2004

Improving preschoolers' memories for the sources of events: A comparison of two source-monitoring training techniques

Francine M. Pilon
Wilfrid Laurier University

Improving Preschoolers' Memories for the Sources of Events: A Comparison of Two Source-Monitoring Training Techniques

By

Francine M. Pilon

Baccalaureate of Arts in Psychology, University of Ottawa, 2002

THESIS
Submitted to the Department of Psychology/Faculty of Science
in partial fulfillment of the requirements
for the Master of Arts/Master of Social and Developmental Psychology degree
Wilfrid Laurier University
2004

Your file Votre référence
ISBN: 0-612-96593-7
Our file Notre référence
ISBN: 0-612-96593-7

Acknowledgments

This project would not have been possible without the presence and support of many individuals, to which I am tremendously grateful. First and foremost I would like to thank my advisor Dr Kim Roberts, to whom I am forever indebted for her aid and support. This project would certainly not have been possible without her conceptualization, contribution, and dedication over the past two years. In addition I would like to thank the members of my committee, Dr. Roger Buehler and Dr. Alexandra Gottardo, whose thoughts have certainly been indispensable to the success of this project. I would also like to extend my gratitude to Sean Cameron and Angela Evans for their aid in developing the materials for this study. Their expertise and experience have been central to the success of this project and I am certainly appreciative of their creativity, time, and effort.

It is a certainty that a study this large could not have been executed without the aid of two wonderful research assistants, Sonja Brubacher and Leanne Gosse, whose time, dedication, and effort was evident throughout this entire project. I certainly could not have completed my thesis without their valuable help. In addition I would like to thank Emmanuel and Winston Daycare Centers for allowing us to conduct this study in their institutions. I am certainly grateful for the opportunity they have bestowed upon us, for without their generosity this project would certainly not exist. It is for this reason that I would also like to express thanks to the participants and their parents for taking part in this study as well as for allowing us to further developmental research. I am truly appreciative of their participation and willingness to aid us in the conduction of this study, for without them it certainly would not have been possible. Further I would like to thank

Dr Robert Gebotys for taking the time to provide his statistical input. The statistical skills learned from and outside this project will forever be valuable and I thank you for your kindness.

Lastly, and certainly not least, I would like to thank my wonderful family for their continuous support throughout these past couple of years. There have been many hardships throughout the making of this project and goodness knows I could not have made it through without their love and constant moral support. I would especially like to thank my two loving parents Rhéal and Suzanne, for teaching me the value of hard work and dedication, for it is through their example that I have achieved such accomplishments. Mother and father, there is 'no me without you' and goodness knows I wouldn't be who I am today if it weren't for you, I love you.

I would also like to extend my deepest gratitude to all of my friends in Ottawa and especially the new ones I have made here in Kitchener-Waterloo, that are far too numerous to mention here, for their caring and concern. Goodness knows I could not have "made it" without these extraordinary people from which I have learned so much. I would especially like to thank Lisa Legault and Elizabeth Stacey for listening, and for their constant advice, moral support, and understanding throughout the past two years.

Table of Contents

List of Tables

Abstract

Preschoolers have a tendency to confuse the sources of events when recalling information. Two source-monitoring training (SMT) techniques were compared to see whether source confusions can be reduced in 3- to 4-year-old children (N = 37). After watching a puppet-show and story, children were randomly assigned to one of three conditions: two SMT conditions (explicit and implicit) and one control condition (memory training) where they were trained on non-target puppet-show and story events. The explicit method consisted of a clear mention of both sources (story, puppet show) and their modality (hearing and seeing, respectively) during training, specific instruction to utilize the strategy during the target interview and a definition, and clear mention to beware of misleading questions. The implicit condition utilized a general mention of both sources (hear, see) as well as no mention of misleading questions or instruction to continue utilizing the strategy. Children in the control condition were not given source training, but rather were trained to recognize the presence of items in each event. No differences were found between conditions in response to yes-no questions. However planned comparisons revealed differences between the explicit and control groups with regards to source-recognition, with the explicit group performing more accurately with regards to identification. Children in the implicit group were more likely to respond 'I don't know' in comparison to the control group with regards to open-ended questions. Implications for strategy development are discussed.

Improving Preschoolers' Memories for the Sources of Events: A comparison of two source-monitoring training techniques

Since the 1980s there has been a dramatic increase in the number of reports of child sexual abuse. As a result, children's testimony, either as witnesses or victims, of such crimes has attained significant importance (Ceci & Bruck, 1993). There is concern, however, that children's testimony can be contaminated by information provided by interviewers during investigations of child sexual abuse. As children are generally less likely than adults to spontaneously recall information (e.g., Cole & Loftus, 1987), investigators sometimes struggle to elicit spontaneous accounts from children about the alleged abuse (Nesbitt & Markham, 1999). In their efforts to obtain information, interviewers sometimes make suggestions about what happened that may not be entirely accurate (e.g., Lamb, Hershkowitz, Sternberg, & Esplin, 1996).

Although children's acceptance of false information, or their suggestibility (Ceci & Bruck, 1993) may be due to social factors (e.g., pressure to respond, fear of punishment, Ceci & Bruck, 1993), research has increasingly focused on cognitive explanations (e.g., failure to remember the original event (Gordon, Jens, Shaddock, & Watson, 1991). One such explanation, based on source-monitoring theory (Johnson, Hashtroudi, & Lindsay, 1993), proposes that children confuse the sources of acquired information. Specifically, children mistakenly believe that the suggested information originated from the actual event (wrong source) rather than the interviewer (correct source) (e.g., Ceci, Loftus, Leichtman, & Bruck, 1994). In some cases children confuse the sources of real events, however simply recall incidents from the wrong source. For instance, when asked about a particular event in question (i.e. real-life experience), children may erroneously report occurrences from an event of which is not of interest (i.e. story), hence confusing information from two sources and responding inaccurately to inquiries

regarding the event of interest (e.g. Poole & Lindsay, 1995). For instance, Roberts and Blades (1998) found that children who participated in a live event and watched a similar event on video tended to confuse the events when asked questions regarding the live event. Correlations between source monitoring performance and suggestibility have been found in the literature, demonstrating a reduction in suggestibility with the use of this source-monitoring ability (Giles, Gopnik, & Heyman, 2002). As children sometimes report information from an erroneous source as fact, thus damaging the chances of fair investigation, researchers have begun to study whether children can be trained to reduce source confusion. The present study seeks to investigate two source-monitoring training (SMT) techniques designed to improve children's awareness of where and how they learned information. If children can be encouraged to remember *where* they learned information, they may be more resistant to accepting false information gleaned from other sources.

Several studies have documented that children sometimes remember information accurately, but cannot specify where they learned the information (e.g., Gopnik & Graf, 1988; Powell, Roberts, Ceci, & Hembrooke, 1999). For example, Foley and Johnson (1985) found that 6-year-olds, compared to adults, were confused regarding whether they had performed or imagined certain actions. Another study by Roberts and Blades (1999) demonstrated similar findings when 4- and 10-year-old children were asked to distinguish between what they had seen on a video and what they had seen in a real-life event. Other studies confirm these age trends (Ackil & Zaragoza, 1995; Lindsay, Johnson, & Kwon, 1991; Markham, 1991; Parker, 1995).

While there are conflicting theories regarding children's failure to identify source, there is consensus that the ability develops between ages 3 and 8 (Roberts, 2002). Preschoolers (3- to 5- year-olds) in particular have been consistently shown to have the most difficulty with this task

as compared to other age groups (e.g., Drummey & Newcombe, 2002; Poole & Lindsay, 1995), and this is also the age group that shows the greatest acceptance of false information (Ceci & Bruck, 1993). According to fuzzy-trace theory (e.g., Brainerd &, Reyna 2002), source is encoded as a verbatim, rather than a gist, trace. A verbatim trace is described by Brainerd and Reyna (2002) as "episodically instantiated representations of the surface forms of experienced items" (p.165) such as contextual cues or the actual experienced object. A gist trace, in contrast, has been described as "episodic interpretations of concepts" (p. 165) such as the semantic and relational properties of experienced items. In other words, gist traces contain the meanings, relationships and patterns between details in an event. When a child recalls an event these are preserved but the actual surface forms are not. For example, a child may have seen a man drinking lemonade while walking a German shepherd and recall seeing an adult drinking while walking a dog. So, the child basically remembers the "gist" of what has occurred and has thus preserved the meaning (cold drink and dog), relationship and patterns (seeing someone walking the dog while drinking) but will not recall the actual surface form (lemonade and German Shepard). Thus, because young children retain verbatim information less well than older children, surface information and source are simply not remembered. In contrast, source-monitoring theory (Johnson et al., 1993) proposes that source is attributed to memories as they are recalled. Source can be attributed by examining the characteristics of one's memories (e.g., "I remember it clearly so it must have happened") or by using reasoning (e.g., "It must have been a dream because I wasn't there that day"). There is currently no specific developmental mechanism contained in source-monitoring theory, however, a number of suggestions have been made. For instance, Lindsay et al. (1991) have speculated that difficulty in source-monitoring in young children may be due to a failure to reflect on the contents of their memories. The authors

also posit differences in sophistication with respect to retrieval strategies amongst children and adults as possibly accountable for age related differences in source-monitoring ability. This ability is conjectured to develop gradually amongst children as they continue to acquire more complex retrieval strategies.

Previous research shows that preschoolers are developing the ability to identify the source of their knowledge. It is speculated that children have some awareness of source, but cannot make source-monitoring judgments spontaneously (Roberts, 2002). For instance, in a study by Whitcombe and Robinson (2000), children were exposed to pairs of similar objects. One of the objects was removed from the pair and was either seen by themselves or by an interviewer who told the child about the object. Following this, children were asked to determine which object was removed from the pair and subsequently asked about how they knew about the object. Children were quite proficient at remembering the missing objects, however displayed some difficulty remembering whether they saw the object or were merely told about it. A similar study by Robinson (2002) also demonstrated that children aged 3- to 5-years are quite able to acquire and recall information from different sources, however have difficulty reflecting on their own judgments. Lastly, Wimmer, Hogrefe, and Perner (1988) also obtained similar results in a study in which 3- to 5-year-old children were either shown objects or told about them. It was found that 3- to 4-year-old children, in particular, displayed a lack in ability to associate knowledge with a particular source. Children were quite capable of remembering objects, but had much difficulty remembering *how* they knew about the objects. It is thus clear that children are able to retrieve information, but lack the ability to spontaneously assess source-information. Many assumptions have been made as to why preschoolers have such difficulty with source-monitoring tasks.

