Materials, and Procedure

This was a 2 (suggested/control) x 2 (fixed/variable) within-subjects design.

Play Sessions

Four play sessions were held on four consecutive days. One child participated in the play sessions alone, all other children participated in groups of between 2 and 4 children. The procedures for each play-day were identical except for changes in options as described below, and a procedural change on the fourth day that was designed to "tag" it for later memory testing.

Each play session contained three distinct activities that were always presented in the same order. First the children sat on the floor and were instructed to listen carefully to a story. Children heard a story about a typical morning in the life of a little girl named Lauren. The story contained four critical items each with five options. The critical items (with options in parentheses) were: an object in her dream (candle, cup, bottle, hat, box), a vehicle

(car, van, truck, motorcycle, bus), a pet (cat, gerbil, bird, dog, fish), and a toy (ball, puzzle, stuffed bear, guitar, lego). A table of the critical items associated with each of the activities is in Appendix L.

Across story presentations two items were fixed and two items were variable. That is, for two items the same option was presented on each of the four play days, and for two items a different option was presented on each of the four play days. The fixed/variable manipulation was partially counter-balanced so that for half of the children the fixed items were the object in Lauren's dream and the vehicle, and for the other half of the children the pet and the toy were fixed.

The options for each item were randomly assigned a number between 1 and 5 (the options listed above are presented in order from number 1 to number 5) so that two option sets could be created. Half of the children were assigned to option-set 1 wherein variable options 1, 4, 3, 2, were presented on days 1, 2, 3, 4. Half of the children were assigned to option-set 2 wherein variable options 5, 4, 2, 3, were presented on days 1, 2, 3, 4. The daily presentation order of critical items is in Appendix M and the stories for one group of children are in Appendix N.

The second activity was a magic game. There were four critical items: position of the children's feet, a theme sticker, a magic wand, and the magic trick, each with five

options (see Appendix L). The options for each of these items are listed below in order from number 1 to number 5. The children first stood around a small table and were instructed to place their feet in one of five positions: with both feet pointed in toward the middle, with both feet pointed strait and apart, with feet crossed, with one knee bent, or with one foot pointed strait and the other pointed to the side. The experimenter also placed her feet in the required position.

The children were then asked to imagine that they were magicians at a child's birthday party. To help them with the imagination game the children were given a sticker with a birthday party theme picture on it and their attention was drawn to the picture on the sticker (e.g., "today your birthday theme name-tag has a picture of a birthday cake on it"). The "name tag" was a 2 1/2" (4 1/2 cm) x 1 1/2" (3 cm) plain white sticker on which was placed a birthday party theme sticker that filled approximately 1/3 to 1/2 of the space on the white sticker. The theme sticker was a balloon, birthday cake, birthday hat, present, or candles.

Next the children were given a magic wand to help them with the magic trick, and again their attention was drawn to the color of the wand. The wand was silver, white, blue, black, or red.

When the children were ready the experimenter provided each child with the props and instructions needed to perform

one of five magic tricks: make a ball reappear in a vase, put plastic spikes through a plastic coin, turn a penny into a dime, make a vase stay on its side, or put a pencil through a plastic frame. A detailed discussion of the magic tricks and the magic wand is presented in the materials section of Experiment 1.

Two of the magic-trick items were fixed and two were variable. This was partially counter-balanced so that for half of the children the fixed items were the magic trick and the color of the magic wand and for half of the children the fixed items were the position of their feet and the theme sticker. The presented order of options for variable items on days 1 to 4 were 1, 4, 3, 2 (option-set 1) for half the children, and 5, 4, 2, 3 (option-set 2) for half the children. To ensure that day four (the day targeted for memory testing) was identical for all children in an option-set condition the presented option for fixed items was option 2 in option-set 1 and option 3 in option-set 2. The order of presented options is in Appendix O.

When the magic trick had been performed the experimenter collected the theme stickers, magic wands, and props and the children were informed that the paper-folding activity would begin. For the paper-folding game there were four target items, position of the children's legs, a paper hat, theme sticker, and the paper model, each with five options (see Appendix L). Each option was randomly assigned

to a number between 1 and 5. Listed below are the options presented in order from number 1 to number 5.

The children first sat on the floor and were told and shown how to place their legs in one of five positions: crossed indian style, straight out and together, tucked under their bottom, 1 straight and the other tucked under their bottom, straight out in a V shape. The children were then given the paper-folding "name-tag" (similar to those distributed during the magic game but with a craft theme sticker on it) and the experimenter named the picture displayed on the sticker. The theme stickers were a picture of a: marker, pencil, paint brush, pen, or crayon. Next the children were given a paper hat to wear and their attention was drawn to the color of the hat. The paper hat was either orange, brown, yellow, purple, or green. Materials and instructions were then provided for the children to make one of five paper models: book, kite, boat, house, or envelope. A detailed discussion of the paper models and paper hat is in the materials section of Experiment 1. When the children completed the paper model they wrote their names on them and returned them to the experimenter along with the paper hats and theme stickers. A list of the presented options related to the paper-folding game is in Appendix P.

The procedures used to assign and counterbalance options to option-sets and to the fixed/variable factor were identical to those described in the magic games activity.

For half of the children in each option-set condition the paper model and the color of the paper hat were fixed, and for half of the children in each option-set condition the position of their legs and the theme sticker were fixed.

During the fourth play session the experimenter wore an apron. Children's attention was drawn to the apron by asking them if they liked the apron and by asking for suggestions as to how it should be worn (bib up or bib down). This was done to "tag" the final play session for later memory testing.

Biasing Interview

Three days after the final play session a new experimenter (biaser) met with each child individually. The biaser began by briefly chatting with the child to establish rapport. When the child appeared to be comfortable, the biaser drew the child's attention to "apron day" and asked the child to answer the questions based on what they remembered about that day. Each child was asked 12 questions, one about each of the critical items experienced during the fourth play session. The questions were organized into three groups of four questions each, with each group relating to one activity (i.e., story, magic, paper-folding). Each set of four questions began with a brief description of the target activity. Contained in the description were erroneous suggestions about two details that did not occur during any of the play sessions and that

contradicted the child's experience (e.g., suggested that the paper hat was green when in fact the child wore a brown hat and did not wear a green hat during any of the play sessions). The suggested option was option 5 in option-set 1 and option 1 in option-set 2. The description was immediately followed by the four questions related to that activity. Embedded in two questions were the suggestions that had been introduced in the description. In the other two questions, which served as control questions, neutral information about the target detail was offered (e.g., that the child wore a hat without reference to its color). In each question group one suggestive and one control question related to a fixed item and one suggested and one control question related to a variable item.

In total each child was asked six suggestive questions and six control questions. This was counterbalanced so that for each target item the corresponding question was suggestive for half of the children and control for half of the children. Additionally, half of the suggestive questions and half of the control questions related to fixed items and half of each related to variable items. This was also counterbalanced so that each suggested and control question corresponded to fixed items for half of the children and corresponded to variable items for half of the children.

A sample biasing interview is in Appendix Q. The biasing interview was audiotaped and videotaped as described

in Experiment 1.

Final Memory Test

The day after the biasing interview a new researcher met with each child individually. A rapport-building period preceded the interview. When it appeared to the interviewer that the child was comfortable, the interviewer told the child that she would ask questions about apron day. The child was asked if he/she remembered the day that the experimenter wore a special apron and was invited to describe the apron. The child was again asked to answer the questions based on their memory for apron day. Before the questions were asked the child was told that he/she could say "no" to some of the questions. The child was then asked a question for which the correct answer was "no": "On the last day did Debbie fly across the room?". If the child responded "yes" the tester gently told the child that Debbie did not fly across the room and that "no" was the correct response to that question. Periodically throughout the interview references to apron day were made to ensure that the child continued to base their answers on memory for the target day.

Children were first asked to report everything that they could remember about the last play session. When it appeared that the child had reported all that he/she could, non-directive prompts about how things looked and sounded were introduced. The sensory prompts were successfully used

by Poole and Lindsay (1995).

"Will you tell me everything that you can remember about what happened the last time that Debbie was here to play games with you? I would like you to tell me what happened on the day that Debbie put on a special apron."

"Sometimes we can remember a lot about how things look. Think about all of the things that were in the room. Tell me how everything looked on apron day."

"Sometimes we can remember things that people say. Tell me about all of the things you heard during apron day."

Following free recall children were cued with the names of each activity (i.e., story, magic, paper-folding) and encouraged to report all that they could remember about each activity. The cues were very general and did not specifically request information about the critical items. The free and cued recall protocols are in Appendixes R and S, respectively.

When the children appeared to have reported all that they could in response to the prompts, they were asked a series of "yes/no" recognition questions. There were two questions for each target item, one related to the new item (suggested for half of the children and control for half of the children) and one related to the experienced item. Thus, there were eight questions concerning each of the three activities. The questions were organized so that all questions related to the Lauren story were asked first, questions related to the magic game were second, and the third set of questions was about paper-folding. The position, first or second, of the correct response was randomly assigned for half of the children. For the other

half of the children the position of the correct response was reversed. An example of the recognition protocol is in Appendix T. The final memory interview was audiotaped and videotaped as described in Experiment 1.

Results

To facilitate comparisons across studies the organizing structure of the results section of Experiment 2 follows that of Experiment 1. Within each primary section of Experiment 2, recall and recognition, responses to questions about the magic and paper-folding games (for the sake of consistency they are called focal activities) and the Lauren story are reported separately.

A 2 x 2 within-subjects ANOVA with fixed/variable and suggested/control as the within-subjects variables was used in all primary analyses. Dependent samples t-tests were used to follow-up the reliable interactions and to execute planned comparisons. All reliable effects are at the alpha level of .05 unless otherwise stated.

Free and Cued Recall

Content of Focal Activities

Incorrect reports of suggested details. Out of 64 suggestions presented, only three were reported in free and cued recall. Two of the suggestions related to variable items and one was associated with a fixed detail.

Intrusions. As a reminder, an intrusion is defined as a report of a detail experienced on a non-target day. Children

included an average of .56 (SD = .73) intrusions in their recall reports of the focal activities. This is consistent with the relatively high intrusion rate of 8-year-olds in the 4-S condition of Experiment 1 (M = .75, SD = .13).

Correct reports of event details. There were no main effects nor was the interaction significant, all F's = 1 or < 1. Mean proportions (SDs in parentheses) for suggested fixed, control fixed, suggested variable, and control variable were .31 (.31), .19 (.25), .22 (.26), and .22 (.26), respectively.

Lauren Story

Incorrect reports of suggestions. Of 32 suggestions presented, children incorrectly reported only two in their free and cued recall reports. Both reported suggestions related to variable details.

Intrusions. Children reported an average of .44 (SD = .81) details that had been included in stories that were presented on non-target days.

Correct reports of event details. There was a main effect of fixed/variable, F(1, 15) = 6.00, MSe = .17. Children correctly included more details that were fixed (M = .31, SD = .40) than variable (M = .06, SD = .17). Neither the main effect of target/control, nor the interaction of Fixed/variable x Target/control was significant, F's < 1.

Recognition

Focal Activities

Incorrect "yes" responses to suggested details. There was a main effect of fixed/variable, $F(1, 15) = 14.12$, $MSe = .25$, $p < .01$, a main effect of suggested/control, $F(1, 15) = 5.29$, $MSe = .36$, and an interaction between the two, $F(1, 15) = 6.36$, $MSe = .20$. This interaction is illustrated in Figure 4. Importantly, there was not a reliable suggested/control difference in responses to questions about fixed items, ($M_s = .09$ and $.06$, $SD_s = .20$ and $.17$ for suggested and control items, respectively), $t(15) = .57$, $p = .58$. Conversely, children's responses to variable items were incorrect significantly more often if the items were suggested ($M = .47$, $SD = .39$) than if they were control ($M = .16$, $SD = .24$), $t(15) = 2.61$.

Correct "yes" responses to event details. There was a main effect of fixed/variable, $F(1, 15) = 12.79$, $MSe = .05$, $p < .01$. Children were more likely to say "yes" to fixed items ($M = .94$, $SD = .11$) than to variable items ($M = .75$, $SD = .24$). Neither the main effect of target/control nor the Fixed/variable x Target/control interaction was reliable, $F's < 1$.

Signal detection. There was a main effect of fixed/variable $F(1, 15) = 24.36$, $MSe = .02$, $p < .001$. Old/new recognition discrimination scores were higher for fixed ($M = .86$, $SD = .07$) than for variable items ($M = .70$,

SD = .15). The main effect of suggested/control approached significance, $F(1, 15) = 3.53$, MSe = .03, $p = .08$, suggesting that children discriminated between old and new control items (M = .82, SD = .08) better than they discriminated between old and new suggested items (M = .74, SD = .16). The Fixed/variable x Suggested/control interaction was not reliable, $F(1, 15) = 2.64$, MSe = .03. $p = .13$.

In the analysis of B''_d scores there was not a reliable main effect of fixed/variable, $F < 1$. The main effect of suggested/control was reliable, $F(1, 15) = 5.22$, MSe = .11. The interaction of Fixed/variable x Suggested/control was not reliable, $F(1, 15) = 2.45$, MSe = .15, $p = .14$. Based on predictions from Experiment 1 planned t-test were conducted. These tests confirmed expectations that among fixed items B''_d scores were not reliably different for suggested (M = -.04, SD = .30) and control items (M = 0, SD = .34), $t(15) = .37$, $p = .72$. However among variable items bias scores for control and suggested items differed in both magnitude, $t(15) = 2.45$, and direction. For control items the response bias was moderate with a tendency to be conservative (M = .10, SD = .50). Conversely, for suggested items the magnitude of the response bias was larger, and it was liberal, (M = -.24, SD = .45).

Lauren Story

Incorrect "yes" responses to suggested details. The

main effect of fixed/variable was not reliable, $F(1, 15) = 1.15$, $p = .3$. The main effect of suggested/control was significant $F(1, 15) = 13.36$, $MSe = .23$, $p < .01$. The proportion of incorrect responses to suggested items was higher ($M = .59$, $SD = .38$) than the proportion of incorrect responses to control items ($M = .16$, $SD = .24$). The interaction between fixed/variable and suggested/control was not reliable, $F < 1$.

Correct "yes" responses to event details. The main effect of fixed/variable fell short of the conventional level of reliability, $F(1, 15) = 3.15$, $MSe = .12$, $p = .10$, although the direction of the differences is consistent with the prediction that children would be correct more often when responding to fixed items ($M = .81$, $SD = .25$) than variable items ($M = .66$, $SD = .35$). The main effect of target/control was not reliable, $F(1, 15) = 1.52$, $p = .24$, nor was the Fixed/variable x Target/control interaction, $F = 1$.

Signal detection. In the analysis of discrimination scores the main effect of fixed/variable was not reliable, $F(1, 15) = 2.68$, $p = .12$. The main effect of suggested/control was reliable, $F(1, 15) = 8.42$, $MSe = .20$. Children discriminated between old and new control items ($M = .70$, $SD = .17$) reliably better than they discriminated between old and new suggested items ($M = .38$, $SD = .39$). = .12. The Fixed/variable x Suggested/control interaction was

not reliable, $F < 1$.

In the analysis of bias scores the main effect of fixed/variable was not reliable, $F < 1$. The main effect of suggested/control approached significance, $F(1, 15) = 4.23$, $MSe = .19$, $p = .06$. Children tended to employ a moderately liberal bias when responding to suggested items ($M = -.20$, $SD = .36$) and almost no bias when responding to control items ($M = .03$, $SD = .27$). The Fixed/variable x Suggested/control interaction was not reliable, $F(1, 15) = 1.74$, $p = .21$.

Discussion

The pattern of errors in children's recall reports of the focal activities was similar across the two Experiments. Children reported very few suggestions in free and cued recall and this is consistent with a substantial amount of literature (e.g., Batterman & Goodman, 1993; Cassell & Bjorklund, 1996). When suggestions are presented once, the final memory interview is non-directive, and it is administered within a few days of the target event, children report very few erroneous suggestions. Although the suggestions were not reported, children seemed to have difficulty isolating the particular variable option that was presented on the target day, as evidenced by the high intrusion rate in both experiments.

Most importantly, the Fixed/variable x Suggested/control interaction was reliable. Eight-year-olds

who experienced four play sessions were incorrect more often when responding to questions about suggested than control items, but only if the corresponding event details were variable. If the corresponding event details were fixed there was not a suggested/control difference in incorrect recognition responses.

In the 1- and 4-S conditions of Experiment 1 children incorrectly said "yes" more often to variable than fixed items, and this was true for both suggested and control items. If, as several researchers have argued (e.g., Ceci et al. 1988), control performance is a baseline measure of item memory, then this suggests that items assigned to be variable in Experiment 1 were intrinsically less memorable. Some researchers have also argued that poorer item memory is associated with higher levels of suggestibility (for a discussion see Brainerd & Reyna, 1988). Accordingly, the suggested/control difference observed for variable items in the 4-S condition of Experiment 1 may have been due to poorer baseline memory for variable items.

In Experiment 2 the proportion of incorrect responses to control questions about fixed and variable details was equivalent, suggesting that baseline memory for fixed and variable details was comparable. The proportion of incorrect responses to questions about suggested items was higher for variable than fixed details. This suggests that the variable manipulation accounts for the higher level of incorrect

reports. This argues against the idea that an item effect accounts for the Fixed/variable x Suggested/control interaction observed in the 4-S condition of Experiment 1.