A current speculation in cognitive research posits a relationship between the theory of mind understanding (the ability to infer other people's mental states) and source-monitoring ability. Essentially, the ability to conceive of another person's mental states entails possessing a dual-representation for the same entity, (i.e., knowing that a lecture has been cancelled and not going to class and understanding that another individual may not possess this knowledge and hence present themselves to the lecture hall). Research has provided support for the notion that this ability may be associated with source-monitoring as the latter involves the discrimination of two similar incidents occurring in two separate contexts. Theory of mind research has generally established a deficit in source-monitoring ability, mainly concentrated in younger preschool children (i.e. 3- year-olds). However, the presence of the ability to remember where something was learned has been found in children as young as 4 and 5-years of age (Nesbitt & Markham, 1999). Hence, the issue may not be a lack of ability, but rather that of a utilization deficiency (Miller, 2000). A utilization deficiency is defined as the production of a strategy that "leads to either no benefit for performance, or leads to little benefits" for strategic children (Miller, 2000, p. 1013). Perhaps children possess certain strategies to discriminate between two mental representations, however they do not possess the ability to utilize them spontaneously and hence reap any benefits. Perhaps younger children are in need of instruction for when and where to utilize a particular strategy. Researchers argue that training is crucial to successful strategy use as the production of a strategy is highly dependent on situational factors. For instance, children have been witnessed to produce strategies with high social support (i.e. the presence of an adult telling them to utilize the strategy) (Miller, 2000).

As mentioned above, negative implications resulting from children's source-monitoring difficulties have been noted with regards to preschool children's testimony. Hence, there is a

strong need to improve children's source-monitoring ability as well as a need to instruct children on the use of strategies conducive to making accurate source-monitoring judgments. Seeing as previous research indicates promising outcomes for strategy instruction and thus a reduction of source-monitoring errors, it would seem beneficial to explore various training methods.

Attempts to reduce children's acceptance of false information by providing children with SMT has produced inconsistent findings. SMT consists essentially of the presentation of a strategy designed to aid children to correctly attribute the source of particular events. For instance Thierry , Spence, & Memon (2001) exposed children (ages 3 to 4 and 5 to 6) to a source-monitoring task designed to help them distinguish two target events and found that only 5- to 6-year-olds displayed improvements in source-monitoring abilities. In this method children were specifically taught how and where they learned particular information, however the authors (2001) did not provide children with feedback on their task performance. In a second study, Thierry and Spence (2002) attempted to replicate the previous study with the added provision of feedback as well as training for the rejection of misleading questions. Thus, the 2002 study can be conceptualized as a 'training study' whereas the 2001 study merely involved 'instruction' in source monitoring.

Thierry and Spence (2002) asked 3- to 4-year-olds to view two similar science demonstrations; one demonstration was viewed on television, and one was a live demonstration. A few days after the initial viewing of the target events, children were asked to view two puppet shows, one of which was televised and one of which was live, and trained to distinguish between the two sources. During training, children were asked direct questions about the occurrence of certain central events and were subsequently asked to attribute the source of these items (live or television). Children were given feedback. The children were then trained to identify questions

that misled the child about the source of the event (e.g., claiming that an item that was in the live demonstration was on the video). When given similar questions about the science demonstrations (i.e., the target events), children answered the misleading questions more accurately than did children in a control condition who had received no such training of direct skill.

In contrast, Poole and Lindsay (2001) provided SMT training to help children discriminate between two target events as well, and found that only children aged 7- and 8-years and not younger children benefited from, what is in comparison to Thierry and Spence's (2002) method, a less specific training method. Older children were more likely to respond correctly to misleading questions in comparison to the younger age group. In Poole and Lindsay's study, children were not trained on a task identical to the target task and it was not fully explained how they knew about certain information. Hence the procedure was a little more subtle than that of Thierry and Spence (2002).

A follow-up study (Poole & Lindsay, 2002), eliminating the mention of a contaminating source, demonstrated similar findings, with SMT training not benefiting 3- to 4- year-old children. Poole and Lindsay (2002) found that SMT did not benefit children younger than 7-years. Children (aged 3 to 4, 5 to 6, and 7 to 8) viewed four science demonstrations three months prior to being read a story about the science demonstrations. A month later, immediately before interviewing children about the science demonstrations, an interviewer performed some preparation activities (e.g., wiped the tape recorder) and described some preparatory actions (e.g., mentioned that she sometimes presses the blue button). The experimenter then asked children open-ended questions regarding the seen and heard preparation activities (i.e. "What did I do just now to get ____ ready?") and commended them on responding with seen preparations ("That's right, I really did _____. You know that because you saw me _____.") or corrected

them when responding with heard preparations (i.e. "Think hard. Remember when I said that sometimes I _____? But you didn't really see me _____, did you? No, you didn't, so 'no' is the right answer"). The training was disguised as a normal course of action prior to interviewing. At no point during training were children made aware of the fact that training was occurring with only a slight reference that something was learned prior to the target interview, nor were they specifically told to distinguish between both sources. It was simply expected that children would discriminate between both sources and transfer what they had learned to the interview process. Following training, children were asked to respond to misleading and non-misleading questions pertaining to the target events with an indication to respond to questions regarding what they had seen in the science demonstrations. When subsequently questioned about the science demonstrations, the 7- to 8-year-olds responded more accurately to misleading questions (i.e., claiming that events described in the story actually happened in the science demonstrations) than did age-mates in a no-training control condition, but this SMT technique did not benefit the reports of the younger children. One could speculate developmental differences came into play here, however other factors may have been responsible for the ineffectiveness of this particular technique with preschoolers, some of which are discussed below.

There are several methodological differences between the two studies described above (i.e., Poole & Lindsay, 2002; Thierry & Spence, 2002) that may account for the contrasting results with regards to preschoolers. As well as sampling differences, differences in the experimental delays, the events, and the length of training may all have affected the efficacy of the SMT. One difference is particularly interesting with respect to preschoolers. Recall that Thierry and Spence trained children on events that were identical in format and style as the target events (i.e., live activity and a video), whereas Poole and Lindsay trained with events that were

quite dissimilar to the target events (i.e. seen and described preparation activities vs. live science demonstrations and stories), which may have prevented children from seeing the relevance of the training to the target task.

Another interesting difference is that Thierry and Spence made references during training to misleading questions, for instance reminding children about "trick" questions prior to follow-up source questions and instructing children to mind them during the training. Poole and Lindsay (2002) gave a more general instruction to tell "only about things that you remember seeing or feeling yourself". The children were also told not to report anything they had heard other people talk about. The difference in specificity is that children were not specifically instructed to mind tricky questions, nor were they instructed specifically as to what tricky questions were (i.e., questions inquiring about heard events). Further, Thierry and Spence encouraged children to consider both sources, hence specifically encouraging them to make a source monitoring judgment and encouraging them to consider a dual representation for similar occurrences. Poole and Lindsay on the other hand only instructed children to think about and report occurrences from one source, thus encouraging children to consider only one representation for both events. Perhaps, due to this, younger children were not source monitoring, but rather combining information from two differences sources, hence confusing them. In essence, with such general instruction one would have to infer that source monitoring is needed to complete the target task. A younger, less strategic, child may be less likely to do so. Hence, this task may have been too difficult for young children. Although this method is certainly high in forensic relevance, it forces the child to monitor the source of the actual event and a contaminating source, which the preschooler may not be aware of due to a difficulty with the conception of dual-representations (i.e., DeLoache & Burns, 1994).

Lastly, research has demonstrated a difficulty among preschool children to understand the link between what one experiences and the resulting knowledge from that experience: children cannot later say how they learned particular information (i.e. O'Neill & Gopnik, 1991; Robinson, 2000; Wimmer et al., 1988). Very young children are not aware of the fact that one needs to experience something in order to possess knowledge of it. Hence, young children fail to make the relation between knowledge and the source of this knowledge. Thierry and Spence (2002) make this connection rather clear in their training method (i.e., "*you know this because you saw it in the puppet show/video*"). Poole and Lindsay (2002) make this connection clear in the training, however do not make this connection clear in the target events (i.e., they do not tell children that seeing corresponds to the live event and hearing corresponds to the story), hence this connection between knowledge and source are not clear. With young children, this connection should be explicitly taught in order to witness improvements in source-monitoring ability. Perhaps the success of Thierry and Spence's method may be due to the presence of this specific instruction.

Findings in the strategy development literature show that successful training attempts include specific instruction and demonstration, as well as specific instruction and encouragement for applying the technique in a new task (Pressley, 1989a). Specific instructions as to how, when, and where to use a strategy have been shown to produce significant improvement in performance in memory tasks amongst preschoolers (Fletcher & Bray, 1996). For example, Lange and Pierce (1992) showed that children as young as 4-5 years were more likely to utilize a strategy when taught to do so with the use of specific instructions as opposed to a more general form of instruction that required the child to make an inference that previous training can be used. Bigler and Liben (1992) found that 5-to10-year old children were much more successful at classifying

information contradictive to gender stereotypes when taught that the same entity can belong to two separate categories concurrently with specific instruction and demonstration, as compared to those in a control group who were not taught to classify information in an equal manner. This study demonstrates that even young children with one-dimensional views of gender stereotypic information can be taught through specific instruction and training to view certain categories (i.e., gender roles) as potentially belonging to two different categories (i.e. woman and engineer). This research is certainly encouraging for source-monitoring research in that it promotes the notion that children can be trained, with specific instruction, to acknowledge two representations for the same object. Perhaps the success observed in Thierry and Spence's (2002) study was due to the fact that they specifically taught children how to perform a task (i.e. specifically telling child to distinguish between two sources before training) as well as utilized highly similar materials in both training and target tasks.

Similarly, the lack of SMT benefits in Poole and Lindsay's preschoolers could be because the children failed to see the relevance of the training to the new task, a connection that the older children were able to make and thus benefit from. Past studies with preschoolers have shown that alerting children to the presence of two different sources (before training as well as before target activity) as well as instructing children to distinguish between them in these kinds of tasks tends to lead to greater accuracy in responses to misleading questions and has been shown to be quite effective amongst 3- to 4-year-old children (Thierry et al., 2001; Thierry & Spence, 2002). Lastly, perhaps training did not transfer in Poole and Lindsay (2002) due to the short length of the training. Recall that training only consisted of three questions in this study as opposed to twelve (24 if repeated twice) as seen in Thierry and Spence (2002). This possibly was not enough exposure to the strategy hence preventing younger children to grasp the strategy.

Hence, there are several candidate explanations of the inconsistent results regarding the effectiveness of SMT with preschoolers. In comparison to Thierry and Spence's (2002) technique, that of Poole and Lindsay (2002) is more general in nature. That is, Thierry and Spence's (2002) training was more explicitly linked to the target source task in comparison to Poole and Lindsay's (2002) training which was implicitly linked to the target task (as in Poole & Lindsay, 2002).

To determine whether a deficiency in strategy utilization prevents preschoolers from benefiting from SMT, a relative comparison of two contrasting SMT techniques is needed. For instance, a comparison between an SMT technique that utilizes specific instruction and is directly related to the target sources as seen in Thierry and Spence (2002) and SMT that utilizes more general instruction and needs to be generalized to the target sources, as seen in Poole and Lindsay (2002) is vital. Controlling for confounds is needed in order to determine whether differential effects were merely due to extraneous factors (e.g., differences in delays between target events, different populations) as opposed to the experimental manipulations.

Although it can be argued that the comparison of a successful technique with that of an unsuccessful one would lead to obvious results (i.e., findings indicating that successful technique is best), one can not be sure of this conclusion due to the other possible extraneous factors mentioned above. In order to truly determine the superior effectiveness of one technique over another there needs to be a direct comparison of both techniques in a setting that controls for all other possible confounds. This must be done in order to truly determine whether the suggested factors are in fact what are causing differing results across both studies.

In sum, the purpose of this study is to determine which technique is most effective in improving preschool children's memory for the sources of events. The question sought to be

answered here is "Is an explicit SMT technique more effective than an implicit SMT technique?" In light of past research, it is hypothesized that children in the explicit training condition will produce a significantly greater amount of accurate responses to misleading and non-misleading questions as compared to those in the implicit training condition. Children aged 3- to- 4 participated in two sessions, a target event session and a training session, consisting of a story and a puppet show about bees, followed by a target interview. Children were randomly assigned to one of three conditions: two were source-monitoring training conditions (explicit or implicit) and one was a control condition (memory control training). These three conditions allow an effective comparison of both SMT techniques while controlling for possible confounds (i.e., improvements in general memory rather than specifically memory for source). Following training, transfer of training was tested by subjecting children to an interview consisting of non-misleading and misleading closed and open-ended source questions regarding the main target events.

Based on the previous literature, four predictions were made. First, it was predicted that children's responses to non-misleading and misleading target follow-up source questions would be more accurate for children in the explicit SMT condition as compared to children in the other two groups. Secondly, it was predicted that children in the explicit SMT condition would be more accurate in responding to follow-up source questions as compared to those in the implicit SMT training condition, who in turn were expected to respond more accurately as compared to the control condition. Third, as children were not trained to respond to misleading or non-misleading open-ended questions, it was predicted that all groups would show some difficulty on this question format, particularly on misleading open-ended questions due to their difficulty. Lastly, the fourth hypothesis was exploratory. It was predicted that children in the explicit SMT

training group would perform better than children in the other conditions when responding to open-ended non-misleading and misleading questions due to a superior lesson in identifying where certain events occurred (Thierry & Spence, 2002).

Method

Participants and Design

Sixty-four children from local daycares and preschools were recruited to participate in this study. Twenty seven children were excluded from the study as 8 children did not meet age criteria; 11 children did not complete one of the two sessions; and 8 children's schedules did not meet the delay requirements of this study. Thus the final sample consisted of 37 3- to 4-year-old children (20 3-year-olds and 17 4-year-olds, mean age: 47.24 mos., $SD = 6.66$). Parents provided informed consent and children were included in the study if they assented to participation in the two sessions. Children participated individually in 2 sessions, the first of which lasted approximately 12 minutes and the second approximately 15-20 minutes, with the explicit condition lasting closer to 20 minutes and the control condition lasting closer to 15 minutes. Participants were randomly assigned to one of three conditions, either the explicit source-monitoring condition ($n = 12$; age: $M = 47.38$ months, $SD = 7.34$), an implicit source-monitoring training condition ($n = 12$; $M = 46.08$ months, $SD = 6.61$) or a memory control condition ($n = 13$; $M = 48.19$ months, $SD = 6.45$). Of the 27 children excluded from the study, 2 were assigned to the explicit condition, 2 to the implicit condition, and 5 to the memory control condition. The remaining 18 were never assigned to a condition as they never participated in session 2 for reasons mentioned above. There was an approximately equal number of boys and girls in each condition. The experiment utilized a 3 (SMT Condition: Explicit vs. Implicit vs. Memory-

Control) X 2 (Question Type: Misleading vs. Non-misleading) X 2 (Question Format: Yes-No vs. Open-Ended) mixed design with SMT condition as a between-subjects variable.

Procedure

Session 1: Target Events

Children were asked if they would like to learn about bees. Children who gave assent were exposed individually to a lesson about bees comprised of two similar events: a scripted puppet show where the children learned about bees by watching a plush bee (Benny the Bee) and hearing a story was presented to the children by the experimenter. Thus, children *saw* the puppet show, but merely *listened* to the story. Each event lasted approximately six minutes. The order of the events was counterbalanced so that half of the children heard the story first and the other half witnessed the puppet show first. The experimenter introduced the puppet show and the story by labeling them as such before presenting them to the children. For example, the experimenter said "now we are going to see a puppet show about bumblebees. Do you know what bumblebees are? They are little creatures that fly and buzz" and "let's listen to a story about bumblebees" (see Appendix A for script). The content of the target events were also counterbalanced such that each detail was presented equally often during the puppet show and the story across the experiment (see Table 1).

Session 2: Training

Following a 3 to 4 day delay, the children were randomly assigned to one of three training conditions, with stratification based on age and gender. One group received training that is explicitly linked to the target sources by presenting specific alternate sources (*explicit* condition), and another group received training that is not specifically linked to the target sources (*implicit* condition) by presenting implicit alternate sources (i.e., hear and see). The remaining

children were placed in the control condition and received training on the recognition of details in the events, but did not receive SMT (*memory-control* condition) (See Appendix B for full comparison of conditions). Training as well as the target interview was administered by a different experimenter from the one who administered the first session. This maintained the notion that the interviewer did not know what happened and also ensured that the interviewer was blind to the accuracy of the child's answers (recall that a detail is as likely to have been in the puppet show as the story) (see Table 2 for comparison of items). Both research assistants alternated in doing the target events and interviews.

Explicit SMT condition. This training was based on that described by Thierry and Spence (2002). Children witnessed a puppet show with a frog (Frankie) as well as listened to a story about a frog (each lasted about 3 minutes). The content of the events was counterbalanced such that each detail was presented equally often during the puppet show and the story across the experiment. Children were asked "Do you want to hear a storybook and participate in a puppet show about frogs? Now we are going to see a puppet show about frogs" or "Now we are going to listen to a storybook about frogs." Following these events, children were told, "I'm having a little trouble remembering what we heard in the story about a frog and what we saw in the puppet show with a frog. This always happens and I hate that. Why don't you show me that you can remember what you heard with the frog in the story and what you saw with the frog in the puppet show." Following this, children were individually exposed to 10 trials of the following sequence of questioning, with the order randomized for each participant. Each trial consisted of three parts: a recognition question, a source-monitoring question, and a "check" non-misleading question containing true information about the source of a target detail or a misleading question

containing *false* information about the source of the target detail (See Appendix D). Feedback was provided on responses to each question.

First, children were asked a yes-no *recognition* question such as "Did Frankie the Frog eat a fly with his tongue? After a (correct) "yes" response children were asked a *source-monitoring* question mentioning the alternative sources and how the information was delivered in those sources (i.e., "Did you just *hear* that Frankie ate a fly in the *storybook* or did you really *see* the fly in the *puppet show?*"). The order that the sources were asked about were counterbalanced so that children were either asked about seeing an item in the puppet show or hearing about an item in the storybook equally as a first option. Children were reinforced for correctly answering source-monitoring questions (i.e., "That's right, you just heard that Frankie ate a fly in the story."). If children responded to the recognition question with an (incorrect) "no" response, they were told that this event occurred ("That's a good guess, but Frankie did eat a fly with his tongue. So you should say yes."), asked the source question, and given feedback accordingly ("That's a good guess, but you just *heard* that Frankie ate a fly in the *storybook*). See Appendix C.

Finally, children were asked the *check* question. The experimenter told the children that she may ask questions that may be "funny" about items in the puppet show and story. For example the experimenter asked "Did you *see* Frankie the Frog eat a fly in the *puppet show*?" when he ate a fly in the storybook. If the child produced the correct answer he or she was given positive feedback "That's right you *heard* that Frankie ate a fly in the *storybook*. So you were right to say yes." If the child obtained an incorrect response then feedback was also given "That's a good guess. But you *heard* that Frankie ate a fly in the *storybook*. So you should say yes."

Half of the questions following the source-monitoring questions were misleading regarding source as in the example above, and the other half were non-misleading (e.g., "Did you *see* Frankie the Frog eat a fly in the *puppet show*?" when he indeed ate a fly in the puppet show). All questions were counterbalanced such that each item was asked equally often as a misleading and non-misleading question. Further, as items were counterbalanced to occur in both the story and the puppet show in two different versions, each item was asked equally often from both sources, for a total of 4 versions. Children were given 10 training trials prior to the target interview.

Following training, children were reminded of what they had just learned and were told to think back to the target events presented in the first session. Children were also instructed to continue differentiating between both the puppet show and the story. The experimenter had told the children:

> You did a great job with those questions! I can see that you can remember what you *saw* in the *puppet show* and what you *heard* in the *storybook*. You learned to tell me what you *saw* in the *puppet show* with the frog and what you *heard* in the *storybook* with the frog. Some questions were really hard but you could answer them! Sometimes I tried to ask you a funny question by saying that you *heard* something in the *storybook* when you really and truly *saw* it in the *puppet show*. Sometimes I tried to ask a funny question by saying that you *saw* something in the *puppet show* when you really and truly *heard* it in the *storybook*! But you spotted funny questions that mixed up the puppet show and the storybook! You were smart!
>
> Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I heard that you *saw* a

puppet show about bees and that you *heard* a *storybook* about bees. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. Remember to look out for the funny questions. Can you remember what a funny question is? [Yes,] it's a question that asks if you *saw* something in the *puppet show* when you really *heard* about it in *storybook* or if you *heard* something in the *storybook* when you really *saw* it in the *puppet show*. I know that you'll do a good job because you spotted the "funny" questions about frogs. So now you have to look out for "funny" questions that mix up what you *saw* in the *puppet show* and what you *heard* in the *storybook* about bees.

Implicit SMT condition. The implicit group received SMT but, in contrast to the explicit condition, the training was not explicitly linked to the sources (i.e., children were asked about what they saw and heard but these sensory modalities were not linked to the puppet show and story, respectively). Children were trained with the use of a puppet show and a story. Following the events the experimenter told the children:

I'm having a little trouble remembering what we *heard* about a frog and what we *saw* about a frog. This always happens and I hate that. Why don't you show me that you can remember what you *heard* about the frog and what you *saw* with the frog.

As in the explicit SMT condition, children were exposed to 10 three-part trials of questions (see Appendix D for an example). The experimenter asked a recognition question, followed by a source question (i.e., "Did you just *hear* that Frankie ate a fly with his tongue or did you really *see* the fly?"). As with explicit SMT training, children were asked check questions (e.g., "Did you *hear* that Frankie ate a fly with his tongue?"). Although questions were quite similar to those in the explicit condition, they did not mention source, thus omitting where

a particular event occurred (i.e. in the puppet show or the story). Feedback was similar to the explicit SMT Condition however did not mention sources (See Appendix C for script).