It is also possible that an Item x Sessions interaction explains the Fixed/variable x Suggested/control interaction reported in Experiment 1. That is, the particular items assigned to be variable may have uniquely interacted with sessions such that when they were experienced often larger suggestibility effects emerged. If this accounts for the effect then when items are fully counter-balanced the interaction should disappear. In Experiment 2 the items were counterbalanced across the fixed/variable factor and the Fixed/variable x Suggested/control interaction still emerged.

These data are inconsistent with the idea that the suggested/control difference observed for variable items in Experiment 1 was the result of an item effect or an Item x Sessions interaction. It is more likely that, in both experiments the fixed/variable manipulation, rather than the specific items, lead to greater levels of suggestibility for variable relative to fixed items.

In the 4-S condition of Experiment 1 and in Experiment 2 children were more likely to correctly recognize old focal activity items if they remained fixed across play sessions than if they changed during each play session (see the General Discussion for possible reasons why this was not

observed in the analysis of responses to questions about the Lauren story). The target/control manipulation did not have an effect on children's correct recognition in Experiment 2. Conversely, in Experiment 1 children responded to control items more accurately than they responded to target items.

Analyses of A' scores revealed the same patterns in the 4-S condition of Experiment 1 and in Experiment 2. Children discriminated between old and new fixed items better than they discriminated between old and new variable items. B"_d scores were also similar across experiments. Children employed a relatively more liberal bias when responding to suggested than control items but only if the associated event item was variable. If it was fixed the suggested/control manipulation had no effect on bias scores.

Responses to questions about the Lauren story were analyzed separately. Children's recall of the Lauren story contained more fixed than variable elements, but their recognition performance was unaffected by the manipulation (there was a non-significant trend for children to correctly recognize more fixed items than variable items). Children's recall reports of suggested and control items did not differ, but their recognition performance did vary as a function of the suggested/control manipulation. Children's incorrect responses on the recognition test were higher for suggested than control items, but the suggested/control manipulation had no effect on correct recognition. Further,

children's old/new recognition discrimination scores were lower for suggested than control items, and their B''_d scores revealed a more liberal bias when responding to suggested relative to control items.

The central result of Experiment 2 was that, when focal activity items were made comparable by counterbalancing, the proportion of incorrect responses to recognition questions was higher for suggested than control items but only if the item was variable, there was not a reliable suggested/control difference for fixed items.

GENERAL DISCUSSION

The results of these studies are discussed in five sections. In the first section I briefly discuss the application of some of the data to script theory. The primary purpose of this section is to describe evidence that children in the 4-S condition probably responded to test questions from script memory rather than from memory for a particular play session. The second section, on children's suggestibility, is divided into subsections on omission then commission errors. In each of these subsections I discuss the data related to the focal activities, the deviation visit, and the Lauren story, separately. A discussion of responses to the temperature-taking question is in the subsection on commission errors. In the third section I discuss the legal implications of this research. I begin with a discussion of the application of script theory and

then a discussion of the influence of suggestions on children's reports of an instance of a routine. Future research and general conclusions are discussed in the fourth and fifth sections, respectively.

Script Theory

A consistent finding in the literature on the development of children's script memory is that older children are more likely than younger children to report variable elements of an event experienced four times. This has been taken to mean that preschoolers have more difficulty than school-age children integrating variability into their developing scripts (Bauer & Fivush, 1992; Fivush et al., 1992; Kuebli & Fivush, 1994). This interpretation leads one to expect that preschoolers in the 4-S condition of the present study would be particularly disadvantaged in their recall and recognition of the variable options presented on the target play-day. This was not the case. In Experiment 1, 6- and 8-year-olds were more likely than 4-year-olds to include the experienced variable option in their recall reports, but the effect was not reliably larger among 4-S children. Furthermore, in the 4-S condition preschoolers did not recognize fewer variable event details than older children. In other words, there was little evidence that, relative to older children, prior similar experiences had a stronger inhibitory affect on preschoolers' reports of variable details.

At first this appears to be contrary to the existing literature. There is an important difference between the present study and earlier research that could account for this difference. In the present research, children were asked to report a specific option, the last one experienced. In previous studies, children were asked to recall the general event (i.e., "what happens when...?"), developmental differences were found in the probability that children would include the variable element and in the number of options children reported (Fivush et al., 1992; Kuebli & Fivush, 1994). Researchers have reported that (a) very young children script repeated events (Nelson, 1988 reported evidence of scripting in a 2-year-old), (b) younger children require more experiences to script a complex event (Farrar & Goodman, 1992), and (c) event variability has a relatively stronger inhibitory affect on younger than older children's scripting (Fivush et al., 1992). If scripting facilitates organization of, and access to, event details (Fivush, 1984) then retrieval of variable options presented during early experiences may be more difficult for younger than older children. The source of previously reported developmental differences may have been children's reports of the earlier presented options rather than reports of options presented later in the sequence.

In Experiment 1, children in the 4-S condition were more likely than children in the 1-S condition to use the

first-person pronoun and the present tense in their free recall reports. Following from other researchers (e.g., Kuebli & Fivush, 1994; Nelson, 1986), this is taken as evidence that children in the 4-S condition scripted the event. Also, as described next, the overall pattern of responses is more satisfactorily explained with script theory, than with the idea that 4-S children responded to the final memory test questions from memory for a particular instance.

Relative to children in the 1-S condition, children in the 4-S condition were less often incorrect, and more often correct, in their recognition responses to questions about fixed items. Fixed items did not vary across sessions and so the corresponding script was expected to contain the fixed details. Accordingly, 4-S children could use their script to respond correctly to questions about event items and to reject questions about suggested items. Children in the 1-S condition responded to the questions from memory for the particular instance. Researchers have reported that fixed details in script memory are relatively more accessible (Farrar & Goodman, 1992; Myles-Worsley et al., 1986), and comprehensive (Hudson, 1990; Hudson & Nelson, 1986) than memory for corresponding details when they are associated with a single event. Thus, relative to those in the 1-S condition, children in the 4-S condition should be correct more often and incorrect less often when their scripted

knowledge can be used to answer the questions.

It is possible to explain the pattern of responses to questions about fixed details without relying on a scripted memory. Children in the 4-S condition could have retrieved memory for any one of the four instances. Because memory for each instance included the same fixed details any one of them would have provided children with the information needed to say "yes" to questions about event details and "no" to questions about suggested details.

Either of these interpretations explains why, when responding to questions about fixed details, children in the 4-S condition were more often correct and less often incorrect than children in the 1-S condition. However, script theory provided a more satisfactory explanation for the following pattern of responses to questions about variable details: (a) 4-S children were less likely than 1-S children to include target-day options in their recall reports, (b) 4-S children were more likely than 1-S children to agree that suggested options were present during the final play session, (c) 1- and 4-S children were equally likely to reject a variable control items, and (d) 1- and 4-S children were equally likely to recognize experienced target-day options.

Four-S children were less likely than 1-S children to include target variable options in their recall reports. They were, however, much more likely than 1-S children to

recall variable options that were experienced on non-target days. This is consistent with the idea that 4-S children retrieved a list of experienced options, that contained relatively little source information, and selected one when asked about the target-day option.

It is also possible that children retrieved memory for a particular instance, one that may or may not have been the target-day instance, and reported the associated variable options. If this explains how children completed the task one would expect that, for a given child, intrusions would be from the same non-target day. This was not the case. Across experiments, of the 15 children who included two or more intrusions in their recall reports, 13 children reported options from different days (e.g., reported the paper-model from day 2 and the magic-words from day 3).

Children in the 4-S condition were more likely than children in the 1-S condition to agree that suggested variable items were present on the target day. This finding is easily interpreted with script theory, but more difficult to reconcile with a strict instance-retrieval interpretation. According to script theory, the list-like representation of variable options is dynamic and flexible (Nelson, 1986). Often, this flexibility is adaptive because it allows children to accept some event variation and still consider the instance an example of the same basic routine. However, in the current study the flexible nature of this

representation placed children at a disadvantage. When suggested details matched the characteristics of experienced options children were likely to agree that they occurred during the target instance.

Suggested details were not experienced on any of the play days and so retrieval of any instance would have provided children with the information needed to reject the suggestion. It is possible that children retrieved an instance, found that the suggestion was inconsistent with information in memory for the instance, but accepted the suggestion because they were not sure if they retrieved the target-day instance. If this occurred one would expect the same process to lead 4-S children to say "yes" to questions about new control items more often than 1-S children.

Children in the 4-S condition were not more likely than children in the 1-S condition to agree that new variable control items were experienced during the target play session. This is consistent with the idea that memory for variable options contained information about particular experienced options, rather than being a general set of characteristics that options must meet. At test, when asked about new variable options that were similar to the experienced options, but that children had not been told were present during the event, they could survey the list of options and correctly reject the new ones. Other researchers have reported that, early in script development, children

were more likely to report particular options than to report the variable act at a general level (Fivush et al., 1992; Kuebli & Fivush, 1992). Perhaps, similar to what Bruce and Read (1988) found with an adult participant, when there are relatively few occurrences children have access to experienced options (although, as evidenced by the high intrusion rate, they have difficulty attributing each option to an instance), and increases in frequency leads to a more generalized representation.

Correct recognition of target-day variable options was comparable across the 1- and 4-S conditions. Children in the 4-S condition would not have to attribute options to particular instances to successfully complete the task. They needed only to confirm that the test options were present in their list of experienced options. This effect is not as easily reconciled with an instance-retrieval interpretation. If children retrieved memory for an individual instance, one would expect 4-S children to recognize fewer target-day options because they would sometimes retrieve a non-target instance and this would lead them to reject the correct option. The recognition question, because it contained the experienced variable option, may have been a powerful cue for children to retrieve the target-day instance. One might still expect more errors among children in the 4-S than the 1-S condition because multiple experiences with similar instances would result in less confidence that they had

retrieved the appropriate instance, and may lead to more false rejections. In fact, in both the 1- and 4-S conditions, children correctly recognized 84% of the target variable options.

In summary, relative to 1-S children's, 4-S children's recognition performance was more often accurate, and less often inaccurate, when responding to questions about fixed items. Alternatively, 1-S children's memory reports concerning variable details were more often accurate (recall) and less often inaccurate (recognition performance on suggested items) than 4-S children's. Two theoretical explanations for this pattern were presented. Children may have retrieved memory for a particular instance and used that information to complete the task. Alternatively, children may have retrieved a script, an abstract representation of what usually happens during the routine, and used information associated with the script to complete the task. Either theory adequately explains the pattern of results observed for fixed details. However, I have argued that script theory provides a more satisfactory theoretical framework within which to explain the pattern of responses to questions about variable details. Importantly, I am not suggesting that, in the present study, children had no memory for particular instances. Several researchers have demonstrated that script memory and memory for instances often coexist (e.g., Fivush, 1984; Reiser et al., 1985) My

argument is that the pattern of data suggests that children in the 4-S condition often based their test responses on a more abstract script memory than on memory for a particular instance. Accordingly, in the remainder of this discussion I rely on script theory to interpret and discuss the data.

Suggestibility

Two memory based explanations have been offered for the suggestibility effect. It may be a consequence of memory impairment. That is, postevent suggestions overwrite, or otherwise impair, memory for the corresponding event details (Loftus, 1979). The misinformation effect may also be a consequence of source misattributions (Lindsay & Johnson, 1987, 1989). That is, children may retrieve suggested details and misattribute their source to the original event. When participants are motivated to report from memory for the event (i.e., the opposition instruction is used), failure to report event details (omission errors) have been used to support the presence of memory impairment, and reports of suggested details (commission errors) have been used to support the presence of source misattributions (Lindsay, 1990, 1994; Lindsay et al., 1994, 1995; Weingardt, Loftus, & Lindsay, 1995). The opposition instruction is essential to this argument, if it is not used then failure to report event details and/or reports of suggested details may be a consequence of misinformation acceptance and have little to do with memory impairment or source

misattributions. Following from this, if the opposition instruction is not employed no compelling conclusions can be drawn if participants fail to report event details or if they report suggested details. However, the absence of one or both effects may indicate no memory impairment or no source misattributions.

Omission Errors

Focal activities. In the present research, effects of suggestions on inhibiting correct reports of details associated with the focal activities were rare and unstable (i.e., they did not replicate across experiments). In neither Experiments 1 nor 2 did the presentation of suggestions reduce the number of event details recalled. In Experiment 1, 6- and 8-year-olds were less likely to recognize event details if corresponding suggestions had been presented than if corresponding suggestions had not been presented. However, this effect did not emerge in Experiment 2 when 8-year-olds were tested.

Deviation visit. There is no theoretical reason to expect memory impairing effects of erroneous postevent suggestions because suggestions associated with the deviation activity did not contradict specific event details. However, suggestions were associated with specific event details. For instance, it was suggested to some children that "the new person" watered the plants while she attended the final play session. In fact, she appeared to

photograph the play session. Four-year-olds in the 4-S condition and 6-year-olds in both sessions conditions were more likely to fail to recall that the new person took photographs if they were told that she watered the plants than if they were given no suggestions about what she did during the final play session.

It is possible that some children considered the suggested and event details contradictory. For instance, children who were misled about the activities of the "new person" knew that she had done only one thing when she attended the play session and reported, in recall, that she watered the plants. If this occurred, omission errors might be suggestive of memory impairment effects. However, this interpretation is compromised for two reasons. First, the effect of suggestions on omission errors did not emerge in the recognition data. Second, as discussed below, omission errors in recall might have been a consequence of misinformation acceptance.

Lauren story. In Experiment 2, there was no evidence that suggestions inhibited correct recall or correct recognition of details related to the Lauren story.

Summary. Omission errors were rare. The few that were observed were unstable across experiments or measures. As discussed below, the presence of omission errors is difficult to interpret because procedures to minimize misinformation acceptance were not used. However, failure to

observe omission errors may be taken as evidence that postevent suggestions did not impair memory for the corresponding event details. The present research adds to the body of literature that finds that memory impairing effects of erroneous postevent suggestions are infrequent (Lindsay & Johnson, 1989a, 1989b; Zaragoza, 1987, 1991; Zaragoza et al., 1992).

Commission Errors

Focal activities. Across experiments and ages, children included very few suggestions in their free and cued recall reports. Other researchers have found that under conditions similar to those used in the present study (i.e., a single non-aggressive presentation of suggestions and all experimental procedures administered within a few days) children's recall reports rarely included suggestions (e.g., Goodman & Aman, 1990; Goodman, Hirschman, Hepps, & Rudy, 1991). Others have found that following aggressive presentation of suggestions (Leichtman & Ceci, 1995), or a long delay of three months (Poole & Lindsay, 1995), or one year (Bruck et al., 1995) children have included suggestions in their recall reports with a relatively high probability. Further, in the Leichtman and Ceci (1995) study, preschoolers were more likely than older children to spontaneously report suggested details. More aggressive presentation of suggestions or a longer delay between the target event and presentation of suggestions, may have lead

to more reports of suggestions, and the data needed to test the effects of age and the sessions and fixed/variable manipulations on children's recall reports of suggestions.

In recognition responses to questions about the focal activities, children were more likely to say "yes" to questions about suggested items than to questions about control items (a possible source misattribution effect). Although 4-year-olds were more likely, than 8-year-olds, to say "yes" to questions about suggested items, they were also more likely to say "yes" to questions about control items. There was no evidence that the source misattribution effect was larger among preschoolers than school-age children. This contrasts with a substantial amount of literature that finds reliable age differences in source misattribution errors. For instance, Ackil and Zaragoza (1995) reported that 6-year-olds were more likely than 8-year-olds, 10-year-olds, or adults to report that a suggested-only item was present in the original event. Furthermore, adults were less likely than 6-, 8-, or 10-year-olds to commit such errors.

Importantly, in the Ackil and Zaragoza study, and in all studies (except Lindsay et al., 1994) discussed in the introduction, suggestions augmented rather than contradicted event details. In all studies, except the Lindsay et al. study, substantial age-related declines in misattribution errors were reported. Lindsay et al. (1994) presented suggestions that contradicted event details and found a non-

significant tendency for the influence of suggestions on commission errors to be stronger among preschoolers than school-age children and adults. In the present study, suggestions associated with the focal activities also contradicted event details, and there was no evidence that the misattribution effect was larger among preschoolers than school-age children.

In Experiment 1, children in all age groups were more likely to say "yes" to questions about suggested than control items. Most interestingly, the magnitude of this effect interacted in important ways with the sessions and fixed/variable manipulations. In response to questions about variable details, the misattribution effect was larger in the 4-S condition than in the 1-S condition. In responses to questions about fixed items, the misattribution effect was more than two times larger in the 1-S condition (.13) than in the 4-S condition (.05), although the Sessions x Suggested/control interaction was not reliable. In Experiment 2, there was a reliable misattribution effect when children responded to questions about variable details. However, there was not a reliable misattribution effect when children responded to questions about fixed items.

Mitchell and Zaragoza (1996) recently reported research that complements the present pattern of data. In their study adults viewed a video of a burglary, followed a few minutes later with a set of suggestive questions that

was presented three times. In one condition, each presentation of the suggestions was in the same modality (single-modality condition). In another condition, each presentation of the suggestions was in a different modality (variable-modality condition). Participants in the variable-modality condition were more likely than participants in the single-modality condition to report that suggested items were present in the event. In other words, Mitchell and Zaragoza (1996) found that variability in the presentation of suggestions exacerbated the source misattribution effect.

Mitchell and Zaragoza (1996) speculated that presentation variability resulted in "generification of subjects memory for suggested items, whereby subjects could no longer remember specific information about their source" (p. 258). This is similar to the mechanism offered to explain the pattern of results in the present research, but there are two important differences. Based on script-memory theory, I suggest that repetition leads to schematization, and that both fixed and variable elements of an repeated event become schematized, or scripted.

A script is an abstract cognitive representation of what usually happens when a routine is encountered. Both fixed and variable details of a routine are represented in script memory but in importantly different ways. Fixed details of a routine are akin to typical details, that are hypothesized to be represented as particular details in the

script (Graesser et al., 1980, 1982). Variable elements of a routine are hypothesized to be represented at a general level with a list-like set of options that are ways that the variable components have been satisfied in the past (e.g., Fivush, 1984; Slackman et al. 1986). Importantly, neither fixed nor variable details of a script are hypothesized to be strongly associated with particular instances, they are ways the event components have been satisfied, and provide expectations about the probable characteristics of future instances of the routine (Nelson, 1986). To put it slightly differently, when an event is scripted source information, that would allow one to attribute particular details to specific instances, is impoverished.

In the present study, when children were asked if previously presented suggestions, that corresponded to fixed event details, were present during the target play-day, they could retrieve the script and successfully reject the suggestions based on information contained therein. Alternatively, when asked if suggestions, that corresponded to a variable event details, were present during the target play-day, retrieval of the scripted representation did not always provide children with the information needed to reject the suggestions. The list-like representation of experienced variable options probably did not contain sufficient information to allow children confidently to attribute options to the target day, and so to say that the

suggested details did not occur. Furthermore, memory for variable components of a routine is intrinsically dynamic (Nelson, 1986) and so, perhaps, malleable. Impoverished source information associated with memory for predictable variation, and the flexible nature of the corresponding memory representation, provide a theoretical interpretation for the results observed in the present study. That is, when responding to questions about variable event details there was a larger source misattribution effect in the 4-S condition compared to the 1-S condition.

Deviation visit. The pattern of responses to questions about the deviation visit were similar, in some ways, to the pattern of responses to questions about the focal activities. That is, there was a reliable misattribution effect, children were more likely to say "yes" to questions about suggested items than to questions about control items. Four-year-olds were more likely to say "yes" to questions about suggested and control items, but there was no evidence that the misattribution effect was larger among preschoolers than school-age children.

Although the response patterns were similar, the size of the misattribution effect was numerically larger when children responded to questions about deviation-visit details (analyses comparing responses across focal and deviation activities were not executed). In recall, 16.8% of the suggestions associated with the deviation visit were

reported. This contrasts with inclusion in recall of only 1.8% of the suggestions associated with the focal activities. In recognition, the size of the misattribution effect associated with the deviation visit (.38) was more than twice the size of the misattribution effect associated with the focal activities (.16).

As discussed in the introduction, several researchers have demonstrated a reliable relationship between memory strength and the misinformation effect, such that a larger source misattribution effect is associated with weaker memory for the original event (e.g., Pezdek & Roe, 1995; Rudy & Goodman, 1991; Tobey & Goodman, 1992). In the present study the deviation visit was clearly peripheral and unrelated to the central features of the event. Thus, it is probably the case that children's memory for related details was weaker than their memory for the focal activities and this accounts for the larger misattribution effect.

Contrary to expectations, children in the 4-S condition were not more resistant to suggestions than children in the 1-S condition. Children in the 4-S condition were expected to have scripted the event and so to be more resistant to suggestions. This expectation derived from two hypotheses. The Script-pointer-plus-tag hypothesis is that deviations from a script are distinctively organized in memory as apart from, but tagged to, the corresponding script. The Schema Confirmation-deployment hypothesis is that when a script is

formed children's attention to predictable details of the routine is reduced and more attention is allocated to event details that deviate from the routine. There was convincing evidence in the present study that children in the 4-S condition scripted the event. Why, then, did they not realize a memory advantage for details of the deviation visit?

It could be that, when the deviation visit was presented, the basic routine was still very interesting and continued to inspire children's attention. It is also possible that because the basic event was participatory, attention was necessary to complete the tasks. This would leave relatively less attentional resources available for the passive activity of observing the deviation activity. These possibilities are consistent with the findings that in the 4-S condition the proportion of correct recognition responses to questions about the deviation visit (.71) was numerically lower than the proportion of correct responses to questions about the focal activity (.89). In retrospect, a more participatory deviation activity, that demand some attention, would have been a more appropriate manipulation.

Lauren story. Children included very few suggestions in their recall of the Lauren story, only 2 out of a possible 32. In recognition, there was a reliable source misattribution effect, but the effect was not reliably larger for variable than fixed items. Although not reliable,

the misattribution effect was numerically larger when children responded to questions about variable details (.50) than when they responded to questions about fixed items (.38). A power analysis revealed that with 16 participants, an effect size of .12, and a MSE for the interaction term of .16, the power to detect a reliable interaction between fixed/variable and suggested/control was only .22. Thus, the non-significant interaction found in the present study may be a type II error.

Temperature-taking question. When children were asked to describe what happened when some of the children's temperatures had been taken 18.75% of the 4-year-olds reported details of a temperature-taking episode. Only 3% of the 6-year-olds reported such details and none of the 8-year-olds reported that a child's temperature had been taken during the final play session. After the recognition test the children were asked again if their temperature had been taken. This time 28.13% of the 4-year-olds responded "yes", 9.38% of the 6-year-olds said "yes", and none of the 8-year-olds reported that their temperature had been taken. This is consistent with an increasing amount of research that finds that young children will report that complete events, that were only suggested to have occurred, really had happened (e.g., Leichtman & Ceci, 1995; Poole & Lindsay, 1995).

Misinformation acceptance. Lindsay (1990; Lindsay et al., 1994) argued that commission errors reflect genuine

source confusions when participants are motivated to report from memory for the event (i.e., when the opposition instruction is used). In the present study techniques that would minimize, or eliminate, misinformation acceptance (i.e., guessing bias, response bias, and demand characteristics) were not employed, reasoning that the first step in this research is to identify if prior similar experiences influence the effect of suggestions on children's memory reports. Thus, an unqualified conclusion that children in the 4-S condition experienced genuine source confusions more often than children in the 1-S condition when responding to questions about variable details, and less often than 1-S children when responding to questions about fixed details, may be premature. Further research would be needed to isolate the relative contribution of misinformation acceptance to this effect.

In spite of this, a general comment is appropriate. Lindsay et al. (1994, 1995) demonstrated a substantial decrease in source misattributions when the effect of misinformation acceptance is minimized. Given this, it is likely that some of the variance in the present data is attributable to it.

McCloskey and Zaragoza (1985) offered three explanations for the misinformation effect that do not involve memory failures. Although their challenge was originally to studies of the memory impairment hypothesis,

Zaragoza and Koshmider (1989) reasoned that the arguments apply equally to studies of source misattributions. In one scenario, a guessing bias, neither misled nor control participants remember the event detail (for reasons unrelated to the presentation of misinformation). Misled participants may remember that the experimenter provided information that could be used to answer the test question, accept the suggestion and report it as having been present in the original event. Participants who were not exposed to the suggestion do not have this supplementary information and so will report the suggested information at chance levels. To the extent that a guessing bias contributes to source misattributions, the effect of suggestions on commission errors will increase with a decrease in memory for the target details. In the present study the misattribution effect was larger in the 1-S condition for fixed items and larger in the 4-S condition for variable items. If a guessing bias accounts for some of the variance in the present data, then, relative to 1-S children, 4-S children had relatively more target fixed details available at test, and relatively fewer target variable details available at test. Correct reports of fixed and variable details is consistent with this. Children in the 4-S condition recognized more fixed details than did 1-S children, and 4-S children recalled fewer variable details than did 1-S children.

In a second scenario, a response bias, misled participants may report the misled details because they accept the accuracy of the postevent information and believe that their memory for the corresponding event details must be wrong. If this explanation accounts for some of the variance in the present study, then the effect of suggestions on shaking confidence in memory for the event was stronger in the 4-S condition than in the 1-S condition when suggestions were about variable details, and stronger in the 1-S condition than the 4-S condition when suggestions related to fixed details.

In a third scenario, demand characteristics, misled subjects may choose the misled details, in spite of intact memory for the event, because they believe it is the response the experimenter wants to hear. There are a couple of reasons why this may not have had a strong influence on responses in the present study. First, there were very few suggested details included in children's recall. If there was an effect of demand characteristics it was not strong enough to compel recall of suggestions. Second, in Experiment 2, when the questions concerned fixed details children were not incorrect more often on suggested than control items. The same children were substantially more incorrect on suggested than control items when the questions concerned variable details. Demand characteristics did not influence responses to questions about fixed items and so it

is probably the case that demand characteristics were not a strong influence on children's responses to variable details.

Summary. In Experiment 1, a reliable source misattribution effect was revealed in all analyses of recognition data. In Experiment 2, a reliable source misattribution effect was observed in responses to questions about variable details, but not in responses to questions about fixed details.

There was no evidence that the effect is developmentally sensitive. This is in stark contrast with much of the literature on children's source misattributions in which age differences have been reported (Ackil & Zaragoza, 1995; Ceci, Crotteau-Huffman, Smith, & Loftus, 1994; Ceci, Loftus, Leichtman, & Bruck, 1994; Leichtman & Ceci, 1995). In almost all research in children's source misattributions the suggested details augmented, rather than contradicted, event details. In the present research, suggestions related to the focal activities contradicted event details. It is possible that the nature of suggestions (i.e., contradict or augment event details) interacts with age such that reliable age-related differences are observed when suggestions augment event details, but are smaller and more infrequent when suggestions contradict event details.

Most importantly, relative to 1-S children, 4-S children committed more commission errors when responding to

questions about variable details, and fewer commission errors when responding to question about fixed details. I have argued that 4-S children scripted the event, and used their scripted knowledge to answer the test questions. When children were presented with erroneous postevent suggestions, and later asked if the suggested details occurred on the target play-day, scripted knowledge sometimes enhanced, and sometimes inhibited, correct responses. Scripted knowledge enhanced children's ability to resist suggestions related to fixed details. Scripted knowledge inhibited children's ability to resist suggestions related to variable details.

Legal Implications

Very young children are being sexually abused. The Standing Committee on Justice and the Solicitor General in relation to its four-year review of the Act to Amend the Criminal Code and the Canadian Evidence Act (1993) (hereafter referred to as the Standing Committee on Justice and the Solicitor General) reported that child sexual abuse occurs often, and that "most child sexual abuse victims are under 12 years of age, and between 15 and 22 percent are under five" (p. 4).

One response of the legal community is to make a legal remedy more available to young children. In a recent Supreme Court of Canada decision (R. v. B. (G.)) (1990) Wilson J. said, "In recent years we have adopted a much more benign

attitude to children's evidence, lessening the strict standards of oath-taking and corroboration, and I believe that is a desirable development" (p. 219). In another Supreme Court of Canada decision (R. v. Khan, 1990) McLachlin J. wrote that there is a "need for increased flexibility in the interpretation of the hearsay rule to permit the admission in evidence of statements made by children to others about sexual abuse" (p. 102).

The prevalence of young children's participation in the legal process is increasing. In R. v. B. (G.) (1990) Wakeling, J. A. of the Saskatchewan Court of Appeal was quoted "I do not need to resort to statistics to establish that there are many more cases now coming to trial involving sexual abuse of children and requiring a very difficult evaluation of youthful testimony" (p. 207). The Standing Committee on Justice and the Solicitor General (1993) wrote, "In the view of criminal justice system practitioners, increasingly young children are testifying" (p. 4).

Script Theory

It is probably the case that, for some children, sexual abuse is associated with a repeated event. Sometimes the repeated event is the abuse itself. The Standing Committee on Justice and the Solicitor General reported that "In the majority of cases, the perpetrator was known to the victim Typically, he was the child's father, stepfather or common-law partner of the child victims mother." (pp. 3 -

4). Given the proximity of many perpetrators to their victims it is almost certain that in some cases children are repeatedly abused. In other cases, child sexual abuse may occur in the context of a some other routine such as bedtime, or bathtime, or a visit to the doctor for a check-up. In this scenario, sexual abuse may be a predictable part of the routine or it may be an infrequent, or single-occurring, deviation from the routine.

The junction of these scenarios is that an event has been experienced often (i.e., sexual abuse is the repeated event or sexual abuse occurs in the context of a different repeated event). When the child enters the legal process it is likely that she will be required to report an instance, or a subset of instances, of the event. Wilson J., writing for the Supreme Court of Canada, confirmed that the sufficiency standard set in *Brodie v. The King* (1936) continues to be the standard today, "the indictment must describe the offence so as to 'lift it from the general to the particular'" (*R. v. B (G)*, 1990, p. 209). Most importantly, the indictment must be sufficiently particular to allow the defendant to prepare a defence.

Throughout this paper I have described a considerable amount of literature that finds that one consequence of repeatedly experiencing an event is that the corresponding memory representation moves from the particular to the general, and retrieval of particular instances is sometimes

very difficult. The tension is clear. The integrity of the justice system depends, in part, on disclosure of particulars of the offence so that the defendant can prepare an answer. However, when the offence is one that has occurred often, children's memory for particulars of an instance, or a subset of instances, may be impoverished, making it difficult to provide the particulars needed for the indictment or for a conviction.

Another consequence of scripting, that is relevant here, is the language children tend to use when reporting an instance of a routine. Consistent with a considerable amount of literature on children's script memory (e.g., Nelson, 1986), I found that children who reported an instance of a routine (i.e., 4-S children) tended to use the present verb tense and temporal markers more often than same-age children who reported the same event when it was a unique occurrence (i.e., 1-S children). Importantly, this script-like language was observed when children were asked about a particular instance of the routine. It is likely that the prevalence would increase, and children might also use the impersonal pronoun (i.e., "you"), if the children had been asked "what usually happens when...?" (Hudson & Nelson, 1986). Autobiographical reports that use present verb tense and temporal markers (e.g., "I do X and then I do Y, but first he does Z") may, on the surface, sound coached or even fabricated. This may be the case (this research did not

study the language children use when reporting an event they were only told about), it may also be an indication that the child is reporting an instance of a routine. The extent to which this kind of language would affect the credibility of a child's testimony would depend on the inferences, if any, drawn by those involved in the legal process.

There was also a high incidence of intrusions in children's reports of an instance of a routine. In the 4-S condition children were as likely to report an experienced non-target variable option as they were to report the experienced target option. I have argued that the overall pattern of data is consistent with the idea that when children responded to questions about variable details of the routine they surveyed across a list of experienced options, that were only loosely associated with particular instances, and selected one to report. In this case the various options would be available for children to retrieve but the task of attributing options to particular instances would be difficult and a high intrusion rate would be difficult to overcome. It is also possible, although I surmised less likely, that children surveyed across memories for particular instances and selected one instance from which to report the associated variable option. If this was the case, then children did have the available information to report the target option but chose to report a different option. Future research would then focus on ways to

encourage children to report the target option.

By either account, the possibility exists that children would change the reported option across accounts of the event. Importantly, this change might be evident in recall reports, and could occur both within and between recall sessions. This could seriously compromise the credibility of a child's testimony. If a child reports seemingly contradictory details one could reasonably come to the conclusion that the child does not know what happened, or that nothing happened.

These effects of prior similar experiences on children's reports of an instance of a routine, changes in the style of language and a high intrusion rate, were observed in spite of efforts to encourage children to report a particular instance. These effects would likely increase if children were asked to describe what usually happens during the routine (Nelson, 1986).

For psychological researchers, these findings direct future projects to an investigation of methods that would encourage children to retrieve, and report from, memory for particular instances of a routine. Importantly, as I have maintained throughout this report, I do not propose that when children experience an event often they irrevocably lose access to all information related to particular instances. My position is that scripted knowledge is relatively more accessible than is memory for particular

instances, and that it is the "default" memory that children will retrieve when asked to report details related to a routine. Accordingly, there may be ways to encourage children to retrieve memory for instances. Perhaps questioning techniques that are specifically designed to apply to cases where the offense is alleged to have occurred repeatedly. Additionally, training children to identify the characteristics of script memory and to encourage further memory search when a memory with such characteristics is retrieved.

Suggestibility

There is little doubt that suggestive questioning is a part of the legal process. Further, I speculate that suggestive questioning is not only an unfortunate consequence of the investigative process. It is also a mechanism built into the system as a kind of test of the veracity of memory. A person who, following suggestions that facts X, Y, and Z are not true but that facts A, B, and C are true, continues to report that X, Y, and Z had occurred and that A, B, and C had not occurred is, perhaps, judged to have better memory for the event and so to be more credible. And, there is a good amount of research to support the validity of this kind of test of memory strength. Several researcher have argued that strong memory for the original event is associated with resistance to suggestions (Brainerd & Reyna, 1988; Ceci & Bruck, 1993, 1996; Pezdek & Roe,

1995). Although resistance to suggestions may be an indication that memory for the original event is strong, it does not follow that failure to resist suggestions is an indication that memory for the event is weak. Other factors, such as repeated experience with the event, may heighten suggestibility for some aspects of the event (i.e., variable details).