Following training, the children were reoriented to the lesson learned a few days prior about bees. A transition statement was given that reviewed the preceding activity but did not explicitly mention the relevance of the training to the upcoming task. The statement did, however, include the same positive reinforcement as the statement in the explicit SMT condition.

> You did a great job with those questions! Some questions were really hard but you could answer them! You were smart! Now let's talk about what happened when [name] visited you. I understand that you learned about bees. Do you remember learning about bees? Good. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart.

Memory-Control Condition. Children in this group were exposed to the same puppet show, story, yes-no recognition questions, and feedback for the recognition questions as in the other SMT conditions. Children were not asked source questions nor were they asked misleading and non-misleading source questions as in the other conditions. Thus, they were not exposed to feedback regarding source information nor to source questions. Following the events the experimenter told the children:

> I'm having a little trouble remembering what happened with the frog. This always happens and I hate that. Why don't you show me that you can remember what happened with the frog.

Children in this condition were trained to remember the content of the events without any rehearsal of source information. They were also provided training in recognizing "funny"

questions, however, these questions did not mislead children about source; rather, they mislead children about items that did not occur in either event. For example, children were asked "Did a snake chase Frankie the Frog ?" This question is thus similar in form to the question asked in the other SMT conditions, however it does not mention source (See Appendix D).

Following training, the same transition statement as in the implicit SMT condition was used. The experimenter told the children, "You did a great job with those questions! Some questions were really hard but you could answer them! You were smart!"

> Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart.

Target Event Interview. This part of the interview was identical for children in all three conditions. Participants were asked about 24 details from the bee puppet show and the bee story. Half of the details were probed with yes-no recognition questions (i.e. "Was it Benny's birthday?") and the rest with open-ended questions (i.e. "The wind blew Benny onto a rock. What was the name of the ladybug that lived under the rock?"). The yes-no questions were similar to those in the training. Correct answers to the yes/no recognition questions were followed by yes-no source questions, half of which were misleading regarding the target event (e.g. "Was it Benny's birthday in the puppet show?" when Benny's birthday was in the story). The other target-event questions were open-ended, probed about true central features of the events, and half were misleading and half were not. The misleading open-ended questions presupposed that a detail that occurred in one event (e.g., the puppet show) occurred in the alternate event (e.g., the story). An example of a misleading question is: "How did Benny clean

his eyes with the leaves?" Here the first part of the question is non-misleading because it refers to an item that occurred in the puppet show (bee cleaning his eyes) however, it becomes misleading when it refers to an item that occurs in the story (picking up leaves). The other half of the open-ended questions were non-misleading and probed children regarding central details regarding the individual events. Both the yes-no and open-ended questions were counterbalanced such that each set of items (similar items occurring in alternate events) were probed equally often using a yes-no, open-ended, misleading, or non-misleading question. Further, questions regarding puppet show and story details were counterbalanced such that items occurring in each event were probed equally often. The order of questions was also randomized within each question type (See Appendix D for script).

Coding. Children's responses were coded as correct, incorrect, don't know, other , or not asked for all question types. A response was coded as *other* if a child responded in a manner that did not answer the question, and was coded as not asked if a question was overlooked by an experimenter for some reason. Further, a response to a follow-up source question was coded as not asked if a child responded "no" to a recognition question, by which it followed that the source question would not be asked. With regards to the misleading open-ended questions, a response was coded as *correct* if children rejected the false suggestion presented in the question. An *incorrect* response consisted of a failure to reject the false suggestion. Inter-rater reliability was 95%. Raters were blind to condition when coding target interviews.

Following the interview children were thanked for their participation and escorted back to their regular classroom. At the end of the study, children were given a gift bag containing a small toy as a sign of gratitude for their cooperation, and parents were provided with feedback on the study results.

In summary, the differences between the SMT conditions were quite clear. They consisted of a specific introduction of sources prior to presentation (i.e., puppet show and storybook) and mention of sources throughout training (e.g., during questioning and feedback), a review of training and reminder to continue utilizing the strategy during the target interview, as well as a definition of what a misleading question is for children in the explicit condition. Children in the implicit condition received a general mention of sources (i.e., see and hear), no review of training or reminder to continue utilizing the strategy in the target task, as well as no definition of a misleading question. The control condition received object recognition training (for a full comparison see Appendix B).

Results

Training Task

As a manipulation check, the rate at which children produced correct responses was assessed by counting the average number of accurate responses to the recognition, source, and check questions. Averages were collected for both misleading and non-misleading questions and compared across conditions.

For recognition questions, the mean number of correct responses for all 10 questions were compared across conditions. The number of accurate responses to the 10 recognition questions were entered into a 3 (Condition: Explicit SMT vs. Implicit SMT vs. Memory Control) analysis of variance (ANOVA). Results indicated a main effect of condition, F (2, 34) = .016, p < .05. Multiple comparisons indicated that children in the explicit SMT group (M= 8.50, SD =1.17), as well as children in the implicit SMT group (M = 8.33, SD = 2.06), were more accurate in responding to the training recognition questions than were children in the memory control group (M = 6.62, SD = 1.81).

The number of accurate responses to the 10 source questions were entered into a 2 (Condition: Explicit SMT vs. Implicit SMT) analysis of variance (ANOVA). Children in the explicit SMT group and the implicit SMT group, respectively, produced an average of 5.67 (*SD* = 2.02) and 5.33 (*SD* = 1.60), correct questions. Thus, there was no difference in the accuracy of responses to the source questions, $F(1, 22) = .200, p > .05$.

Lastly, the averages for the "check" questions were calculated separately for both non-misleading and misleading questions, thus yielding an average out of 5 questions for each type of question, rather than 10. The number of accurate responses to the check questions were entered into 3 (Condition: Explicit SMT vs. Implicit SMT vs. Memory Control) X 2 (Question Type: Non-Misleading vs. Misleading) analysis of variance (ANOVA). For the non-misleading questions, children in the explicit SMT group and the implicit SMT group, respectively, produced an average of 4.25 (*SD* = .87) and 4.42 (*SD* = 1.00) correct responses. This indicates that children were fully trained on this question type. With regards to the misleading questions, children in the explicit SMT group and the implicit SMT group, respectively, produced an average of 1.17 (*SD* = 1.19) and 1.50 (*SD* =1.78) correct responses, indicating poor performance and lack of training on this question type. There were no differences between the groups, $F(2, 34) = 1.42, p > .05$.

Thus, children performed quite well on the recognition questions, however performed at chance on the source questions. With regards to the "check" questions, children did quite well when asked non-misleading questions, but poorly when asked misleading questions, indicating the need for more training.

Target Yes-No Questions

Recognition of target events. Children's ability to recognize the target events was examined to ensure that any differences in children's source monitoring can not be attributed to group differences between memories of the individual items. Percentages were calculated by dividing the number of correct responses to the recognition questions by the total number of recognition questions asked (possible 12). The percentage of accurate responses to the 12 recognition questions were entered into a 3 (Condition: Explicit SMT vs. Implicit SMT vs. Memory Control) analysis of variance (ANOVA). Results indicated no difference between the explicit ($M = 77.63$, $SD = 17.98$), implicit ($M = 75.00$, $SD = 27.75$), and memory control ($M = 77.43$, $SD = 21.26$) groups on recognition of target events, $F\ (2, 34) = .051$, $p > .05$. Thus, the groups did not differ on recognition of the target items. Incorrect responses were not analyzed however no differences seem to be apparent between the explicit ($M = 13.88$, $SD = 17.95$), implicit ($M = 21.52$, $SD = 29.84$), and memory control groups ($M = 21.15$, $SD = 20.06$) with children producing few incorrect responses to recognition questions (see table 3, 4, 5 for means).

Performance on follow-up source questions. Children's performance on misleading and non-misleading follow-up source questions were analyzed by entering the percentages of correct responses into a 3 (Condition: Explicit vs. Implicit SMT vs. Memory Control) x 2 (Question type: non-misleading vs. misleading) repeated-measures ANOVA, with question type as a within subject variable. Percentages were calculated by dividing the number of correct responses to non-misleading questions (possible 6) by the total number of non-misleading questions asked (i.e., 6) (see table 3 and 5 for means). Responses to the misleading questions were calculated in the same way. There was a significant main effect of question type, $F\ (2, 34) = 13.27$, $p < .01$. The means indicated that children responded more accurately to non-misleading follow-up

source questions ($M = 68.73$, $SD = 35.10$) as compared to misleading follow-up source questions ($M = 32.07$, $SD = 36.24$). There was no main effect of condition, $F(2, 34) = .772$, $p > .05$, however, the means showed that children in the explicit condition ($M = 84.72$, $SD = 18.06$) scored higher than children in the control condition ($M = 52.30$, $SD = 38.78$) and a planned comparison revealed that this was a significant difference, $t(23) = 2.64$, $p < .05$. The children in the implicit condition were 70.55% accurate ($SD = 38.26$). There were no significant differences between this group and the explicit group, $t(22) = 1.16$, $p > .05$, nor were there differences between the implicit and the control group, $t(23) = 1.18$, $p > .05$.

Means for the inaccurate responses to non-misleading source questions, although not analyzed, seem to indicate a group difference between both the explicit ($M = 11.11$, $SD = 12.97$) and implicit ($M = 13.88$, $SD = 17.16$) groups and the memory control group ($M = 33.33$, $SD = 29.65$). It appears that the memory control group has produced a larger amount of incorrect responses in comparison to the SMT groups. There did not appear to be any group differences for incorrect responses to misleading source follow-up questions (for results see table 5). Lastly, there appear to be differences amongst incorrect responses for misleading and non-misleading questions. It appears that all children tended to respond more incorrectly to misleading follow-up source questions as compared to the non-misleading questions (see table 5).

Target Open-Ended Questions

Performance on open-ended misleading and non-misleading questions. Children's responses to misleading and non-misleading open-ended questions were coded as correct, incorrect, don't know (36% of children's responses to misleading and non-misleading questions consisted of 'don't know'), other (i.e. speaking off topic, only 3% of all children's responses consisted of 'other') or not asked (should an interviewer overlook a question, this occurred for

less than 1% of all responses). A repeated measures analysis was not utilized for this analysis as none of the children produced correct responses to all the misleading questions. Thus, responses to the non-misleading and misleading questions could not be statistically compared, though it is clear that the misleading ($M = 0.00$, $SD = 0.00$) questions were more difficult than the non-misleading questions ($M = 15.32$, $SD = 18.16$). Hence, percentages were only calculated for accurate non-misleading questions by dividing the number of correct responses (possible 6) by the total number of non-misleading (possible 6) questions. The percentages of correct responses to open-ended non-misleading questions were entered into a 3 (Condition: Explicit SMT vs. Implicit SMT vs. Memory Control) one way ANOVA. There was no main effect of condition, $F(2, 34) = .06$, $p > .05$ (see table 3 and 5 for means).