As I outlined earlier, there are several scenarios in which a child may be exposed to suggestions respecting an instance, or a subset of instances, of a repeated event. It may be that the child is interviewed about abuse that occurred repeatedly. It could be that abuse occurred in the context of a different routine, such as bathtime, during which sexual abuse occurred often, sometimes, or once as a deviation from the routine. Alternatively, a child may be interviewed about details of a routine, such as bathtime, in which no sexual abuse occurred, but suggestions that it had are presented. In all of these hypothetical scenarios, a child is questioned about an instance, or a subset of instances, of a repeated event and may be exposed to suggestions that some things happened that had not.

Results from the present research suggest that the effect of suggestive questioning on children's reports of event details is, at best, small. That is, when the suggestions are presented once, within a few days of the target experience, in a non-aggressive manner, and memory is

tested the following day, the effect of suggestions on inhibiting reports of event details is quite small.

The same cannot be said for the effect of suggestive questioning on children's incorrect reports of suggested details. First, it is important to emphasize that most of the suggestions used in the present research contradicted event details, and my comments apply only to analogous situations. It would be interesting to continue this line of research with a similar design but to use suggestions that augment target-event details.

In the present research I found that the effect of misleading suggestions on commission errors, in reports of an instance of a routine, depended on the form of the question (i.e., free and cued recall or "yes/no" recognition questions), and on the relationship between the suggestions and particulars of the event (i.e., suggestions concerned a deviation from a routine, or they concerned fixed or variable components of the routine).

Children's free and cued recall contained very details that were only suggested to have occurred. However, the recall reports were generally quite incomplete, and so conclusions about the effect of suggestions on children's recall of an instance of a routine are preliminary.

When "yes/no" recognition questions were used the influence of prior misleading suggestions depended on the relationship between the suggestions and particulars of the

event. If suggestions corresponded to event details that were constant across instances, then the effect of suggestions was minimal. If suggestions concerned details of the event that varied across experiences (importantly, the suggestions fit the general characteristics of experienced options), children reported, with surprising frequency, that the suggestions had occurred. The seriousness of reports of suggested details will, of course, depend on particulars of the case and on the details reported.

Sometimes, erroneous details will be immaterial, such as the clothes worn by the perpetrator or the time of day (although in some cases these details are quite relevant, for instance, the time of day may be relevant for an alibi defence). Other times erroneous reports will be very important. For instance: when the effect is to elevate the seriousness of the offence (e.g., the perpetrator generally talked to the child during commission of the offence about lots of things including the importance of keeping the secret, and it was suggested, and later reported by the child, that the perpetrator threatened her), when the effect is to implicate an innocent person (e.g., there were various perpetrators, and it is suggested, and later reported by the child, that an innocent person also committed an offense, when the effect is to falsely accuse (e.g., Dad usually assisted with the bathtime routine and it was suggested, and later reported by the child, that Dad touched her in

uncomfortable ways).

I have described a small subset of possible scenarios to demonstrate the dangers inherent in suggestive questioning when the event is one that has occurred often. I do not suggest that these data can apply to individual cases. In cases of child sexual abuse, where the event is not controlled (i.e., as in the present research where some details never changed, some details always changed, and some details occurred only once) it is not clear which event details would be perceived by the child as variable, and which would be perceived as deviations. It is also not clear how a child might perceive a suggestion. In the present research suggestions concerning variable components of the event were quite similar to experienced options. As noted in the section on Future Research, the pattern of results might have been different had the suggestions been more distinct from the experienced variable options.

Ecological Validity

The most likely challenge to this research is its application to the context of children's testimony in court. The conclusions are based on children's memory for a voluntary play session. Can these data be used to inform forensic professionals about children's memory for non-consensual activity that is often unpleasant and sometimes terrifying and humiliating?

Ceci (1991) argued that laboratory work is

indispensable to the process of understanding how memory operates in various contexts. The laboratory experimenter's objective is to identify and to explain basic memory processes. To accomplish this one of the most powerful tools is to hold "extraneous" variables constant and to manipulate and measure the effects of other variables. Through replication and procedural modification the laboratory researcher undertakes to identify and explain basic memory processes.

The next step is to test the replicability of basic processes in various contexts. Sometimes, variables that are present in a particular context will moderate, or even eliminate, effects observed in the laboratory. A variable that was not present in my research, and that is relevant in the forensic context, is emotional arousal. For obvious ethical reasons I did not come close to approximating the degree of emotional arousal that is present in some particularly violent cases of child sexual abuse. In such cases there may be memory mechanisms that moderate or eliminate the process of scripting (I am unaware of any research in children's script memory that studied memory for a recurring event that is highly emotionally arousing), and/or that alter mechanisms that lead to source misattributions.

However, most cases of child sexual abuse probably do not involve the level of penetrating terror to which I have

just referred. The Standing Committee on Justice and the Solicitor General (1993) reported that most cases of child sexual abuse involve genital fondling. Although this is almost certainly humiliating, embarrassing, and very upsetting for many children, the level of emotional arousal associated with these cases may be within the range that has been studied in the laboratory.

Several researchers have studied memory and suggestibility for naturally occurring moderately stressful situations such as a well-child physical check-up (Baker-Ward et al., 1993), an injury that required emergency hospital treatment (Howe et al., 1995), or a blood-test or DPT inoculation (Goodman et al., 1991, Exp. 1, 3, & 4) and reported that memory for the event and resistance to suggestions was unrelated to level of stress. Other researchers have reported a relationship between resistance to suggestions and high levels of stress, however the reported direction of the effect is inconsistent. Goodman et al. (1991, Exp. 2) reported that children who were very stressed during a DPT inoculation or a blood-test were more resistant to erroneous suggestions than were children rated as less stressed during the procedure. Alternatively, Bruck et al. (1995) and Peters (1991) reported that higher levels of stress were associated with reduced resistance to suggestions. Importantly, in none of these studies did the researchers report that emotional arousal altered the basic

process. That is, children who were presented with erroneous postevent suggestions were more likely than children who were not presented with such suggestions, to report that the suggested details really had occurred.

Accordingly, there is no evidence to suggest that the basic memory processes identified in the laboratory will not generalize to events that are emotionally arousing, at least when the level of arousal is within a moderate range.

Summary

I have proposed a number of ways in which research psychologists and legal professionals can work together in a combined effort to understand children's eyewitness memory, and to facilitate children's access to the legal process. The forensic need for particular details related to an offence encourages research on techniques that will promote children's retrieval of particular instances of a repeated event. Psychological research on the language children tend to use to report details of a repeated event can assist legal professionals to interpret a child's testimony, or to caution against interpreting it as necessarily coached or fabricated. Research on the influence of suggestive questioning on children's reports of an instance of a repeated event serves as a general and ardent caution against such questioning techniques, and invites research psychologists to investigate alternative questioning methods. I certainly do not propose to resolve these issues.

I raise them to encourage further discussion and research, and to highlight the advantages that can derive from a alliance between Psychology and Law.

Future Research

Proposals for future research have been introduced throughout this discussion. In this section I highlight the recommendations that I consider to be most important, and introduce a few that have not yet been discussed.

The most important next step in this research program is to begin to disentangle the relative influences of misinformation acceptance and genuine source misattributions on children's reports of an instance of a routine. One way to proceed is to employ the opposition instruction at test. The opposition instruction has been adapted for use with children as young as 4-years old (Lindsay et al., 1994).

Perhaps, the most fertile area for future research involves the influence of suggestions on children's memory reports of variable components of a routine. There are several different approaches that could be taken in this regard. One approach would be to investigate boundary conditions on the suggestions that would later be reported. In the present research the suggestions were very similar to experienced options. Would children be more resistant to suggestions if they differed, on one or more dimensions, from experienced options?

An answer to this may depend on the extent to which the

variable options are schematized, or represented at a general level. One factor that has been hypothesized to influence the schematization process is time (Myles-Worsley et al., 1986). That is, over time details related to a routine become more general and less specific. Thus, it would be reasonable to speculate that if the suggestions deviate from experienced options a longer delay between the event and the presentation of suggestions would be required to obtain an effect.

Another interesting question concerns the effect of repetition of suggestions on children's memory reports of variable components of the event. If, as I speculated, children represent variable options as lists of possible ways for a variable component to be satisfied, then it is conceivable that options that are only suggested to have occurred are assimilated into the list. This process may be facilitated if the suggestions are presented several times rather than, as in the present study, only once (see Mitchell & Zaragoza, 1996 for a similar argument).

Related to this is research that addresses conditions that affect the flexibility of memory for options. As Nelson (1986) argued, children's ability to represent variability in routines is adaptive because it allows them to experience some variation without thinking about each new option as a distinct event. However, there are boundaries on how deviant the option can be and still be considered a legitimate

expression of the variable component of the event. The boundary conditions are set based on experience with diverse options. It should therefore be that if the options that children experience are relatively more diverse than those presented in the present study, the boundaries they set for inclusion of legitimate options will be correspondingly wider. This may then translate into relatively high levels of suggestibility for more diverse suggestions.

In the present research the oldest group of participants were 8-years old. Another direction for future research is to study the effect of suggestions on reports of an instance of a routine with an adult population. Several researchers have argued that the basic structure and function of script memory is similar in children and adults (Fivush, 1988; Fivush & Slackman, 1986; Hudson et al., 1992, but see Price & Goodman, 1990 for an alternative opinion). This suggests that a similar pattern of results would emerge with an adult sample. However, younger children are hypothesized to be more script dependent than older children or adults (Fivush, 1993; Fivush & Slackman, 1986; Hudson & Nelson, 1986, Exp. 2). That is, younger children are more likely than older children or adults to report from script memory when asked about details of an instance of a routine. This suggests that the pattern of responses that I observed with a group of children may not replicate with an adult sample.

Conclusions

The effect of erroneous postevent suggestions on children's memory reports of a particular episode was influenced by their past experience with similar episodes and by the relationship between the suggestions and the corresponding event details. If suggestions corresponded to event details that had varied in the past, children with prior similar experiences were more likely, than children with no prior similar experiences, to report that the suggested details really had happened. If suggestions corresponded to event details that had remained constant in the past, children with prior similar experiences were less likely, than children with no prior experience, to report that the suggestions really had happened.

To the best of my knowledge, this is the first study on children's suggestibility that has systematically manipulated the presence and content of prior similar experiences with the target event. Some researchers have studied children's suggestibility for naturally occurring repeated events, most commonly medical procedures, (e.g., Baker-Ward et al., 1993; Bruck et al., 1995; Ornstein et al., 1992). However, their motivation, typically, was to study children's suggestibility for emotionally-arousing events. Accordingly, the effect of number of prior experiences and the differential effect of suggestions on reports of fixed and variable details of the event were not

reported. The results of the present study suggest that these factors are very important and should be measured in future studies of children's suggestibility for naturally-occurring repeated events.

Increasingly young children are participating in the legal process, and it is almost certain that some children are required to provide details of an instance, or a subset of instances, of a repeated event. The present research suggests that in such situations the effect of suggestive questioning may be very serious. When erroneous suggestions concerned variable details of a repeated event, children were surprisingly likely to report that they really had happened. This poses a very difficult dilemma, one that I do not propose to resolve with this research. I do propose that a continued alliance of psychological researchers and legal professionals will most profitably advance their mutual goal of resolving such difficult issues.

References

Abelson, R. P. (1981). Psychological status of the script concept. American Psychologist, 36, 715 - 729.

Adams, L. T., & Worden, P. E. (1986). Script development and memory organization in preschool and elementary school children. Discourse Processes, 9, 149 - 166.

Ackil, J. K., & Zaragoza, M. S. (1995). Developmental differences in eyewitness suggestibility and memory for source. Journal of Experimental Child Psychology, 60, 57 - 83.

Alba, J. W., & Hasher, L. (1983). Is memory schematic? Psychological Review, 93, 203 - 231.

Baker-Ward, L, Gordon. B. N., Ornstein, P. A., Larus, D. M., & Clubb, P. A. (1993). Young children's long-term retention of a paediatric examination. Child Development, 64, 1519 - 1533.

Batterman-Faunce, J. M., & Goodman, G. S. (1993). Effects of context on accuracy and suggestibility. In G. S. Goodman & B. L. Bottoms (Eds.), Child victims, child witnesses: Understanding and improving testimony (pp. 301 - 330). New York: Guilford

Bauer, P. J., & Fivush, R. (1992). Constructing event representations: Building on a foundation of variation and enabling relations. Cognitive Development, 7, 381 - 401.

Bauer, P. J., & Shore, C. M. (1987). Making a memorable

event: Effects of familiarity and organization on young children's recall of actions sequences. Cognitive Development, 2, 327 - 338.

Belli, R. F. (1989). Influences of misleading postevent information: Misinformation, interference, and acceptance. Journal of Experimental Psychology: General, 118, 72 - 85.

Belli, R. F., Lindsay, D. S., Gales, M. S., & McCarthy, T. T. (1994). Memory impairment and source misattribution in postevent misinformation experiments with short retention intervals. Memory and Cognition, 22, 40 - 54.

Belli, R. F., Windschitl, P. D., McCarthy, T. T., & Winfrey, S. E. (1992). Detecting memory impairment with a modified test procedure: Manipulating retention interval and centrally presented event items. Journal of Experimental Psychology: Learning, Memory, and Cognition, 18, 356 - 367.

Brainerd, C. J., & Reyna, V. F. (1988). Memory loci of suggestibility development: Comment on Ceci, Ross, and Toglia (1987). Journal of Experimental Psychology: General, 117, 197 - 200.

Brewer, W. F., & Nakamura, G. V. (1984). The nature and functions of schemas. In R. S. Wyer, & T. K. Srull (Eds.), Handbook of social cognition, (pp. 119 - 160). Hillsdale, NJ: Erlbaum.

Bruce, D., & Read, J. D. (1987). The how and why of memory for frequency. In M. M. Gruneberg, P. E. Morris, & R. N. Sykes (Eds.), Practical aspects of memory: Current

research and issues (Vol. 1), (pp 317 - 322). New York: Wiley.

Bruck, M., Ceci, S. J., Francoeur, E., & Barr, R. (1995). "I hardly cried when I got my shot!" Influencing children's reports about a visit to their paediatrician. Child Development, 66, 193 - 208.

Cassell, W. S., Roebbers, C. E. M., & Bjorklund, D. F. (1996). Developmental patterns of eyewitness responses to repeated and increasingly suggestive questions. Journal of Experimental Child Psychology, 61, 116 - 133.

Ceci, S. J. (1991). Some overarching issues in the children's suggestibility debate. In J. Doris (Ed.), The suggestibility of children's recollections: Implications for eyewitness testimony (pp. 1 - 9). Washington, DC: American Psychological Association.

Ceci, S. J., & Bruck, M. (1993). The suggestibility of the child witness: A historical review and synthesis. Psychological Bulletin, 113, 403 - 439.

Ceci, S. J., & Bruck, M. (1996). Jeopardy in the courtroom: A scientific analysis of children in the courtroom. Washington, DC: American Psychological Association.

Ceci, S. J., Crotteau-Huffman, M. L., Smith, E., & Loftus, E. F. (1994). Repeatedly thinking about a non-event. Consciousness and Cognition, 3, 388 - 407.

Ceci, S. J., Loftus, E. F., Leichtman, M. D., & Bruck,

M. (1994). The possible role of source misattributions in the creation of false beliefs among preschoolers. The International Journal of Experimental Hypnosis, 42, 304 - 320.

Ceci, S. J., Ross, D. F., & Toglia, M. P. (1987a). Suggestibility of children's memory: Psycholegal implications. Journal of Experimental Psychology: General, 116, 38 - 49.

Ceci, S. J., Ross, D. F., & Toglia, M. P. (1987b). Age differences in suggestibility: Narrowing the uncertainties. In S. J. Ceci, D. F. Ross, & M. P. Toglia (Eds.), Children's eyewitness memory, (pp. 79 - 91). New York: Springer-Verlag.

Ceci, S. J., Toglia, M. P., & Ross, D. F. (1988). On remembering...more or less: A trace-strength interpretation of developmental differences in suggestibility. Journal of Experimental Psychology: General, 117, 201 - 203.

Chandler, C. C. (1989). Specific retroactive interference in modified recognition tests: Evidence for an unknown cause of interference. Journal of Experimental Psychology: Learning, Memory, and Cognition, 15, 256 - 265.

Chandler, C. C. (1991). How memory for an event is influenced by related events: Interference in modified recognition tests. Journal of Experimental Psychology: Learning, Memory, and Cognition, 17, 115 - 125.

Connolly, D. A., Hockley, W. E., & Pratt, M. W. (1996).

A developmental evaluation of frequency memory for actions presented in lists, scripts, and stories. Memory, 4, 243 - 263.

Davidson, D., & Hoe, S, (1993). Children's recall and recognition memory for typical and atypical actions in script-based stories. Journal of Experimental Child Psychology, 55, 104 - 126.

Donaldson, W. (1992). Measuring recognition memory. Journal of Experimental Psychology: General, 121, 275 - 277.

Farrar, M. J., & Goodman, G. S. (1990). Developmental differences in the relation between scripts and episodic memory: Do they exist? In R. Fivush & J. A. Hudson (Eds.), Knowing and remembering in young children. New York: Cambridge University Press.

Farrar, M. J., & Goodman, G. S. (1992). Developmental changes in event memory. Child Development, 63, 173 - 187.

Fivush, R. (1984). Learning about school: The development of kindergartner's school script. Child Development, 55, 1697 - 1709.

Fivush, R. (1988). The functions of event memory: Some comments on Nelson and Barsalou. In U. Neisser, & E. Winograd (Eds.), Remembering reconsidered: Ecological and traditional approaches to the study of memory (pp. 277 - 282). New York: Cambridge University Press.

Fivush, R. (1993). Developmental perspectives on autobiographical recall. In G. S. Goodman, & B. L. Bottoms

(Eds.), Child victims, child witnesses: Understanding and improving testimony (pp. 1 - 24). New York: Guilford Press.

Fivush, R., & Hamond, N. R. (1990). Autobiographical memory across the preschool years: Toward reconceptualizing childhood amnesia. In R. Fivush & J. A. Hudson (Eds.), Knowing and remembering in young children (pp. 223 - 248). New York: Cambridge University Press.

Fivush, R., & Hudson, J. A. (1990). Knowing and remembering in young children. New York: Cambridge University Press.

Fivush, R., Hudson, J., & Nelson, K. (1984). Children's long-term memory for a novel event: An exploratory study. Merrill-Palmer Quarterly, 30, 303 - 316.

Fivush, R., Kuebli, J., & Clubb, P. A. (1992). The structure of events and event representation: A developmental analysis. Child Development, 63, 188 - 201.

Fivush, R., & Slackman, E. A. (1986). The acquisition and development of scripts. In K. Nelson (Ed.), Event knowledge: Structure and functions in development (pp. 71 - 96). New Jersey: Erlbaum.

Foley, M. A., Durso, F. T., Wilder, A., & Freidman, R. (1991). Developmental comparisons of explicit versus implicit imagery and reality monitoring. Journal of Experimental Child Psychology, 51, 1 - 13.

Foley, M. A., & Johnson, M. K. (1985). Confusions between memories for performed and imagined actions: A

developmental comparison. Child Development, 56, 1145 - 1155.

Foley, M. A., Johnson, M. K., & Raye, C. L. (1983). Age-related changes in confusions between memories for thoughts and memories for speech. Child Development, 54, 51 - 60.

Foley, M. A., Santini, C., & Sopasakis, M. (1989). Discriminating between memories: Evidence for children's spontaneous elaborations. Journal of Experimental Child Psychology, 48, 146 - 169.

Follmer, A., & Gordon, B. N. (1994, April). Does enactment facilitate children's recall of a paediatric examination? Paper presented at the biennial meetings of the conference on Human Development, Pittsburgh, PA.

Furman, L. N., & Walden, T. A. (1990). Effect of script knowledge on preschool children's communicative competence. Developmental Psychology, 26, 227 - 233.

Galambos, J. A. (1983). Normative studies of six characteristics of our knowledge of common activities. Behavior Research Methods and Instrumentation, 15, 327 - 340.

Galambos, J. A., & Rips, L. J. (1982). Memory for routines. Journal of Verbal Learning and Verbal Behavior, 21, 260 - 281.

Geddie, L., Trapp-Meyers, J., & Ornstein, P. A. (1994, April). Children's memory of a physical examination: A

comparison of recall and recognition assessment protocols. Paper presented at the biennial meetings of the conference on Human Development, Pittsburgh, PA.

Goodman, G. S., & Aman, A. (1990). Children's use of anatomically-detailed dolls to recount an event. Child Development, 61, 1859 - 1871.

Goodman, G. S., Aman, A., & Hirschman, J. (1987). Child sexual and physical abuse: Children's testimony. In S. J. Ceci, M. Toglia, & D. Ross (Eds.), Children's eyewitness memory (pp. 1 - 23). New York: Springer-Verlag.

Goodman, G. S., & Clark-Stewart, A. (1990). Suggestibility in children's testimony: Implications for sexual abuse investigations. In J. Doris (Ed.), The suggestibility of children's recollections: Implications for eyewitness testimony (pp. 92 - 105). Washington: American Psychological Association.

Goodman, G. S., Hirschman, J. E., Hepps, D., & Rudy, L. (1991). Children's memory for stressful events. Merrill-Palmer Quarterly, 37, 109 - 158.

Goodman, G. S., Rudy, L., Bottoms, B. L., & Aman, C. (1990). Children's concern's and memory: Issues of ecological validity in the study of children's eyewitness testimony. In R. Fivush & J. A. Hudson (Eds.), Knowing and remembering in young children (pp. 249 - 284). New York: Cambridge University Press.

Graesser, A. C., Gordon, S. E., & Sawyer, J. D. (1979).

Recognition memory for typical and atypical actions in scripted activities: Test of a script pointer + tag hypothesis. Journal of Verbal Learning and Verbal Behavior, 18, 319 - 332.

Graesser, A. C., Woll, S. B., Kowalski, D. J., & Smith, D. A. (1980). Memory for typical and atypical actions in scripted activities. Journal of Experimental Psychology: Human Learning and Memory , 6, 503 - 515.

Greene, E., Flynn, M. S., & Loftus, E. F. (1982). Inducing resistance to misleading information. Journal of Verbal Learning and Verbal Behavior, 21, 207 - 219.

Hale, G. A. (1977). On the use of ANOVA in developmental research. Child Development, 48, 1101 - 1106.

Hamond, N. R., & Fivush, R. (1990). Memories of Mickey Mouse: Young children recount their trip to Disneyworld. Cognitive Development, 6, 433 - 448.

Howe, M. L., Courage, M. L., & Peterson, C. (1995). Intrusions in preschoolers' recall of traumatic childhood events. Psychonomic Bulletin and Review, 2, 130 - 134.

Hudson, J. A. (1986). Memories are made of this: General event knowledge and development of autobiographic memory. In K. Nelson (Ed.), Event Knowledge: Structure and function in development (pp. 97 - 118). New Jersey: Erlbaum.

Hudson, J. A. (1988). Children's memory for atypical actions in script-based stories: Evidence for a disruption effect. Journal of Experimental Child Psychology, 46, 159 -

173.

Hudson, J. A. (1990). Constructive processes in children's event memory. Developmental Psychology, 26, 180 - 187.

Hudson, J. A., Fivush, R., & Kuebli, J. (1992). Scripts and episodes: The development of event memory. Applied Cognitive Development, 6, 483 - 505.

Hudson, J., & Nelson, K. (1983). Effects of script structure on children's story recall. Developmental Psychology, 19, 625 - 635.

Hudson, J., & Nelson, K. (1986). Repeated encounters of a similar kind: Effects of familiarity on children's autobiographic memory. Cognitive Development, 1, 253 - 271.

Jacoby, L. L., & Brooks, L. R. (1984). Nonanalytic cognition: Memory, perception, and concept learning. In G. H. Bower (Ed.), The psychology of learning and motivation: Advances in research and theory (Vol. 1) pp. 1 - 47.

Johnson, M. K., & Foley, M. A. (1984). Differentiating fact from fantasy: The reliability of children's memory. Journal of Social Issues, 40, 33 - 50.

Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source Monitoring. Psychological Bulletin, 114, 3 - 28.

Johnson, M. K., & Raye, C. L. (1981). Reality monitoring. Psychological Review, 88, 67 - 85.

Johnson, M. K., Raye, C. L., Hasher, L., & Chromiak, W.

(1979). Are there developmental differences in reality monitoring? Journal of Experimental Child Psychology, 27, 120 - 128.

Kuebli, J., & Fivush, R. (1994). Children's representation and recall of event alternatives. Journal of Experimental Psychology, 58, 25 - 45.

Leichtman, M. D., & Ceci, S. J. (1995). The effects of stereotypes and suggestions on preschoolers' reports. Developmental Psychology, 31, 568 - 578.

Lindsay, D. S. (1990). Misleading suggestion can impair eyewitnesses ability to remember event details. Journal of Experimental Psychology: Learning, Memory, and Cognition, 16, 1077 - 1083.

Lindsay, D. S. (1993). Eyewitness suggestibility. Current Directions in Psychological Science, 2, 86 - 89.

Lindsay, D. S. (1994). Memory source monitoring and eyewitness testimony. In D. F. Ross, J. D. Read, & M. P. Toglia (Eds.), Adult eyewitness testimony: Current trends and developments (pp. 27 - 55). New York: Cambridge University Press.

Lindsay, D. S., Gonzales, V., & Eso, K. (1994). Mechanisms of child and adult eyewitnesses: Separating memory source confusions from demand characteristics. Manuscript submitted for publication.

Lindsay, D. S., Gonzales, V., & Eso, K. (1995). Aware and unaware uses of memories of postevent suggestions. In M.

S. Zaragoza, J. R. Graham, G. C. N. Hall, R. Hirschman, & Y. S. Ben-Porath (Eds.), Memory, suggestibility, and eyewitness testimony in children and adults: Vol.1. Applied Psychology: Individual, social, and community issues (pp. 86 - 108). California: Sage.

Lindsay, D. S., & Johnson, M. K. (1987). Reality Monitoring and suggestibility: Children's ability to discriminate among memories from different sources. In S. J. Ceci, M. P. Toglia, & D. F. Ross (Eds.), Children's eyewitness memory (pp. 92 - 121). New York: Springer-Verlag.

Lindsay, D. S., & Johnson, M. K. (1989a). The eyewitness suggestibility effect and memory for source. Memory and Cognition, 17, 349 - 358.

Lindsay, D. S., & Johnson, M. K. (1989b). The reversed eyewitness suggestibility effect. Bulletin of the Psychonomic Society, 27, 111 - 113.

Lindsay, D. S., Johnson, M. K., & Kwon, P. (1991). Developmental changes in memory source monitoring. Journal of Experimental Child Psychology, 52, 297 - 318.

Loftus, E. F. (1979a). Eyewitness Testimony. Cambridge: Harvard University Press.

Loftus, E. F. (1979b). The malleability of human memory: Information introduced after we view an incident can transform memory. American Scientist, 67, 312 - 320.

Loftus, E. F., Hoffman, H. G., & Wagenaar, W. A. (1992). The misinformation effect: Transformations in memory induced

by postevent information. In M. L. Howe, C. J. Brainerd, & V. F. Reyna (Eds.), Development of long-term retention (pp. 159 - 183). New York: Springer-Verlag.

Loftus, E. F., & Loftus, G. R. (1980). On the permanence of stored information in the human brain. American Psychologist, 35, 409 - 420.

Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into a visual memory. Journal of Experimental Psychology: Human Learning and Memory, 4, 19 - 31.

Loftus, E. F., Schooler, J. W., & Wagenaar, W. A. (1985). The fate of memory: Comment on McCloskey and Zaragoza. Journal of Experimental Psychology: General, 114, 375 - 380.

Mandler, J. M. (1984). Stories, scripts, and scenes: Aspects of schema theory. Hillside NJ: Erlbaum.

McCloskey, M., & Zaragoza, M. (1985a). Misleading postevent information and memory for events: Arguments and evidence against memory impairment hypothesis. Journal of Experimental Psychology: General, 114, 1 - 16.

McCloskey, M., & Zaragoza, M. (1985b). Postevent information and memory: Reply to Loftus, Schooler, and Wagenaar. Journal of Experimental Psychology: General, 114, 381 - 387.

McConnell, T. R. (1963). Suggestibility in children as a function of chronological age. Journal of Abnormal and

Social Psychology, 67, 286 - 289.

Messerschmidt, R. (1933). The suggestibility of boys and girls between the ages of six and sixteen years. Journal of Genetic Psychology, 43, 422 - 437.

Mistry, J. J., & Lange, G. W. (1985). Children's organization and recall of information in scripted narratives. Child Development, 56, 953 - 961.

Mitchell, K. J., & Zaragoza, M. S. (1996). Repeated exposure to suggestion and false memory: The role of contextual variability. Journal of Memory and Language, 35, 246 - 260.

Myles-Worsley, M., Cromer, C. C., & Dodd, D. H. (1986). Children's preschool script reconstruction: Reliance on general knowledge as memory fades. Developmental Psychology, 22, 22 - 30.

Nakamura, G. V., & Graesser, A. C. (1985). Memory for script-typical and script-atypical actions: A reaction time study. Bulletin of the Psychonomic Society, 24, 384 - 386.

Nakamura, G. V., Graesser, A. C., Zimmerman, J. A., & Riha, J. (1985). Script processing in a natural situation. Memory and Cognition, 13, 140 - 144.

Nelson, K. (1986). Event knowledge: Structure and function in development, Hillside NJ: Erlbaum.

Nelson, K., & Gruendel, J. (1986). Children's scripts. In K. Nelson (Ed.), Event knowledge: Structure and function in development (pp. 21 - 46). New Jersey: Erlbaum.

Ornstein, P. A., Gordon, B. N., & Baker-Ward, L. E. (1992). Children's memory for salient events: Implications for testimony. In M. L. Howe, C. J. Brainerd, & V. F. Reyna (Eds.), Development of long-term retention (pp. 135 - 158). New York: Springer-Verlag.

Ornstein, P. A., Gordon, B. N., & Larus, D. M. (1992). Children's memory for a personally experienced event: Implications for testimony. Applied Cognitive Psychology, 6, 49 - 60.

Otis, M. (1924). A study of suggestibility of children. Archives of Psychology, 70. 5 - 108.

Peters, D. P. (1991). The influence of stress and arousal on the child witness. In J. Doris (Ed.), The suggestibility of children's recollections: Implications for eyewitness testimony (pp. 60 - 76). Washington: American Psychological Association.

Pezdek, K., & Roe, C. (1995). The effect of memory trace strength on suggestibility. Journal of Experimental Child Psychology, 60, 116 - 128.

Poole, D. A., & Lindsay, D. S. (1995). Interviewing preschoolers: Effects of nonsuggestive techniques, parental coaching, and leading questions on reports of nonexperienced events. Journal of Experimental Child Psychology, 60, 129 - 154.

Price, D. W., & Goodman, G. S. (1990). Visiting the wizard: Children's memory for a recurring event. Child

Development, 61, 664 - 680.

R. v. B. (G.) (1990) 56 C. C. C. (3d).

R. v. Khan (1990) 59 C. C. C. (3d).

Ratner, H. H., Smith, B. S., & Dion, S. A., (1986).

Development of memory for events. Journal of Experimental Child Psychology, 41, 411 - 428.

Reiser, B. J., Black, J. B., & Abelson, R. P. (1985).

Knowledge structures in the organization and retrieval of autobiographical memories. Cognitive Psychology, 17, 83 - 137.

Rudy, L., & Goodman, G. S. (1991). Effects of

participation on children's reports: Implications for testimony. Developmental Psychology, 27, 527 - 538.

Rumelhart, D. E. (1984). Schema and the cognitive

system. In R. S. Wyer & T. K. Srull (Eds.), Handbook of social cognition (pp. 161 - 188). Hillsdale, NJ: Erlbaum.

Saywitz, K. J., Goodman, G. S., Nicholas, E., & Moan, S

F. (1991). Children's memories of a physical examination involving genital touch: Implications for reports of child sexual abuse. Journal of Consulting and Clinical Psychology, 59, 682 - 691.

Slackman, E. A., Hudson, J. A., & Fivush, R. (1986).

Actions, actors, links, and goals: The structure of children's event representations. In K. Nelson (Ed.), Event Knowledge: Structure and functions in development (pp. 47 - 70). New Jersey: Erlbaum.

Slackman, E., & Nelson, K. (1984). Acquisition of an unfamiliar script story form by young children. Child Development, 55, 329 - 340.

Smith, D. A., & Graesser, A. C. (1981). Memory for actions in scripted activities as a function of typicality, retention interval, and retrieval task. Memory and Cognition, 9, 550 - 559.

Snodgrass, J. G., & Corwin J. (1988). Pragmatics of measuring recognition memory: Applications to dementia and amnesia. Journal of Experimental Psychology: General, 117, 34 - 50.

Standing Committee on Justice and the Solicitor General: Four-year review of the act to amend the criminal code and the Canada Evidence Act (Sexual Offenses) (1993). House of Commons. Issue No. 101

Tobey, A. E., & Goodman, G. S. (1992). Children's eyewitness memory: Effects of participation and forensic context. Child Abuse & Neglect, 16, 779 - 796.

Toglia, M. P., Ross, D. F., Ceci, S. J., & Hembrooke, H. (1992). The suggestibility of children's memory: A social psychological and cognitive interpretation. In M. L. Howe, C. J. Brainerd, & V. F. Reyna (Eds.), Development of long-term retention (pp. 217 - 241). New York: Springer-Verlag.

Toland, K., Hoffman, H., & Loftus, E. (1991). How suggestion plays tricks with memory. In J. F. Schumaker (Ed.), Human suggestibility: Advances in theory, research,

and application (pp. 235 - 252). New York: Routledge.

Tousignant, J. P., Hall, D., & Loftus, E. F. (1986). Discrepancy detection and vulnerability to misleading postevent information. Memory and Cognition, 14, 329 - 338.

Tversky, B., & Tuchin, M. (1989). A reconciliation of the evidence on eyewitness testimony: Comments on McCloskey and Zaragoza. Journal of Experimental Psychology: General, 118, 86 - 91.