Incorrect responses were not analyzed however there appear to be group differences for responses to misleading open-ended questions between the explicit ($M = 61.11$, $SD = 28.72$), the implicit ($M = 41.67$, $SD = 28.87$) and the memory control group ($M = 74.36$, $SD = 26.89$). The means indicate a greater number of incorrect responses to misleading open-ended questions by the control group in comparison to the training groups. Further, it appears that the explicit group produced a larger amount of inaccurate responses to this question type in comparison to the implicit group. No group differences appear to be present for non-misleading questions. Lastly, it appears that the explicit and the memory control groups were more likely to respond inaccurately to misleading open-ended questions in comparison to non-misleading open-ended questions. No differences for the implicit group seem apparent (for results see table 5.)

Due to the large number of children answering 'I don't know' to open-ended questions, analyses were performed on these responses. The percentage of 'I don't know' responses to the non-misleading questions were calculated by dividing the total number of 'don't know'

responses by the total number of possible responses for non-misleading (possible 6) (see table 4 for means). Percentages for the 6 misleading questions were calculated in an identical fashion. The percentage of 'I don't know' responses were entered into a 3 (Condition: Explicit SMT vs. Implicit SMT vs. Memory Control) x 2 (Question type: non-misleading vs. misleading) repeated measures ANOVA, with question type as a within-subject variable. Results indicated a main effect of condition, F (2, 34) = 3.33, $p < .05$. Tukey's LSD test indicated that children in the implicit SMT group (M = 47.22, SD = 26.91) were more likely to respond 'I don't know' to open-ended questions than were children in the memory control group (M = 22.43, SD = 19.36), p= .016. Children in the explicit SMT group responded "I don't know" to 38.19 % of the questions (SD = 26.46).

Summary. Contrary to the first hypothesis stating that children in the explicit condition would respond more accurately to misleading questions, children in the explicit SMT group were not more likely to respond accurately to misleading follow-up source questions as compared to the other two groups. However, a planned comparison revealed that children in the explicit group responded more accurately to non-misleading questions as compared to children in the control group, thus partially confirming the hypothesis of a superior performance on this question type. Contrary to the second hypothesis stating that children in the explicit group would perform more accurately to follow-up source questions as compared to the implicit group who in turn were expected to perform more accurately than the control group, the explicit SMT group did not respond more accurately to follow-up source questions in comparison to the implicit SMT group. In turn, there were no significant differences in accurate responses between the implicit and the control group. In accordance with the third hypothesis, all children had difficulty with open-ended questions, with no children producing accurate responses to misleading questions and few

children responding accurately to non-misleading questions. Contrary to the fourth hypothesis, speculating that children in the explicit condition would perform more accurately to open-ended questions than any other group, children in the explicit condition did not perform at a superior level in comparison to the other conditions when responding to open-ended questions. Responses to the open-ended questions were mostly inaccurate and there were a high proportion of 'I don't know' responses. However, planned comparisons revealed that children in the SMT conditions responded 'I don't know' more than did children in the Control group, with significant differences between the implicit and control groups.

Discussion

In the present study, two groups of 3- to 4-year-old children were trained to monitor information from live and heard events (i.e. puppet show and story). The purpose of this study was to compare two source-monitoring training methods, one that is explicit in nature and one that is implicit in nature. The *explicit* group was trained with a high degree of specificity (i.e., review of the strategy learned, specific instruction on when to utilize the strategy; attention brought to specific sources, etc) and the *implicit* group was trained with a comparatively lesser degree of specificity (no review of strategy learned, no instruction on when to utilize the strategy; no mention of actual sources but rather of the medium, etc). In addition, a control group was trained to recognize the occurrence of particular items within the events, but was not trained to make source distinctions. When asked to monitor sources of information from a different set of live and heard events viewed 3 to 4 days prior to training (target events), children in the trained groups were not able to transfer the trained strategy to the target events. This was demonstrated by a lack of ability to recognize and correct source misattributions, hence partially

refuting hypothesis one. Although main analyses did not show significant group differences, a planned contrast revealed that children in the explicit group were more accurate at remembering where they had learned information as compared to children in the control group. This was demonstrated by their superior performance with regards to correct source attributions, thus partially supporting hypothesis one. There were no differences between the explicit and the implicit groups, nor were there differences between the implicit or the control group, hence refuting the second hypothesis. In accordance with the third hypothesis, children showed some difficulty on open-ended source questions. Further, children in the explicit group did not produce a greater number of accurate responses, thus contradicting the fourth hypothesis. Hence, there were no benefits of training for all three groups for this question type. This was further demonstrated by the large 'I don't know' response rate. Hence, with the exception of a superior performance for the explicit group in comparison to the control group with regards to correct (non-misleading) source attributions, there was little evidence supporting the notion of benefits of training.

Although non-significant, the trend observed amongst the groups with regards to performance on follow-up source questions is quite interesting. Despite the lack of significance, the means displayed a pattern in accordance with the hypotheses. Interesting differences were observed between the SMT group means and the control group means. For instance the explicit group exhibited a superior performance with regards to non-misleading yes-no source questions in comparison to the implicit group who in turn exhibited a superior performance to the control children. In addition, planned comparisons revealed a superior group performance for the explicit group in comparison to the control group, demonstrating, to some degree, the effectiveness of this method. It is also interesting to note the large variability in responses within both the implicit

and control group as indicated by large standard deviations, compared to a smaller standard deviation in the explicit group. One could speculate that a training method with less specific instruction or lack thereof, produced erratic responses demonstrating a lack of efficiency of a general training method. On the contrary, the explicit group exhibited a comparatively lower variability in responses, with a standard deviation roughly 50% smaller than that of the other two groups, indicating consistency in performance amongst the children in this group. As children were performing relatively well, one can not entirely conclude that the explicit source-monitoring training method did not decrease 3- and 4–year-olds' suggestibility more effectively than that of the implicit method. Hence, there is some evidence that explicit source-monitoring training was effective to a certain degree. Although it may very well be possible that individual differences in source-monitoring ability amongst the children in this group are responsible for non-significant results. However it would be highly coincidental that children of high proficiency in source monitoring ability would all be assigned to the explicit group. There are several possible explanations for a lack of significant effects, some of which are discussed below.

Source Monitoring

The lack of strong effects of training observed may be due to children's difficulty with source monitoring. Previous research examining source monitoring has demonstrated a difficulty amongst preschool children to spontaneously engage in this strategy (i.e., Lindsay et al., 1991). The results of this study concur with those of Leichtman, Morse, Dixon, and Spiegel (2000). The authors (2000) engaged 3- and 4-year-old children in a source-monitoring task involving three sources. Children in a source-reinforcement condition were told where they learned information and were required to repeat it. This group was compared to children in a control condition who were merely told about descriptive, non-source information. Results indicated no differences

amongst the groups, indicating a lack of ability to decrease suggestibility. The results of this study also concur with that of Poole and Lindsay's (1995; 2001; 2002) previous attempts at training children on source-monitoring tasks. Recall that children below 7-years of age were unable to transfer the source-monitoring strategy taught to them minutes before the target task. It is important to note that Thierry and Spence (2002) produced one of the only studies demonstrating success in training such a young age group with regards to source monitoring. Recall, their first attempt was unsuccessful, with no differences found between 3- to 4- and 5- to 6-year-olds. Further, the attempt to replicate the authors (2002) results using a similar procedure was unsuccessful.

Strategy Utilization

Preschoolers are less likely to identify source-misattributions as compared to any other age group (Poole & Lindsay, 1995; Poole & Lindsay, 2002). Perhaps this difficulty with source-monitoring is what contributed to children's ineptitude to monitor a set of two events, despite training. Recall that source-monitoring theory states that source is attributed at the time of recall through an examination of one's thoughts or through reasoning (Johnson et al., 1993). This would imply that strategy utilization is heavily needed when engaging in source-monitoring, hence the presence of source-monitoring training methods. As previously mentioned, this theory posits that children have the greatest difficulty utilizing this strategy, especially at the ages of 3- to 4-years. The results of this study demonstrate and provide support for the notion that young children have difficulty engaging in strategy use as well as provide further evidence for source-monitoring theory demonstrating a lack of ability amongst young children. Even with the provision of training a difficulty to engage in this strategy can be observed. Some would argue that the results provide support for fuzzy trace theory, which states that source is encoded and

simply not remembered due to the weakening of verbatim (contextual) traces, as children in this case were not able to remember source. However the presence of patterns in the means as well as the results from the planned comparisons, would lead us to believe that there is some evidence to refute this theory. It can be seen that children in the explicit condition are attaining correct response rates of over eighty percent for follow-up source questions as compared to children in the control condition who are attaining chance-level accuracy. This clearly demonstrates to some degree the efficacy of specific source monitoring training as well as an ability for children to monitor the sources of their memory. Mean differences, although non-significant in the main analyses, indicate the presence of source attributions at recall as training served to improve source-memory through the use of source-attribution instruction. Further, it is possible that perhaps children did learn to source monitor, however did not realize its usefulness in identifying misleading questions.

Methodological Differences

A possible reason for the lack of training benefits amongst children could be that of methodological differences between this training procedure and that of previous studies. Strategy-training research has produced mixed findings. Contrary to this study's results, much research has generated support for the presence of an ability in children to benefit from strategy training. For instance, in a strategy-training study, Stevens (1988) taught remedial elementary school children to identify main ideas within paragraphs. Significant improvements were found with in children who received training, demonstrating strategy-training effectiveness. Other studies have confirmed these results (Carr & Schneider, 1991), including studies regarding training methods designed to improve children's ability to monitor cognitive abilities (Brown, Campione, & Day, 1981). However, it must be noted that these studies included the provision of

demonstration, one element admittedly overlooked in this study. In fact favourable results have been observed when a particular strategy has been executed for children prior to training and target performance task (Miller & Aloise-Young, 1995). Many others have suggested demonstration as a substantive component of training (i.e. Lange & Pierce, 1992). Perhaps this may account for differences between the results of this study and those of the studies mentioned above. Hence it is possible that the lack of transfer to misleading questions in this study could be attributed to the fact that this particular method was not explicit enough for such a young age group. For instance, the decision to eliminate additional meta-cognitive measures from Thierry's original method (i.e. asking children to state why a question is a trick) may have taken away from the explicit nature of the training. However, pilot testing revealed a lack of concentration and the presence of fatigue amongst children due to the use of this longer procedure, hence the decision to eliminate it. Additionally, it should be mentioned that much of the strategy literature mentioned here provides evidence showing an ability in children to utilize a cognitive strategy subsequent to training, however it should be noted that some of these strategies did not substantially improve recall (Lange & Pierce, 1992). The speculation that methodological differences came into play here is possible, however there needs to be further evidence to support the notion that source-monitoring strategies can be taught to preschool children in order to support this notion.

Production or Utilization Deficiency?