Weingardt, K. R., Loftus, E. F., & Lindsay, D. S. (1995). Misinformation revisited: New evidence on the suggestibility of memory. Memory and Cognition.

Zaragoza, M. S. (1987). Memory, suggestibility, and eyewitness testimony in children and adults. In S. J. Ceci, M. Toglia, & D. Ross (Eds.), Children's eyewitness memory (pp. 53 - 78). New York: Springer-Verlag.

Zaragoza, M. S. (1991). Preschool children's susceptibility to memory impairment. In J. Doris (Ed.), The suggestibility of children's recollections: Implications for eyewitness testimony (pp. 27 - 39). Washington: American Psychological Association.

Zaragoza, M. S., Dahlgreen, D., & Muench, J. (1992). The role of memory impairment in children's suggestibility. In M. L. Howe, C. J. Brainerd, & V. F. Reyna (Eds.), Development of long-term retention (pp. 184 - 213). New York: Springer-Verlag.

Zaragoza, M. S., & Koshmider, J. W., III (1989). Mised

subjects may know more than their performance implies.

Journal of Experimental Psychology: Learning, Memory, and Cognition, 15, 246 - 255.

Zaragoza, M. S., & Lane, S. M. (1994). Source misattributions and the suggestibility of eyewitness memory. Journal of Experimental Psychology: Learning, Memory, and Cognition, 20, 934 - 945.

Zaragoza, M. S., & McCloskey, M. (1989). Misleading postevent information and the memory impairment hypothesis: Comment on Belli, and reply to Tversky and Tuchin. Journal of Experimental Psychology: General, 118, 92 - 99.

Zaragoza, M. S., McCloskey, M., & Jamis, M. (1987). Misleading postevent information and recall of the original event: Further evidence against the memory impairment hypothesis. Journal of Experimental Psychology: Learning, Memory and Cognition, 13, 36 - 44.

Appendix A

Parent's Questionnaire

The following questions ask you to rate your child on several scales (e.g., tendency to comply to authority, tendency to engage in imaginary play, etc.). This can be a difficult task and I appreciate your taking the time to complete the questionnaire. For each question, please rate your child relative to other same-age children (e.g., same-age friends, classmates, relatives).

1) Some children are very compliant to authority -- that is, they are quick to pick up on adults' expectations and suggestions, and try to conform to them. Other children, in contrast, are very resistant to authority -- that is they often disregard or even rebel against adults' expectations and suggestions. And, of course, most children are somewhere between these extremes. How would you rate your child on compliance to adult authority?

Very compliant
to authority

Very resistant
to authority

1 2 3 4 5 6 7

2) Many children have imaginary companions, and they greatly enjoy fantasy play. Other children are less interested in fantasy play. How much of you child's play time would you describe as fantasy play?

Almost all

Almost none

1 2 3 4 5 6 7

3) Please rate these activities in order of your child's preference from least (1) to most (6) enjoyable.

_____ Draw or color	_____ Fantasy Play
_____ Listen to stories	_____ Water Play
_____ Play outdoors	_____ Play with games or building toys

4) Compared to same-age children, how would you rate your child's ability to remember details of past experiences? "Very weak memory" would mean your child rarely describes past experiences at all, or frequently makes errors in such descriptions. "Very good memory" would mean that your child frequently describes past experiences accurately and in great detail.

Very weak memory

Very good memory

1	2	3	4	5	6	7
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5) As described in the attached letter, a few days after they participate in the play sessions children will receive verbal suggestions that some things happened during the play sessions that really had not happened (e.g., that they made a paper house when really they made a paper hat). Later, children will be asked to describe what had happened during the play session. Our interest focuses on whether or not children will report the suggested details as things that happened during the play sessions. Do you think your child will report the suggested details when asked to describe the

play sessions?

Sure my child will
report no suggestions

1

2

3

4

5

Sure my child will
report all suggestions

6

7

Appendix B

Critical Focal Activity Items in Experiment 1

Magic Do

- 1) Ball and Vase
- 2) Spikes/Coin
- 3) Penny/Dime
- 4) Vase on Side
- 5) Pencil/Frame

Say

- 1) "Magic come to me"
- 2) "1, 2, 3 make the magic"
- 3) "abra cadabra"
- 4) "hocus pocus"
- 5) "ala cazam"

Location

- 1) Stand around a table
- 2) Stand around a table
- 3) Stand around a table
- 4) Stand around a table
- 5) Stand around a table

Color of Wand

- 1) Silver
- 2) Silver
- 3) Silver
- 4) Silver
- 5) Sliver

Paper Do

- 1) Book
- 2) Kite
- 3) Boat
- 4) House
- 5) Envelope

Say "Folding paper..."

- 1) can be done anywhere"
- 2) is a good thing to learn"
- 3) makes neat things"
- 4) can be hard sometimes"
- 5) is fun"

Location

- 1) On floor in circle
- 2) On floor in circle
- 3) On floor in circle
- 4) On floor in circle
- 5) On floor in circle

Color of Hat

- 1) Blue/green
- 2) Blue/green
- 3) Blue/green
- 4) Blue/green
- 5) Blue/green

Appendix C
 Daily Presentation Order of
 Critical Items for Focal Activities in Experiment 1
Magic Games

<u>Act.</u>	Day	Do	Location	Say	Color
<u>1</u>	1	Ball/Vase	Table	Magic me	Silver
	2	Spikes	Table	1, 2, 3	Silver
	3	Penny/Dime	Table	abra	Silver
	4	Vase/Side	Table	hocus	Silver
<u>2</u>	1	Pencil	Table	ala	Silver
	2	Vase/Side	Table	hocus	Silver
	3	Spikes	Table	1, 2, 3	Silver
	4	Penny/Dime	Table	abra	Silver

Paper-Folding Game

<u>Act.</u>	Day	Do	Location	Say	Color
<u>1</u>	1	Book	Floor	Anywhere	Blue/Green
	2	Kite	Floor	Learn	Blue/Green
	3	Boat	Floor	Neat	Blue/Green
	4	House	Floor	Hard	Blue/Green
<u>2</u>	1	Envelope	Floor	Fun	Blue/Green
	2	House	Floor	Hard	Blue/Green
	3	Kite	Floor	Learn	Blue/Green
	4	Boat	Floor	Neat	Blue/Green

Appendix D

Materials and Procedures for Paper-Folding Game

Before constructing the paper model children sat in a circle on the floor and were given a paper hat to wear.

Paper Book

Materials

- 1 piece of coloured construction paper
- 3 pieces of plain white paper
- white sticker
- stapler

Procedure

- fold the construction paper vertically
- fold 3 white papers vertically
- place the white paper inside the construction paper
- staple the papers together at the fold (experimenter)
- place the white sticker on the front of the book
- write name on the sticker
- repeat "folding paper can be done anywhere."

Paper Kite

Materials

- 1 square piece of paper
- 1 piece of construction paper
- 3 round stickers
- 1 piece of string

Procedure

- fold paper diagonally into a triangle, open
- fold the two long sides along the centre line
- turn paper kite over
- place two round stickers on the kite
- use third sticker to attach a piece of string to the bottom of the kite
- tape the kite to a piece of construction paper
- write name on paper kite
- repeat "folding paper is a good thing to learn".

Paper Sail Boat

Materials

- 1 square piece of white paper
- 1 piece of construction paper
- 3 round stickers
- tape

Procedure

- fold paper diagonally, open
- fold paper horizontally, open
- fold 1 corner to the centre of the paper
- turn the paper over
- tape the sail boat to the construction paper
- decorate the boat with round stickers
- write name on paper boat
- repeat "folding paper makes neat things".

Paper House

Materials

- 1 square piece of white paper
- 1 piece of construction paper
- 3 stickers
- tape

Procedure

- fold paper horizontally, open
- fold paper vertically, open
- fold top left corner to the centre
- fold top right corner to the centre
- turn paper over
- tape to the construction paper
- use stickers to put windows and door on the house.
- write name on paper house
- repeat "folding paper can be hard sometimes".

Paper Envelope

Materials

- 1 square piece of paper
- 1 round sticker
- 1 cent stamp

Procedure

- fold the paper vertically, open
- fold the paper horizontally, open
- fold all corners to the centre
- pull top corner up
- place sticker on the back of the envelope to hold the other three sides down
- place stamp on outside of envelope
- write name on envelope
- repeat "folding paper is fun".

Appendix E
Materials and Procedure for Magic Game

Before learning the magic trick the children were instructed to stand around a table and then were given a silver magic wand.

Ball and Vase

Materials

- blue vase and yellow ball
- magic wand

Procedure

- take the top off the vase
- display the ball that is inside
- remove the ball and place it in pocket or small bag
- place the top back on the vase
- wave wand over vase while saying the magic words "magic come to me"
- take the top off the vase and display the ball

Plastic Spikes Through a Coin

Materials

- yellow container and red coin
- magic wand

Procedure

- place spikes on the table beside the container
- display the solid coin and the container
- place the coin in the container and put the top on
- wave the magic wand over the container while saying the magic words "1, 2, 3 make the magic"
- place each of the eight spikes through the container
- take each of the spikes out of the container
- remove the top and show that the coin is still together

Put a pencil through a Plastic Frame

Materials

- red plastic frame
- two pieces of light construction paper

- magic wand

Procedure

- display the red plastic frame
- show that a pencil can not go through it
- place a piece of construction paper in both sides of the frame
- wave the magic wand over the frame while saying the magic words "ala cazam"
- put a pencil through the centre of the frame
- take the paper out of the frame
- show that the frame is solid.

Turn the Penny into a Dime

Materials

- red container with penny inside
- magic wand

Procedure

- show the audience the red container with the penny inside
- place the top on the container
- wave the magic wand over the container while saying the magic words "abra cadabra"
- tap the top of the container three times
- remove the top of the container and display the dime.

Tilting Vase

Materials

- red and white vase with rods
- magic wand

Procedure

- show that the vase will not stay on its side
- wave your wand over the wand while saying the magic words "hocus pocus"
- place the rod in the vase
- turn the vase onto its side and show that it will stay

Appendix F

Biasing Interview - Experiment 1

Introduction

The interviewer asked the child if s\he would talk to her about what happened when the experimenter was there to play games. The child was told that if s\he does not want to answer any of the questions, or if s\he gets tired that the interview will stop. To begin the interviewer introduced herself and engaged the child in casual conversation. Next questions related to the experimental session started.

"Today I want to ask you some questions about the things that you do when Debbie played the games with you. I would like you to think about the last time that Debbie came to your day care/school. I would like you to answer the questions from what you remember about that day. Can you remember that last time that Debbie was here? I wasn't with you that day so I don't know a lot about some of the things that happened. Debbie told me some of the things that you did and I hope that you can help me to learn more about what happened that day. Do you remember that Debbie wore a special kind of apron on that last day? Do you remember what kind of a apron she wore? That's great that you can remember that day. Now may I ask you some questions about what you remember about that day? Is it O.K. if I turn on these machines (audio and video recorders) so that I can listen to your answers later? I don't want to forget anything that you say.

Suggestive Questions

The last time that Debbie was here, Angela came and spent a little while with you. You probably remember that Angela came. She had a big green watering can and she watered some plants. She tried to be as quiet as she could but I am sure that everyone knew that she was here. I would like to ask you some questions about Angela.

1) What color was Angela's hair?

- 2) Did Angela do anything after she watered the plants?
- 3) When Angela left, what did she do?

Now I am going to ask you some questions about the game that you played with paper. Do you remember that you folded paper and you made some special things like an envelope and a kite? She also told me that the children said special things like "folding paper is fun". Debbie told me that the children really liked that game. Do you remember folding paper to make special things?

- 4) When you started the game where did you sit?
- 5) What color was the paper hat that you wore to play the paper folding game?
- 6) If you could write a letter to a special friend and send it in the envelope that you made, what would you write about?
- 7) When you said "folding paper is fun" did you mean that you liked the game?

Now I am going to ask you some questions about the magic tricks that you learned. Do you remember that all of the children sat in a chair in the corner of the room and Debbie taught you to do magic tricks. First, she gave you a beautiful yellow coloured wand to help you with the tricks. I was told that you learned to do some fun magic tricks. Debbie told me that many of the children were really surprised that they could do the tricks. Do you remember learning the magic tricks?

- 8) When you started the game, you sat on a chair just like the other children, were the chairs in a strait line or in a circle?
- 9) On the last day that Debbie was here you used a yellow coloured wand. Do you think that most magicians really use a yellow magic wand?
- 10) Do you think that you can remember the magic trick that

you learned that day, so that you can tell your friends about it, the one about using the magic wand to make the vase stay on its side?

11) Do you remember what you said just before you did that magic trick?

My next set of questions is about the smelling game that you played. Do you remember that game, Debbie had some coloured smelly stuff in a bottle. She put some of it onto a kleenex, and she asked you to raise your hand when you could smell it?

12) How did you make sure that you couldn't see any of the other children?

13) What color was the kleenex that Debbie put the smelly stuff on?

14) What did it smell like?

The last time that Debbie was here to play the games some of the children said that they weren't feeling very well. Debbie took their temperature to make sure that they weren't too sick. She told me that at the end of the play session when all of the games were over some of the children said that they felt a little sick so she asked them where they weren't feeling well and then she took their temperature. Debbie couldn't remember which children had their temperature taken.

15) Did Debbie take your temperature?

Appendix G

Free Recall - Experiment 1

The interviewer asked the child for permission to conduct the interview and reminded the child that s\he does not have to answer all of the questions, and that the interview would end if the child got tired or did not want to continue. The interviewer engaged the child in conversation to put the child at ease and to encourage recall. Just before the experimental questions began the interviewer asked the child for permission to audio and video record the session.

"I would like to ask you again about the last time that Debbie was here to play those games with you? Do you remember the last time that Debbie was here, when s\he put on the special apron at the end of the play time? Can you tell me what kind of apron Debbie wore? I wasn't here the last time that Debbie played games with you. I hope that you can help me to learn what happened that day. It's really important that you answer these questions from what you remember about the day that Debbie wore a special apron. I also want you to know that it's O.K. to say "no" to some of the questions. If I asked you if Debbie floated across the room that last day what would you say. That's right, the answer is "no" because Debbie didn't float across the room that day.

Will you tell me everything that you can remember about what happened the last time that Debbie was here to play games with you? I would like you to tell me what happened on the day that Debbie put on a special apron. Do you remember how things looked, like the shapes of things or colors that you remember? Do you remember something that you or Debbie said? Do you remember what games you played?

Appendix H

Cued Recall - Experiment 1

Would you tell me what you can remember about the new person who came the last time that Debbie was here to play those games?

Do you remember that somebody new came that day?

Do you remember what that person looked like?

What did the person do when she was here?

What did the person do when she left?

Is there something else that you remember?

Now would you tell me what you remember about the paper folding game that you played?

Do you remember that you made special things with paper?

Will you tell me what you remember about the paper folding game that you played the last time that Debbie was here?

What did you make?

Where in the room did you fold the paper?

Is there something else that you remember?

My next questions is about the magic tricks that you learned the day that Debbie wore a special apron.

Do you remember that you learned magic tricks when Debbie came to play the games with you?

Will you tell me about the magic trick that you learned the last time that Debbie was here?

What magic trick did you learn?

Where in the room did you learn the magic tricks?

Is there something else that you can remember?

Now would you tell me about the smelling game that you played with Debbie?

Do you remember that game that you played with Debbie the last time she played the games with you?

What do you remember about that game?

Can you remember something else about what happened during the smelling games?

I would also like to know about what happened when Debbie took some of the children's temperature.

Appendix I

Recognition - Experiment 1

1) When Angela came the last time that Debbie was here did she water the plants?

Yes _____ No _____

2) When Angela came the last time that Debbie was did she take pictures?

Yes _____ No _____

3) When Angela left did she say good-bye and leave?

Yes _____ No _____

4) When Angela left did she shake your hand and leave?

Yes _____ No _____

5) When you played the paper folding game did you sit on the floor in a circle?

Yes _____ No _____

6) When you played the paper folding game did you and the other children sit on a chair?

Yes _____ No _____

7) Was the color of the paper hat that you wore red?

Yes _____ No _____

8) Was the color of the paper hat that you wore blue/green?

Yes _____ No _____

9) On the last day that Debbie was here did you make a paper envelope?

Yes _____ No _____

10) On the last day that Debbie was here did you make a paper house?

Yes _____ No _____

11) After you finished folding the paper did you say "folding paper is fun".

Yes _____ No _____

12) After you finished folding the paper did you say "folding paper can be hard sometimes?"

Yes _____ No _____

13) When you learned the magic tricks did you stand around a

table?

Yes _____ No _____

14) When you learned the magic tricks did you and the other children sit on chairs?

Yes _____ No _____

15) Was the magic wand yellow?

Yes _____ No _____

16) Was the magic wand silver?

Yes _____ No _____

17) On the last day that Debbie was here did you learn to put a pencil through a plastic frame?

Yes _____ No _____

18) On the last day that Debbie was here did you learn to make a vase stay on its side?

Yes _____ No _____

19) Were the magic words you said "ala cazam"?

Yes _____ No _____

20) Were the magic words you said "hocus pocus"?