Recently, some researchers have explored developmental differences in strategic capabilities and have demonstrated great discrepancies amongst children' strategy use. It appears that transfer of training is difficult to obtain with such a young age group (e.g. Poole & Lindsay, 2001; 2002). This may explain children's lack of ability to produce the trained strategy on the

target task, as children in this study were in fact quite young in comparison to other studies (3.5 years vs. 4.5 years) (e.g. Thierry and Spence, 2002). Some have suggested that children's inability to utilize this or other cognitive strategies may be due to preschoolers' general inability to spontaneously employ a strategy in a cognitive task (i.e. production deficiency) (for a complete review see Bjorklund, Miller, Coyle, & Slawinski, 1997). However, some research suggests that young children are quite capable of utilizing a strategy, but rather gain little or no benefits on task performance (Miller, 1990). For instance, Bjorklund, Coyle, and Gaultney (1992) exposed children to five free-recall tasks utilizing lists containing different categories in order to observe differences in strategy use. Although strategy use was observed amongst preschoolers, increased performance did not occur. In other instances, there has been evidence of increases in performance on recall post-tasks subsequent to strategy training, however an observed decline in memory performance over time was noted (e.g. Lange & Pierce, 1992). Hence children's inability to transfer training with regards to misleading questions and thus benefit from an effective strategy on the target task in this study may indeed have been due to the presence of a utilization deficiency.

On the contrary, some explanations suggest that perhaps a utilization deficiency may not have been responsible for the results. It is quite possible that preschool children are simply not able to retain a complex strategy such as the one trained in this study. Perhaps the strategy required for the task was simply too difficult for children to execute. In a study involving organizational strategies, Bjorklund et al., (1992) noticed that preschoolers did not appear to utilize a learned strategy. The authors speculated that perhaps this may not have been due to a utilization deficiency, but rather due to the complexity of the task requiring mental effort exceeding cognitive capabilities. Perhaps this is what occurred in this study, however the trend

observed with regards to non-misleading follow-up source questions provides some evidence to the contrary. It appears that children in this study perhaps made an effort to perform, however it is possible that they were not trained enough for their capability levels, as evidenced by a lack of poor performance on the training task. Further, this is supported by the apparent lack of group effects on the target tasks in which no differences were found with regards to misleading questions. It is suggested that training be as specific and as thorough as possible (Pressley, 1989a). Recall that the training method presented in this study was less rigorous in comparison to Thierry and Spence (2002). Perhaps this is what is responsible for the absence of training effects with regards to source misattributions as opposed to the lack of ability to learn a strategy. Perhaps a more thorough training method is needed in order to observe some effects with regards to misleading questions.

Dissimilarities with Thierry and Spence

Several candidate explanations for the dissimilarity between the Thierry and Spence study and this study are plausible. Sample differences may have been accountable for discrepancies in the results. Thierry and Spence's (2002) sample consisted of thirty-six children placed in one of two conditions of which roughly included eighteen children. This study consisted of the same number of children; however, they were spread out across three conditions, thus rendering the between cell count lower. Perhaps with a larger number of children in each condition we could have achieved significant results. Power calculations were performed for each question format in order to reveal the study's likelihood of detecting meaningful significant differences with the present sample. Calculations demonstrated a lack of power for open-ended questions with regards to condition, where a power of .25 was observed, however question type revealed a power of .89, indicating a sufficient amount of participants for this within subject

variable. The ideal power for detecting a meaningful difference is .80 (or 80 percent) and largely depends on sample size. Hence it can speculate that this study may have benefited from a slightly larger number of participants in order to attain a significant difference between conditions on this variable. On the contrary, source follow-up questions yielded a power of .79 with regards to condition and a power of .99 with regards to question type. These power figures are in accordance with the results of the analyses as significant differences for question type and a significant trend for condition are observed in the planned comparisons. Perhaps if the sample had been larger, a significant difference would have been observed in the main analyses as well.

Other disparities between samples include developmental differences, with children in this study being much younger in age. The mean age for Thierry's and Spence's (2002) sample was 4.5 years (range = 3 years 2 months to 4 years 11 months). To the contrary, the mean age of this sample was 3.5 years (range = 3 years to 4 years 11 months), with many young 3- to 4- year-olds, thus indicating a mean discrepancy of one year between our samples. This age difference could have impacted on the results in that developmental differences in source-monitoring ability may have come into play. Research suggests a marked developmental change in this ability occurring at approximately 5 years of age. Source monitoring studies show that source monitoring ability improves slightly at roughly five to six years, with children of this age experiencing less difficulty with source-monitoring tasks in comparison to 3- to 4-year-olds (Gopnik & Graf, 1988). A series of studies by Whitcombe and Robinson (2000), in which children were exposed to either single or dual-source conditions in comparison to control groups, confirmed this account. In this study 3- to 4-year-olds (3.5 years- 4.4 years) experienced more difficulty in responding to source questions in comparison to 4- to 5-year-olds (4.5 years to 5.5 years). Interestingly, children in the older age group ranged from months to a year older than the

children in the younger age group and yet performed at superior levels when responding to source questions. Other studies confirm these results (i.e. Leichtman, Morse, Dixon, & Spiegel, 2000). In addition, 5- and 6-year-old children have been shown to accept less false information in comparison to 3- and 4-year-old children, indicating superiority in monitoring false suggestions from accurate information (Ceci & Crotteau-Huffman, 1997). In light of this evidence, it is possible that Thierry's and Spence's (2002) training method was successful due to attaining an older sample. However, Poole and Linsday (1995; 2001; 2002) also had older samples of 3-to 4-year-olds in their previous studies, (i.e. 4.3 years in their first study and a larger number of four year olds in their second study), yet did not observe training effects in this age group. Differences could easily be attributed to other factors previously discussed in this paper (i.e. general instructions, different training and target tasks, etc.).

Meta-cognition

The present findings are also relevant to meta-cognitive literature. There is some discussion that strategy use and memory performance may simply be meta-cognitive rather than related to training. That is the mere fact that children are told to reflect upon the importance of a strategy and the benefit they will gain from it, will cause them to utilize the strategy successfully (Alexander & Schwanenflugel, 1994).This may in part explain why results contrary to the hypotheses were obtained. Recall that the additional meta-cognitive instructions seen in Thierry and Spence (2002) were omitted to avoid fatigue due to an excessively lengthy training process. Some may argue that this is why children in the explicit condition did not succeed in comparison to Thierry and Spence's (2002) source-monitoring condition. Although less excessive, children in this study were given meta-cognitive feedback that specifically instructed them to reflect upon how and where they knew about certain information. In the explicit condition, children were

specifically instructed to utilize the strategy, especially when encountering misleading information. Although feedback was less lengthy than that of the original study for which the explicit condition was modeled, it is believed that these meta-cognitive instructions were sufficient enough to produce optimal results. Hence, if meta-cognition is the sole responsible agent for strategy use, then why were significant results not obtained in the main analyses? Amongst several explanations there is a possibility that meta-cognitive knowledge is simply weakly related to strategy use. Perhaps feedback or meta-cognitive knowledge is not a necessary corollary for effective transfer. In fact, several studies have provided support for this notion. In a study pertaining to first grade children's ability to react to instructional demands, Salatas and Flavell (1976) instructed children to do anything they could to remember a set of objects, that could be categorized into groups, and compared this group to a control group who received no instruction to attempt to remember the objects. The authors (1976) found that although children in the experimental condition remembered more objects than those in the control condition, there was no relation between categorical strategy use and metamemory. Other researchers have confirmed a lack of relation or weak correlations between metacognition and strategy use (for a review see Pressley, 1989b). Hence the lack of significant results for source-monitoring training may not entirely be due to a lack of meta-cognitive instructions.

Examination of Responses to Open-Ended Questions

While there is some evidence that children can benefit from an explicit source-monitoring training method, it is quite clear that benefit is restricted to similar tasks. In this study there was no effect of transfer to open-ended questions. Children produced a minimal amount of accurate responses to this type of question. This was especially pronounced with regards to misleading questions. Preschoolers were more likely to respond 'I don't know' rather than attempt to

produce accurate responses. Specifically the means indicated that children in the implicit group were more likely to respond 'I don't know' than any other group, especially the control group. This result is quite interesting and one can speculate that perhaps training may have influenced children's tendency to avoid inaccurate responses. This result is not surprising as research has demonstrated that the utilization of similar training and target tasks produces optimal performance amongst children (e.g. Thierry & Spence, 2002). It is thus not astonishing that children in this study would have difficulty transferring their knowledge to open-ended questions as this task is highly dissimilar. It is quite possible that children in the SMT conditions realized that the misleading questions were in fact erroneous however training simply did not help them to understand specifically why. Perhaps, training served to make children more vigilant or cautious but did not help them in knowing what to do better. The latter speculation could highly be plausible due to the fact that the children in the explicit group were more likely, although not significantly, to respond 'I don't know' in comparison to children in the memory control group. While training decreased the number of inaccurate responses, it also served to decrease the number of accurate responses as well; this can lead to little or no information. Whether this is beneficial or not is definitely debatable.

Another explanation for lack of transfer of source monitoring training to open-ended questions might be the presence of differential demand characteristics. Recall that the follow-up source questions merely tagged a correct or incorrect source to a recognition question, whereas the open-ended questions either asked about an occurrence within an event or misled that an item in one event occurred in the other event (e.g. "The wind blew Benny onto a rock. What was the name of the ladybug that lived under the rock?" Here Benny was blown onto a rock in say the puppet show, however the lady bug was present in the story). The child was either expected to

respond with the correct answer in the case of a non-misleading question or point out the discrepancy in the case of a misleading question. It should be noted that both non-misleading and misleading open-ended questions required more mental effort than a non-misleading or misleading yes-no question as the latter is much less demanding due to previous training and the lack of need for complex recall. These results with regards to open-ended questions are also in agreement with the results in Thierry and Spence (2002) in which children did not transfer training to misleading open-ended questions. Additionally, these results further provide support for the lack of training effects in Poole and Lindsay's (2002) study, demonstrating that a general training approach will most likely not transfer to a dissimilar task in children this young.

The lack of correct responses to open-ended questions may also be due to social-demand characteristics where children, unsure of the correct response, simply opted to not respond to open-ended questions. It is interesting that children actually produced correct responses to non-misleading questions. Although only a small percentage (15%) of children responded accurately it is quite interesting to see that children were more likely to respond, if at all, to non-misleading questions, thus demonstrating an ability to recognize items. Additionally, children's recognition ability is also demonstrated in their responses to recognition questions, where means for correct responses were quite high, ranging in the mid to upper seventies. Thus it can be speculated that difficulties in responding to open-ended questions were most likely not related to inabilities in recognition, but rather to other grounds. The notion that social-demand characteristics came into play would after all be concordant with previous literature (for a review see Ceci & Bruck, 1993).