Yes _____ No _____

21) When you played the smelling game the last time that Debbie was here did she pour some smelly stuff onto a kleenex?

Yes _____ No _____

22) When you played the smelling game the last time that Debbie was here did she pour some smelly stuff onto a piece of cotton baton?

Yes _____ No _____

23) What did the smelly stuff smell like?

24) Did Debbie take your temperature?

Yes _____ No _____

Appendix J
Debriefing

You did very well today. I asked you some very hard questions. You really helped me to learn more about what happened the last time that Debbie was here to play all of those games. Did you like playing those games with Debbie. What was your favourite one? Do you ever play those games at home? Did you tell any of your friends about the kinds of games that you played here?

Do you want to know what I think? I think that because (name of second experimenter) wasn't here when you were playing all of those fun games that she might have gotten some things wrong when she was asked you some questions. Do you think that she got some things wrong? (If the child said "yes" the interviewer asked what the child thinks was wrong. If the child said "no" then the interviewer did not pursue the issue). Well, I don't have any more questions to ask you. Now it's your turn. Do you have any questions for me about what you did?

Appendix K

Free and Cued Recall Coding Protocols - Experiment 1

Subject Number _____

General

(no specific reference to an activity)

Played _____

Three games _____

Kind of game (specify) _____

Deviation Visit

A new person came _____

Color of her hair (specify) _____

She had a camera _____

She took pictures _____

She watered the plants _____

She watched/listened _____

Did something else (specify) _____

She said good-bye _____

She waved _____

She shook child's hand _____

Paper-folding

Did a paper folding game _____

Sat _____

On the floor _____

In a circle _____

On a chair _____

Other (specify) _____

Played the game in a different location (specify) _____

Had a paper hat _____

Paper hat was red _____

Paper hat was blue/green _____

Child said a different color (specify) _____

What the child made

Made a paper envelope _____

Made a paper book _____

Made a paper house _____

Made a paper boat _____

Made a paper kite _____

Something else _____

Said words after paper folding_____

"folding paper is fun"_____	"folding paper can be hard sometimes"_____
"folding paper can be done anywhere"_____	"folding paper makes neat things"_____
"folding paper is a good thing to learn"_____	other words (specify)_____

Added something else to game (specify)_____

Magic Tricks

Learned magic tricks_____

Stood _____ around a table_____

Sat _____ on chair_____

Played game in different location (specify)_____

Used a magic wand_____

Waved the wand_____	Magic wand was silver_____
Magic wand was red_____	Other color (specify)_____

Learned a magic trick_____

Pencil thru a frame_____	Ball disappear from a vase_____
Make a vase stay on its side_____	Turn a penny to a dime_____
Put spikes thru coin _____	Different magic trick (specify)_____

Said magic words _____

"ala cazam"_____	"magic come to me"_____
"hocus pocus"_____	"abra cadabra"_____
"1, 2, 3 make the magic"_____	Different magic words (specify)_____

Added something else to game
(specify)_____

Smelling Game

Played a smelling game _____
 There was smelly stuff _____
 Sat on the floor _____ Sat in a strait line _____
 Closed eyes _____
 Smelly stuff was yellow _____
 Smelly stuff was some other color (specify) _____
 Stayed really quiet _____
 Poured smelly stuff onto a kleenex _____, cotton baton _____,
 face cloth _____
 Raised hand when smelled it _____
 Child described the smell (specify) _____

Temperature

Temperature was taken _____
 Another child's temperature was taken _____

Language Coding (for free recall only)

Pronouns Total Number _____

I/We _____

They _____

You _____

She _____

Temporal Markers Total Number _____

First, second, etc. _____

And then _____

After/Before _____

Other (specify) _____

Verb Tense Total Number of Verbs used _____

Past tense _____

Present tense _____

Future tense _____

Appendix L

Critical Items in Experiment 2

<u>Magic Do</u>	<u>Paper Do</u>	<u>Lauren Dream</u>
1) Ball and Vase	1) Book	1) Candle
2) Spikes/Coin	2) Kite	2) Cup
3) Penny/Dime	3) Boat	3) Bottle
4) Vase on Side	4) House	4) Hat
5) Pencil/Frame	5) Envelope	5) Box
<u>Sticker</u>	<u>Sticker</u>	<u>Lauren Window</u>
1) Balloon	1) Marker	1) Car
2) Cake	2) Pencil	2) Van
3) Birthday hat	3) Paint brush	3) Truck
4) Present	4) Pen	4) Motorcycle
5) Candles	5) Crayon	5) Bus
<u>Feet Position</u>	<u>Leg Position</u>	<u>Lauren Pet</u>
1) pointed in	1) indian style	1) Cat
2) apart	2) together	2) Gerbil
3) crossed	3) under bottom	3) Bird
4) 1 knee bent	4) 1 straight 1	4) Dog
5) perpendicular	under bottom	5) Fish
	5) in a V	
<u>Color of Wand</u>	<u>Color of Hat</u>	<u>Lauren Toy</u>
1) Silver	1) Orange	1) Ball
2) White	2) Brown	2) Puzzle
3) Blue	3) Yellow	3) Stuffed Bear
4) Black	4) Purple	4) Guitar
5) Red	5) Green	5) Lego

Appendix M

Daily Presentation Order of Critical Items for Lauren Story
Experiment 2

<u>Act.</u>	Day	Dream	Window	Pet	Toy
<u>1</u>	1	Candle	Car	Gerbil	Puzzle
	2	Hat	Motorcycle	Gerbil	Puzzle
	3	Bottle	Truck	Gerbil	Puzzle
	4	Cup	Van	Gerbil	Puzzle
1	1	Cup	Van	Cat	Ball
	2	Cup	Van	Dog	Guitar
	3	Cup	Van	Bird	Bear
	4	Cup	Van	Gerbil	Puzzle
2	1	Box	Bus	Bird	Bear
	2	Cup	Van	Bird	Bear
	3	Candle	Car	Bird	Bear
	4	Bottle	Truck	Bird	Bear
2	1	Bottle	Truck	Fish	Lego
	2	Bottle	Truck	Gerbil	Puzzle
	3	Bottle	Truck	Cat	Ball
	4	Bottle	Truck	Bird	Bear

Appendix N

Lauren Stories

Day 1

This is a story about a little girl named Lauren. One morning Lauren's mother woke her up so that she would not be late for school. Lauren did not want to get up yet so she closed her eyes. Soon she was asleep... and then she began to dream. Lauren dreamed that she was sailing on the deep blue sea. When Lauren looked over the side of the boat she saw a candle floating toward her. Just as she was reaching over to touch it Lauren heard her mother calling her, "Lauren, hurry up or you will be late for school!". Lauren woke up and jumped out of bed. Then she remembered it was her turn to feed her pet gerbil, Binky, his breakfast. Lauren got dressed, combed her hair, and looked out the window just as car was driving by. Then she went to the kitchen for breakfast. Her mother made Lauren her favourite so Lauren sat down and ate it all up. Then it was time to go to school so Lauren waved goodbye and left for school. On the way to school Lauren's friend Tricia showed Lauren the new puzzle she got for her birthday from her uncle Steve. "Lauren, why don't you come to my house after school" Tricia said, "so you can play with me and my little brother. but first make sure you ask your Mom if you can come".

Day 2

This is a story about a little girl named Lauren. One

morning Lauren's mother woke her up so that she would not be late for school. Lauren did not want to get up yet so she closed her eyes. Soon she was asleep... and then she began to dream. Lauren dreamed that she was sailing on the deep blue sea. When Lauren looked over the side of the boat she saw a hat floating toward her. Just as she was reaching over to touch it Lauren heard her mother calling her, "Lauren, hurry up or you will be late for school!". Lauren woke up and jumped out of bed. Then she remembered it was her turn to feed her pet gerbil, Binky, his breakfast. Lauren got dressed, combed her hair, and looked out the window just as a motorcycle was driving by. Then she went to the kitchen for breakfast. Her mother made Lauren her favourite so Lauren sat down and ate it all up. Then it was time to go to school so Lauren waved goodbye and left for school. On the way to school Lauren's friend Tricia showed Lauren the new puzzle she got for her birthday from her uncle Steve. "Lauren, why don't you come to my house after school" Tricia said, "so you can play with me and my little brother. but first make sure you ask your Mom if you can come".

Day 3

This is a story about a little girl named Lauren. One morning Lauren's mother woke her up so that she would not be late for school. Lauren did not want to get up yet so she closed her eyes. Soon she was asleep... and then she began to dream. Lauren dreamed that she was sailing on the deep

blue sea. When Lauren looked over the side of the boat she saw a bottle floating toward her. Just as she was reaching over to touch it Lauren heard her mother calling her, "Lauren, hurry up or you will be late for school!". Lauren woke up and jumped out of bed. Then she remembered it was her turn to feed her pet gerbil, Binky, his breakfast. Lauren got dressed, combed her hair, and looked out the window just as a truck was driving by. Then she went to the kitchen for breakfast. Her mother made Lauren her favourite so Lauren sat down and ate it all up. Then it was time to go to school so Lauren waved goodbye and left for school. On the way to school Lauren's friend Tricia showed Lauren the new puzzle she got for her birthday from her uncle Steve. "Lauren, why don't you come to my house after school" Tricia said, "so you can play with me and my little brother. but first make sure you ask your Mom if you can come".

Day 4

This is a story about a little girl named Lauren. One morning Lauren's mother woke her up so that she would not be late for school. Lauren did not want to get up yet so she closed her eyes. Soon she was asleep... and then she began to dream. Lauren dreamed that she was sailing on the deep blue sea. When Lauren looked over the side of the boat she saw a cup floating toward her. Just as she was reaching over to touch it Lauren heard her mother calling her, "Lauren, hurry up or you will be late for school!". Lauren woke up

and jumped out of bed. Then she remembered it was her turn to feed her pet gerbil, Binky, his breakfast. Lauren got dressed, combed her hair, and looked out the window just as a van was driving by. Then she went to the kitchen for breakfast. Her mother made Lauren her favourite so Lauren sat down and ate it all up. Then it was time to go to school so Lauren waved goodbye and left for school. On the way to school Lauren's friend Tricia showed Lauren the new puzzle she got for her birthday from her uncle Steve. "Lauren, why don't you come to my house after school" Tricia said, "so you can play with me and my little brother. but first make sure you ask your Mom if you can come".

Appendix O

Daily Presentation Order of Critical Items for Magic Game.

Experiment 2

<u>Act.</u>	Day	Do	Position	Sticker	Color
<u>1</u>	1	Spikes	Toes in	Balloon	White
	2	Spikes	Knee bent	Present	White
	3	Spikes	Feet cross	Hat	White
	4	Spikes	Feet apart	Cake	White
1	1	Ball	Feet apart	Cake	Silver
	2	Vase	Feet apart	Cake	Black
	3	Penny	Feet apart	Cake	Blue
	4	Spikes	Feet apart	Cake	White
2	1	Penny	Perpendicular	Candles	Blue
	2	Penny	1 knee bent	Present	Blue
	3	Penny	Feet apart	Cake	Blue
	4	Penny	Feet crossed	Hat	Blue
2	1	Frame	Feet crossed	Hat	Red
	2	Vase	Feet crossed	Hat	Black
	3	Spike	Feet crossed	Hat	White
	4	Penny	Feet crossed	Hat	Blue

Appendix P

Daily Presentation Order of Critical Items for Paper-folding
Experiment 2

<u>Act.</u>	Day	Do	Position	Sticker	Color
<u>1</u>	1	Book	Straight	Pencil	Orange
	2	House	Straight	Pencil	Purple
	3	Boat	Straight	Pencil	Yellow
	4	Kite	Straight	Pencil	Brown
1	1	Kite	Crossed	Marker	Brown
	2	Kite	1 straight	Pen	Brown
	3	Kite	Sit on 1	Paint	Brown
	4	Kite	Straight	Pencil	Brown
2	1	Envelope	Under B.	Paint	Green
	2	House	Under B.	Paint	Purple
	3	Kite	Under B.	Paint	Brown
	4	Boat	Under B.	Paint	Yellow
2	1	Boat	V shape	Crayon	Yellow
	2	Boat	1 straight	Pen	Yellow
	3	Boat	Straight	Pencil	Yellow
	4	Boat	Under B.	Paint	Yellow

Appendix Q

Biasing Interview - Experiment 2

First I want to ask you some questions about the story that you heard. The one about the little girl who had a dream about a box that floated by the boat she was on. Do you remember the story about Loren who woke up and remembered that she had to feed her pet fish Binky?

- 1) When Loren was dreaming she saw a box float by the boat she was on, do you think there was anything in the box Loren saw?
- 2) When Loren looked out the window she saw a vehicle, can you see vehicles from your bedroom window?
- 3) As soon as she woke Loren remembered that she had to feed her pet fish Binky, do you have a pet fish?
- 4) When Loren walked to school with her friend Tricia, Tricia showed her the new toy she had gotten for her birthday, do you sometimes bring toys to school to show your friends?

Now I am going to ask you some questions about the magic tricks that you learned. Do you remember that Debbie taught you to do magic tricks. Debbie told me that many of the children were really surprised that they could do the tricks. Debbie also told me that the children wore a special sticker with a picture of a birthday candles on it. Do you remember learning to do the magic tricks like putting

a pencil through a plastic frame. Do you remember learning the magic tricks?

4) When you started the game, you stood around a table with the other children. Was the table round or square?

5) Do you think that the magic wand you used to help you with the magic looked like a magicians wand?

6) Do you think that you can remember the magic trick that you learned that day, the one about putting a pencil through the plastic frame, so that you can tell your friends about it?

7) During the magic game you wore a special sticker with a picture of birthday candles on it. Do you collect stickers?

Now I am going to ask you some questions about the game that you played with paper. Do you remember that you all of the children sat on the floor with their legs strait out in a V shape and Debbie taught you how to make things with paper? One of the best parts of the game was when the children put on the green paper hat. It didn't fit some of the children but lots of children said how much they liked the hat. Debbie told me that the children really liked that game. Do you remember folding paper to make special things?

8) When you started the game you sat on the floor with your legs strait out in the shape of a V, were the children sitting in a strait line or in a circle?

9) While you played the paper folding game you wore a green

paper hat. Is green your favourite color?

10) Did the paper model that you made look real?

11) On the last day that Debbie was here you wore a special sticker during paper folding, did it stay on for the whole game?

Appendix R

Free Recall - Experiment 2

"I would like to ask you again about the last time that Debbie was here to play those games with you? Do you remember the last time that Debbie was here, when s\he put on the special apron at the end of the play time? Can you tell me what kind of a apron that Debbie put on? I wasn't here the last time that Debbie played games with you. I hope that you can help me again to learn what happened that day. It's really important that you answer these questions from what you remember about that day that Debbie wore a special apron. I also want you to know that it's O.K. to say no to some of the questions. If I asked you if Debbie floated across the room that last day what would you say. That's right, the answer is no because Debbie didn't float across the room that day.

Will you tell me everything that you can remember about what happened the last time that Debbie was here to play games with you? I would like you to tell me what happened on the day that Debbie put on a special apron.

Sometimes we can remember a lot about how things look. Think about all of the things that were in the room. Tell me how everything looked on apron day.

Sometimes we can remember things that people say. Tell me about all of the things you heard during apron day.

Appendix S

Cued Recall - Experiment 2

FEEL CONFIDENT THAT THE CHILD STILL UNDERSTANDS THAT IT IS
APRON DAY THAT YOU WANT THEM TO THINK ABOUT

I would like you to tell me what you can remember about the story that you heard when Debbie came to play the games with you?

Do you remember that you heard a story?

What was the story about?

Is there something else that you can remember?

My next questions is about the magic tricks that you learned the day that Debbie wore a special apron.

Do you remember that you learned magic tricks when Debbie came to play the games with you?

Will you tell me about the magic trick that you learned the last time that Debbie was here?

Is there something else that you can remember?

Now would you tell me what you remember about the paper folding game that you played?

Do you remember that you made special things with paper?

Will you tell me what you remember about the paper folding game that you played the last time that Debbie was here?

Is there something else that you remember?

Appendix T

Recognition - Experiment 2

1) In the story that you heard about Loren did she dream that a cup was floating toward her?

Yes _____ No _____

In the story that you heard about Loren did she dream that a box was floating toward her?

Yes _____ No _____

2) In the Loren story did she remember that she had to feed her pet fish?

Yes _____ No _____

In the Loren story did she remember that she had to feed her pet gerbil?

Yes _____ No _____

3) In the story when Loren looked out the window did she see a bus?

Yes _____ No _____

In the story when Loren looked out the window did she see a van?

Yes _____ No _____

4) On her way to school did Loren's friend show Loren the new puzzle she got for her birthday?

Yes _____ No _____

On her way to school did Loren's friend show Loren the new lego she got for her birthday?

Yes _____ No _____

5) When you learned the magic tricks did you stand around a table with your feet apart?

Yes _____ No _____

When you learned the magic tricks did you stand around a table with one foot pointed strait and the other foot pointed to the side?

Yes _____ No _____

6) Was the magic wand white?

Yes _____ No _____

Was the magic wand red?

Yes _____ No _____

7) On the last day that Debbie was here did you learn to put a pencil through a plastic frame?

Yes _____ No _____

On the last day that Debbie was here did learn to put plastic spikes through a coin?