Dual-Representation

Results of this study are also applicable to the dual-representation literature. Recall that dual-representation is the ability to understand that the same entity can be represented in different ways. This ability develops between the ages of 3 and 5 years. However, 3-year-olds in particular appear to have great difficulty in understanding this concept (Gopnik & Astington, 1988). It appears that children this age do not seem to understand that the same object may possess several representations (DeLoache & Burns, 1994). Considering that the mean age of the children in this study was three and a half years, it is highly possible that children simply could not comprehend the training due to a lack of dual-representation comprehension. It is highly important that children grasp this concept in order to complete a source-monitoring task as it requires that one have two representations of a similar event (i.e. puppet show and story). If children do not understand this, then it is highly likely that they will confuse both events. Recall that the mean age of children in Thierry and Spence (2002) was four and a half years. Perhaps the children in their sample already possessed the ability to comprehend dual-representations and thus were more receptive to the training and thus more likely to apply it in a new task. This comparatively increased ability in knowledge of dual-representations may have increased the likelihood of accurate responses. Other evidence to support this notion is the fact that children in this study were more accurate when responding to non-misleading follow-up source questions as compared to misleading follow-up source questions. This would not necessarily require knowledge of dual-representations as children are "faced with non-conflicting representations about the sources of the events" (Thierry & Spence, 2002).

Implications

The findings of this research are in accordance with various studies demonstrating the difficulty amongst young preschoolers with source-monitoring tasks (Drummey & Newcombe, 2002; Gopnik & Graf; Roberts, 2002) as well as a difficulty in reducing suggestibility with the use of training (i.e. Poole & Lindsay, 1995; 2001; 2002). The examination of both the explicit and implicit method allowed for clear and direct comparison of two current source-monitoring training methods present in the literature. Although results differed from Thierry and Spence's (2002) findings, this study has nonetheless provided valuable implications for source-monitoring literature, providing confirmation of preschoolers' difficulty with source monitoring and thus highlighted a need for further exploration with this age group. This study has also shed light on the extent of the strategic deficiency present within this age group which may entice further research with 3-to 4-year-old children, as research is somewhat scarce. Further, findings of this research have implications for child-witness interview procedures. Even though the study's results are not in accordance with Thierry and Spence (2002) similar trends have been noted. Recall that the means of the three groups were in accordance with the hypotheses, with the explicit source monitoring training group responding more accurately to follow-up source questions as compared to the other training and control groups. Hence, there is some support for the notion that source-monitoring training could be implemented in interview protocols as the results of this study indicate support for the possible effectiveness and usefulness of training methods.

Although results with regards to follow-up source questions veered in the direction of an effective method (explicit), it must be kept in mind that significant differences were few and thus a need for a refinement of this training method is needed prior to implementing source-

monitoring training methods during interviews with child witnesses. Further, in actual cases of sexual abuse, children are often interviewed months or years following the incident. Future research should perhaps investigate this comparison between an explicit and an implicit method with longer delays in order to investigate if the significant results found with planned comparisons would occur. Another threat to ecological validity is the fact that in most cases the contaminating source may not be known. Thus implementing this training method in actual interview protocols may not be feasible. Another possible explanation as to why results did not confirm hypotheses may be due to the fact that the events were simply not salient enough for children. This is most certainly a problem faced in all studies pertaining to suggestibility or source monitoring training. However, due to ethical dilemmas it is not possible to mimic real cases of sexual abuse. Perhaps future studies could include more personally relevant events, within ethical bounds of course (i.e. performing actions/imagining).

Another possible weakness of this study was perhaps the level of complexity of the training methods. As discussed above, children may simply not have learned the strategy due to cognitive overload. It is also quite possible that children were simply too exhausted to perform optimally on target questions due to mental exhaustion (Pressley, 1989b). It is the seeming presence of fatigue that called for the elimination of criterion-based training, the presence of a requirement of a number of responses to be answered correctly in order for said training to be achieved. This is yet another plausible rationalization for differing results as previous research has demonstrated higher rates of success with criterion based training (Thierry & Spence, 2002). The possibility is not ruled out that children may have acquired the strategy but simply lacked the motivation to utilize it due to a belief that they may not achieve the task due to its complexity (Pressley, 1989b).

Future research should attempt to devise more developmentally appropriate methods for preschool children that are shorter in length and thus allow for criterion-based training. Additionally, it would be interesting to develop methods geared at training children on open-ended questions. It is clear from the results that training on yes/no source questions does not transfer to a different question type. It would be quite beneficial to devise these training methods as research shows that children perform more accurately on open-ended questions (Gordon, Jens, Shaddock, & Watson, 1991). Lastly, future research should replicate this study with slight modifications including the use of demonstration, larger sample sizes, and perhaps the use of additional sources. As can be observed there are several candidate explanations for the lack of significant results in the present study. It is quite evident that more research needs to be conducted in order to determine if these explanations are truly valid.

References

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

Alexander, J.M., & Schwanenflugel, P.J. (1994). Strategy regulation: The role of intelligence, metacognitive attributions, and knowledge base. *Developmental Psychology, 30,* 709-723.

Bigler, R.S., & Liben, L.S. (1992). Cognitive mechanisms in children's gender stereotyping: Theoretical and educational implications of a cognitive-based intervention. *Child Development, 63,* 1351-1363.

Bjorklund, D.F., Coyle, T.R., & Gaultney, J.F. (1992). Developmental differences in the acquisition and maintenance of an organizational strategy: Evidence for the utilization deficiency hypothesis. *Journal of Experimental Child Psychology, 54,* 434-438.

Bjorklund, D.F., Miller, P.H., Coyle, T.R., & Slawinski, J.L. (1997). Instructing children to use memory strategies: Evidence of utilization deficiencies in memory training strategies. *Developmental Review,17,* 411-441.

Brainerd, C. J., & Reyna, V. F. (2002). Fuzzy-trace theory and false memory. *Current Directions in Psychological Science, 11,* 164-169.

Brown, A.L., Campione, J.C., & Day, J.D. (1981). Learning to learn: On training students to learn from texts. *Educational Researcher, 10,* 14-21.

Carr, M., & Schneider, W. (1991). Long-term maintenance of organizational strategies in kindergarten children. *Contemporary Educational Psychology, 16,* 61-75.

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

Ceci, S.J., & Crotteau-Huffman, M.L. (1997). How suggestible are preschool children? Cognitive and social factors. *Journal of the American Academy of Child & Adolescent Psychiatry, 36,* 948-958.

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 Clinical and Experimental Hypnosis, 42,* 304-320.

Cole, C.B. & Loftus, E.F. (1987). The memory of children. In M.J. Ceci, M.P. Toglia, & D.F. Ross (Eds.), *Children's eyewitness memory* (pp. 178-179). New York: Springer Verlag.

DeLoache, J.S., & Burns, N.M. (1994). Symbolic functioning in preschool children. *Journal of Applied Developmental Psychology. Special Issue: The preschool child: Recent research and its implications for early childhood practice and policy,15,* 513-527.

Drummey, A.B. & Newcombe, N.S. (2002). Developmental changes in source memory. *Developmental Science, 5,* 502-513.

Fletcher, K.L. & Bray, N.W. (1996). External memory strategy use in preschool children. *Merill-PalmerQuarterly, 42,* 379-396.

Foley, M.A., & Johnson, M.K. (1985).Confusions between memories for performed and imagined actions: A developmental comparison. *Child Development, 56,1145-1155.*

Giles, J.W., Gopnik, A., & Heyman, G.D. (2002). Source monitoring reduces the suggestibility of preschool children. *Psychological Science, 13,* 288-291.

Gopnik, A., & Astington, J.W. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. *Child Development, 59,* 26-37.

Gopnik, A., & Graf, P. (1988). Knowing how you know: Young children's ability to identify and remember the sources of their beliefs. *Child Development, 59,* 1366-1371.

Gordon, B.N. Jens, K.G., Shaddock, A.J., & Watson, T.E. (1991). Children's ability to remember activities performed and imagined: Implications for testimony. *Child Psychiatry and Human Development, 21,* 301-314.

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

Lamb, M.E., Hershkowitz, I., Sternberg, K.J., & Esplin, P.W. (1996). Effects of investigative utterance types on Israeli children's responses. *International Journal of Behavioral Development, 19,* 627-637.

Lange, G., & Pierce, S.H. (1992). Memory-strategy learning and maintenance in preschool children. *Developmental Psychology, 28,* 453-462.

Leichtman, M.D., Morse, M.B., Dixon, A., & Spiegel, R. (2000). Source monitoring and suggestibility: An individual differences approach. In K.P. Roberts & M. Blades (Eds.), *Children's source monitoring* (pp. 257-288). New Jersey: Lawrence Erlbaum Associates.

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

Markham, R. (1991). Development of reality monitoring for performed and imagined actions. *Perceptual and Motor Skills, 72,* 1347-1354.

Miller, P.H. (2000). How best to utilize a deficiency. *Child Development, 71,* 1013-1017.

Miller, P.H., & Aloise-Young, P.A. (1995). Preschoolers' strategic behavior and performance on a same-different task. *Journal of Experimental Child Psychology, 60,* 284-303.

Nesbitt, M., & Markham, R. (1999). Improving young children's accuracy of recall for an eyewitness event. *Journal of Applied Developmental Psychology, 20,* 449-459.

O'Neill, D.K., & Gopnik, A. (1991). Young children's ability to identify the sources of their beliefs. *Developmental Psychology, 27,* 390-397.

Parker, J.F. (1995). Age differences in source monitoring of performed and imagined actions on immediate and delayed tests. *Journal of Experimental Child Psychology, 60,* 84-101.

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.

Poole, D.A., & Lindsay, D.S. (2001). Children's eyewitness reports after exposure to misinformation from parents. *Journal of Experimental Psychology: Applied, 7,* 27-50.

Poole, D.A., & Lindsay, D.S. (2002). Reducing child witnesses' false reports of misinformation from parents. *Journal of Experimental Child Psychology,81,* 117-140.

Powell, M.B., Roberts, K.P., Ceci, S.J., & Hembrooke, H. (1999). The effects of repeated experience on children's suggestibility. *Developmental Psychology, 35,* 1462-1477.

Pressley, M. (1989a). Is good strategy use possible? In W. Schneider & M. Pressley, *Memory development between 2 and 20* (pp. 161-194), New York: Springer-Verlag.

Pressley, M. (1989b). Metamemory. In W. Schneider & M. Pressley, *Memory development between 2 and 20* (pp. 161-194), New York: Springer-Verlag.

Roberts, K.P., & Blades, M. (1998). The effects of interacting with events on children's eyewitness memory and source monitoring. *Applied Cognitive Psychology. 12*, 489-503.

Roberts, K.P., & Blades, M. (1999). Children's memory and source monitoring of real-life and televised events. *Journal of Applied Developmental Psychology. Vol 20*, 575-596.

Roberts, K.P. (2002). Children's ability to distinguish between memories from multiple sources: Implications for the quality and accuracy of eyewitness statements. Developmental Review. *Special issue on forensic developmental psychology, 22,* 403-435.

Robinson, E.J. (2000). Belief and disbelief: Children's assessments of the reliability of sources of knowledge about the world. In K.P. Roberts & M. Blades (Eds.), *Children's source monitoring* (pp. 59-83). New Jersey: Lawrence Erlbaum Associates.