Yes _____ No _____

8) During the magic game did the sticker that you wore have a picture of a cake on it?

Yes _____ No _____

During the magic game did the sticker that you wore have a picture of candles on it?

Yes _____ No _____

9) When you played the paper folding game did you sit on the floor with your legs strait out in a V shape?

Yes _____ No _____

When you played the paper folding game did you sit on the floor with both legs strait out and together?

Yes _____ No _____

10) Was the color of the paper hat that you wore green?

Yes _____ No _____

Was the color of the paper hat that you wore brown?

Yes _____ No _____

11) On the last day that Debbie was here did you make a paper kite?

Yes _____ No _____

On the last day that Debbie was here did you make a paper envelope?

Yes _____ No _____

12) During the paper folding game did the sticker you wore
have a picture of a crayon on it?

Yes _____ No _____

During the paper folding game did the sticker you wore have
a picture of a pencil on it?

Yes _____ No _____

Figure Captions

Figure 1: Mean Proportion of Incorrect "Yes" Responses in Experiment 1 as a Function of Fixed/Variable, Sessions, and Suggested/Control.

Figure 2: Mean Proportion of Correct "Yes" Responses in Experiment 1 as a Function of Sessions and Fixed/Variable.

Figure 3: Mean A' Scores in Experiment 1 as a Function of Fixed/Variable, Sessions, and Suggested/Control.

Figure 4: Mean Proportion of Incorrect "Yes" Responses in Experiment 2 as a function of Fixed/Variable and Suggested/Control.

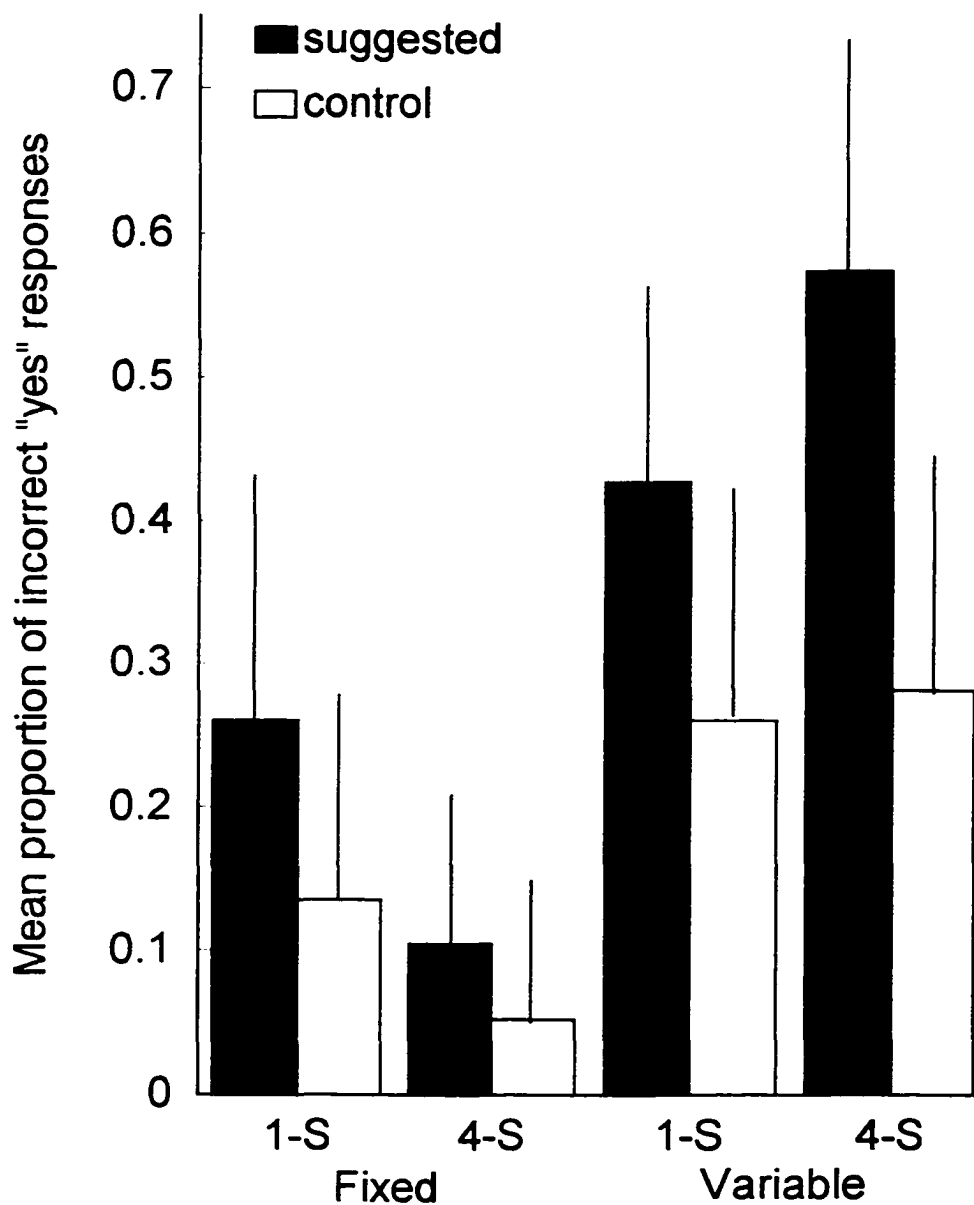


Figure 1. Mean proportion of incorrect "yes" responses (the line above the bar represents 1/2 a standard deviation) in Experiment 1 as a function of fixed/variable, sessions, and suggested/control.

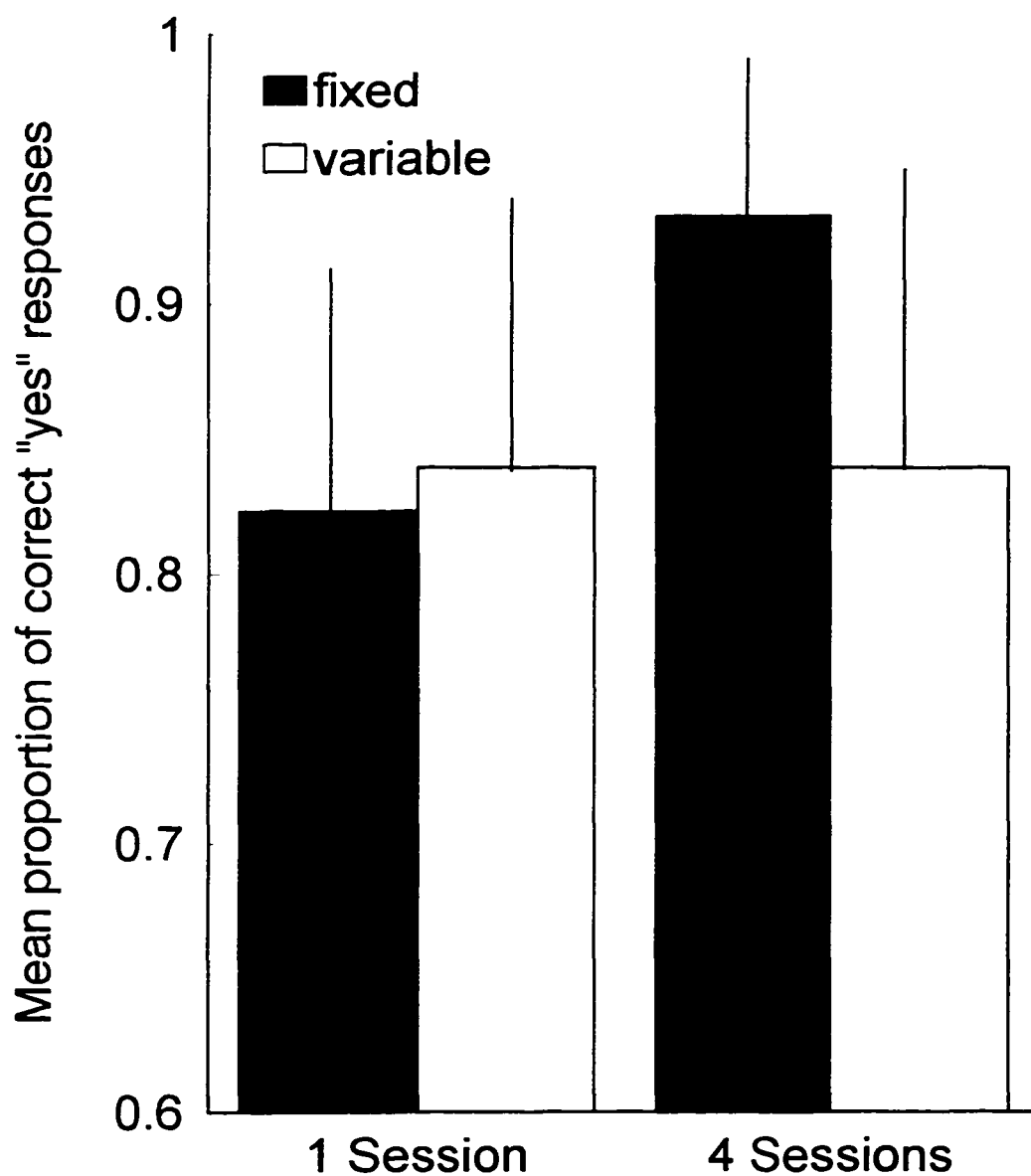


Figure 2. Mean proportion of correct "yes" responses (the line above the bar represents 1/2 a standard deviation) in Experiment 1 as a function of sessions and fixed/variable.

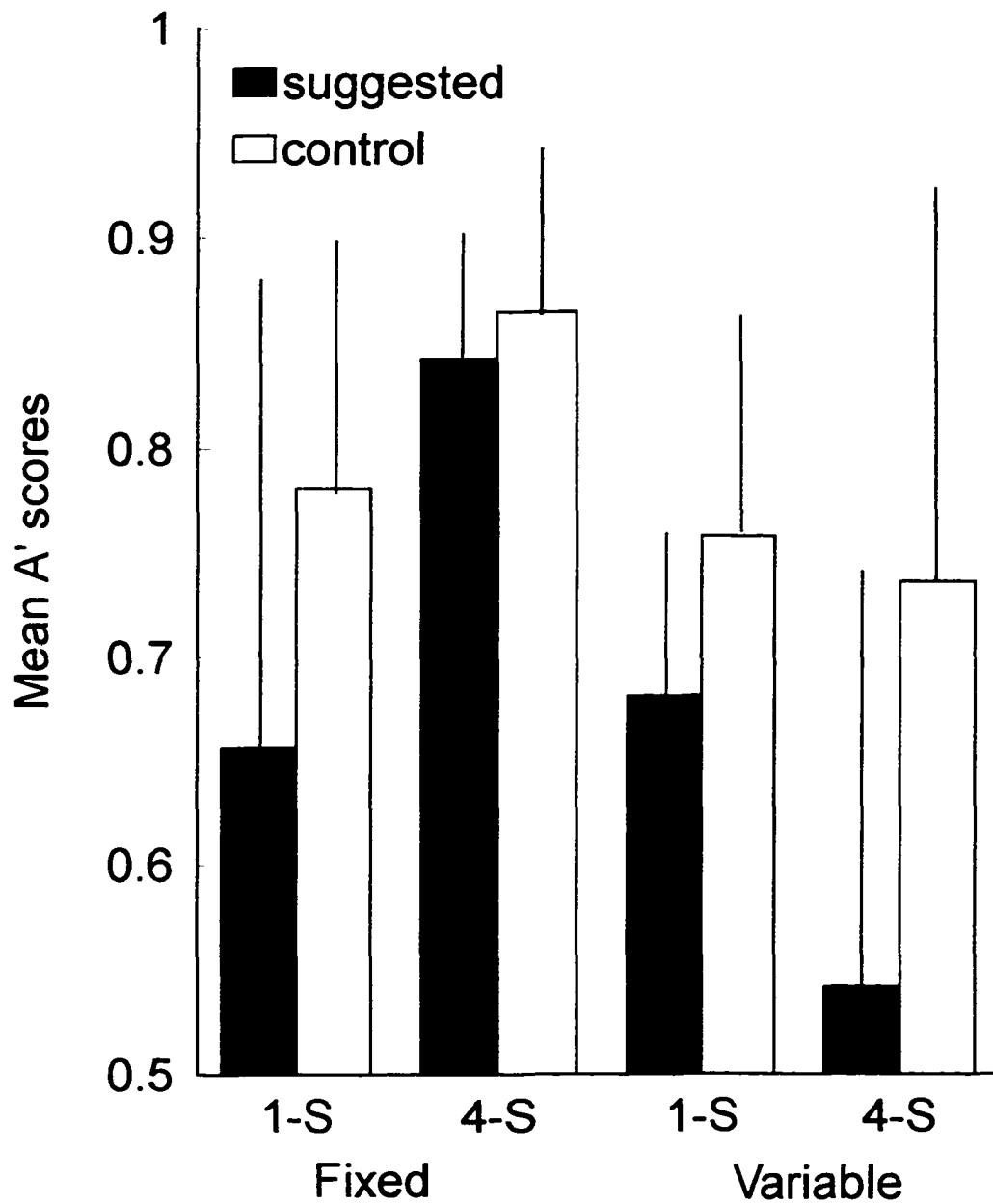


Figure 3. Mean A' scores in Experiment 1 (the line above the bar represents 1/2 a standard deviation) as a function of fixed/variable, sessions, and suggested/control.

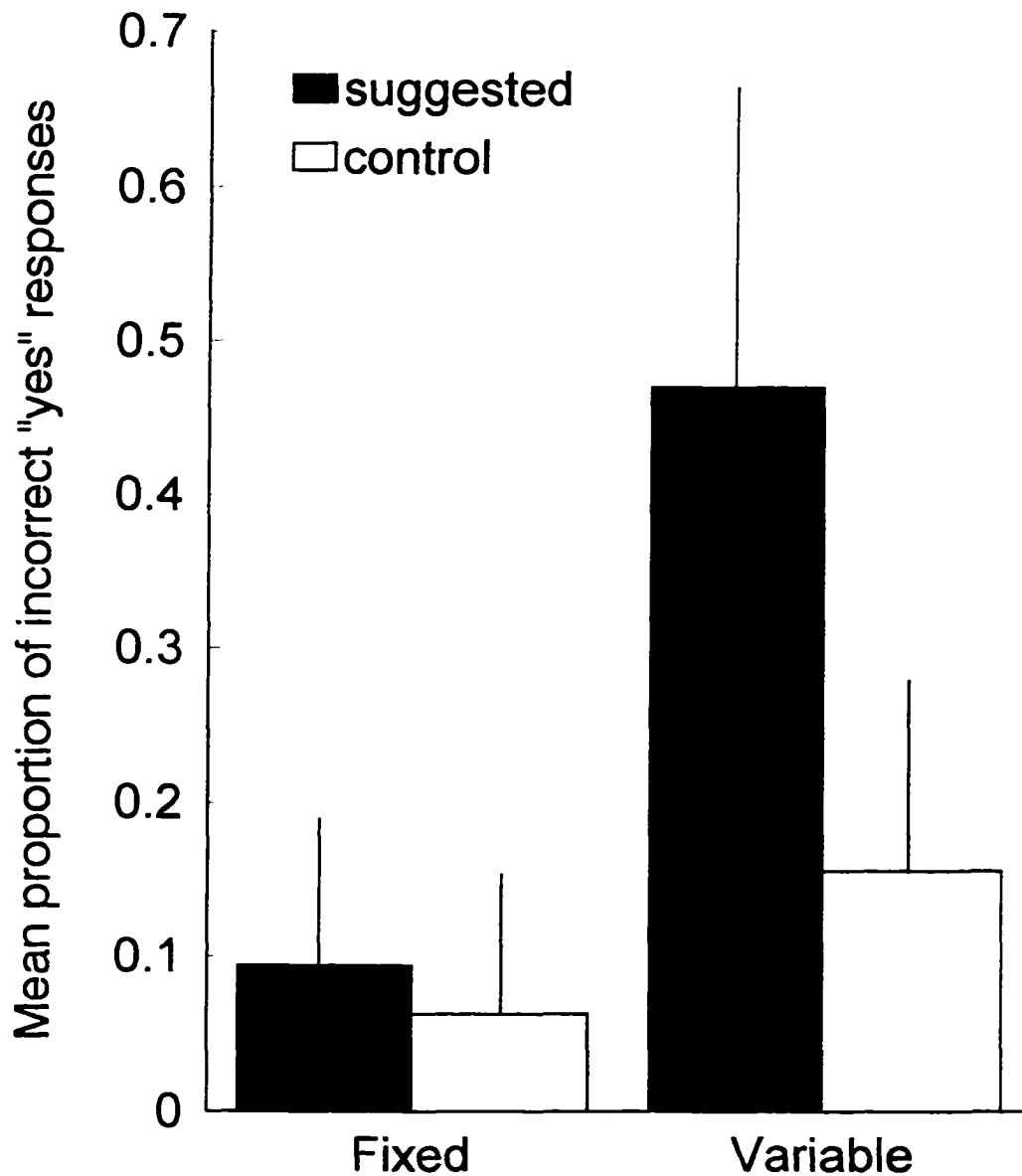


Figure 4. Mean proportion of incorrect "yes" responses (the line above the bar represents 1/2 a standard deviation) in Experiment 2 as a function of fixed/variable and suggested/control.