Salatas, H., & Flavell, J.H. (1976). Behavioral and metamnemonic indicators of strategic behaviours under remember instructions in first grade. *Child Development, 47,* 81-89.

Stevens, R.J. (1988). Effects of strategy training on the identification of the main idea of expository passages. *Journal of Educational Psychology, 80,* 21-26.

Thierry, K.L., & Spence, M.J. (2002). Source-monitoring training facilitates preschoolers' eyewitness memory performance. *Developmental Psychology, 38,* 428-437.

Thierry, K.L., Spence, M.J., & Memon, A. (2001). Before misinformation is encountered: Source monitoring decreases child witness suggestibility. *Journal of Cognition and Development,2,* 1-26.

Whitcombe, E.L., & Robinson, E.J. (2000). Children's decisions about what to believe and their ability to report the source of their belief. *Cognitive Development, 15,* 329-346.

Wimmer, H., Hogrefe, G.J., & Perner, J. (1988). Children's understanding of informational access as a source of knowledge, *Child Development, 59,* 386-396.

Appendix A: The Target Sources Script

Hi, my name is [name]. I work at a university. Do you know what that is? .... It's a big school. I am working on a project right now where I visit schools and read stories and learn things with children. Would you like to come and learn about bumble bees? You can go back to class at anytime if you don't like it.

Children are either presented with a storybook first, or an educational puppet show about bees (order of presentation is counterbalanced).

Storybook

Let's listen to a storybook about bumblebees. Do you know what bumblebees are? They are little creatures that fly and buzz.

Puppet show

Now we are going to see a puppet show about bumblebees.

At the end of the session

Thank you for learning about bumblebees with me today. I'm going to take you back to your class now.

Appendix B: Table of Comparison Between Conditions

Condition/ Procedure	***Explicit SMT***	***Implicit SMT***	***Memory Control***
Target events	Story and Puppet show about bees	Story and Puppet show about bees	Story and Puppet show about bees
Target source distinction	Hear and See	Hear and See	Hear and See
Training events	Story and Puppet show about frogs	Story and Puppet show about frogs.	Story and Puppet show about frogs
Training	Hear and See source distinction	Hear and See source distinction	Hear and See detail recognition
Source presentation	Explicitly mentions both sources (puppet show and story): "Now we are going to watch some things about frogs in this *puppet show."* *"Now I am* going to tell you some things about frogs using this storybook…."	No advance presentation of two distinct sources: "Now we are going to watch some things about frogs…." "Now I am going to tell you some things about frogs…"	No advance presentation of two distinct sources: "Now we're going to learn about frogs".
Introduction to questions	"I'm having a little trouble remembering what we heard in the story about a frog and what we saw in the puppet show with a frog. This always happens and I hate that. Why don't you show me that you can remember what you heard with the frog in the *story* and what you saw with the frog in the *puppet show.*"	"I'm having a little trouble remembering what we heard about a frog and what we saw about a frog. This always happens and I hate that. Why don't you show me that you can remember what you heard about the frog and what you saw with the frog"	"I'm having a little trouble remembering what happened with the frogs. This always happens and I hate that. Why don't you show me that you can remember what happened with the frogs?" (no mention of sources)
Recognition questions	Yes "Did Frankie the Frog eat a fly with his tongue?"	Yes "Did Frankie the Frog eat a fly with his tongue?"	Yes "Did Frankie the Frog eat a fly with his tongue?"
	Yes(to correct yes response): "That's right.		

Recognition question feedback	Frankie the Frog *did* eat a fly with his tongue. So you were right to say yes." (to incorrect no response): "That's a good guess, but Frankie the Frog *did* eat a fly with his tongue. So you should say yes."	Yes (to correct yes response): "That's right. Frankie the Frog did eat a fly with his tongue. So you were right to say yes" (to incorrect no response): " Frankie the Frog *did* eat a fly with his tongue. So you should say yes."	Yes (to correct yes response): "That's right. Frankie *did* eat a fly with his tongue. So you were right to say yes" (to incorrect no response): "That's a good guess, but Frankie did eat a fly with his tongue."
Source questions	Yes "Did you just hear that Frankie ate a fly in the storybook or did you really see the fly in the puppet show?"	Yes "Did you just hear that Frankie ate a fly or did you really see the fly?"	No
Source question feedback	Yes (to correct response): "That's right. You just heard that Frankie ate a fly *in the storybook*." (to incorrect response): "That's a good guess, but you just heard that Frankie ate a fly *in the storybook*."	Yes (to correct response): "That's right. You heard that the frog ate a fly with his tongue." (to incorrect response): "That's a good guess, but you just heard that Frankie ate a fly with his tongue."	No
Misleading questions	Yes	Yes	Yes
Misleading nature	Misled about the *source* of an item (e.g., suggest that a detail from the storybook was in the puppet show): "Did you see Frankie eat a fly in the puppet show?" (event was from the story not the puppet show).	Misled about the *source* of an item (e.g., suggest that was heard was actually seen): "Did you see Frankie eat a fly with his tongue?" (event was heard not seen).	Misled about a *novel* item (e.g., suggest that the frog ate a butterfly when he ate a fly in the story, and there was no butterfly in either the puppet show or the story): "Did Frankie eat a butterfly with his tongue?"
Misleading question feedback	Yes (to correct response): "That's right. You heard that Frankie ate a fly *in the storybook*. So you were right to say yes." (to incorrect response):	Yes (to correct response): "That's right. You heard that Frankie ate a fly with his tongue. So you were right to say yes." (to incorrect response):	Yes (to correct response): "That's right. Frankie did not eat a butterfly with his tongue. So you were right to say no." (to incorrect response): "That's

	"That's a good guess, but you heard that Frankie"ate a fly *in the storybook*. So you should say yes."	"That's a good guess, but you really really did *hear that Frankie ate a fly with his tongue*. So you should say yes."	a good guess, but Frankie did not eat a butterfly with his tongue . So you should have said no."
Transition from training to test	Positive reinforcement; Review of training in source monitoring: "You did a great job with those questions! I can see that you can remember what you saw in the *puppet show* and what you heard in the storybook. You learned to tell me what you saw in the *puppet show* with the frog and what you heard in the storybook with the frog. Sometimes I tried to ask you a funny question by saying that you heard something in the storybook when you *really and truly* saw it in the puppet show. Sometimes I tried to trick you that you saw something in the puppet show when you *really and truly* heard it in the storybook! But you spotted funny questions that mixed up the puppet show and the story! You were smart!"	Positive reinforcement; No mention of training in source monitoring: "You did a great job with those questions! Some questions were really hard but you could answer them! You were smart!" (No definition of a tricky question or warning to mind them in the target interview).	Positive reinforcement; No mention of training in recognition: "You did a great job with those questions! Some questions were really hard but you could answer them! You were smart!" (No definition of a tricky question or warning to mind them in the target interview).
Reminder of usefulness of training	Reminder about the bee lesson and to continue using source-monitoring strategy; highlight similarity of training and target source distinctions. Positive reinforcement: "Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I heard that	Reminder of bee lesson. No reminder to continue doing well (no reference to sources or source-monitoring training). Positive reinforcement: "Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about	Reminder of bee lesson. No reminder to continue doing well (no reference to sources or recognition training). Positive reinforcement: "Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I'm going to ask you some questions about what happened

	you saw a *puppet show* about bees and heard a *story* about bees. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. Remember to look out for the funny questions. Can you remember what a funny question is? [Yes,] it's a question that asks you if you saw something in the puppet show when you really heard about it in the storybook. I know that you'll do a good job because you spotted the funny about frogs. So now you have to look out for funny questions that mix up what you saw in the puppet show and what you heard in the story about bees."	bees? Good. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart."	with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart."

Appendix C: The Training Script

Implicit Condition

*Hi, my name is [*name*]. I work at a university. My job is to find out what children can remember about things. I understand that you heard and saw some things about bees last week. I'd like to find out more about what you learned. Will you talk to me about what happened? Do you want to hear and see some things about frogs? If yes: That's great. Let's go to [*room*]. You can go back to class at any time if you don't like it. Before we talk about what you learned about bumblebees, we are going to learn about frogs."*

Storybook. "First, I'm going to tell you some things about frogs. I want you to listen really carefully" [Interviewer reads storybook for children]

Puppet show. "Now we're going to watch some things about frogs. I want you to watch really carefully" [Interviewer begins puppet show]

Prior to Presentation of Training Questions. "I'm having a little trouble remembering what we heard about a frog and what we saw about a frog. This always happens and I hate that. Why don't you show me that you can remember what you heard about the frog and what you saw with the frog."

Explicit Condition

*Hi, my name is [*name*]. I work at a university. My job is to find out what children can remember about things. I heard that you heard a storybook and saw a puppet show about bees last week. I'd like to find out more about what you learned. Will you talk to me about what*

happened? Do you want to hear a storybook and participate in an puppet show about frogs? *If yes: That's great. Let's go to [*room*]. You can go back to class at any time if you don't like it.*

Storybook. "First, I'm going to tell you some things about frogs using this storybook]. I want you to listen really carefully to the story" [Interviewer reads storybook for children]

Puppet show. "Now we're going to watch some things about frogs in this puppet show. I want you to watch the puppet show really carefully"

Prior to presentation of Training Questions. "I'm having a little trouble remembering what we heard in the story about a frog and what we saw in the puppet show with a frog. This always happens and I hate that. Why don't you show me that you can remember what you heard with the frog in the storybook and what you saw with the frog in the puppet show."

Control Condition

*Hi, my name is [*name*]. I work at a university. My job is to find out what children can remember about things. I heard that you learned about bees last week. I'd like to find out more about what you learned. Will you talk to me about what happened? Do you want to learn about frogs? If yes: That's great. Let's go to [*room*]. You can go back to class at any time if you don't like it.*

Storybook. "Now we're going to learn about frogs."

Puppet show. "Now we're going to learn about frogs."

Prior to presentation of Training Questions. "I'm having a little trouble remembering what happened with the frog. This always happens and I hate that. Why don't you show me that you can remember what happened with the frog."

Appendix D: Training Interview Question Example

Question Nature	**Condition**	**Recognition**	**Source**	**Check**
Non-Misleading	Explicit	Did Frankie the Frog eat a fly with his tongue? (yes)	Did you just hear that Frankie ate a fly in the storybook or did you really see the fly in the puppet show? (yes in story)	Did you hear that Frankie ate a fly in the storybook? (yes)
	Implicit	Did Frankie the Frog eat a fly with his tongue? (yes)	Did you just hear that Frankie ate a fly with his tongue or did you really see the fly? (yes heard it)	Did you hear that Frankie the Frog ate a fly with his tongue? (yes)
	Control	Did Frankie the Frog eat a fly with his tongue?	N/A	N/A
Misleading	Explicit	Did you learn that a frog's tongue is as long as a spoon?	Did you really see that a frog's tongue is as long as a spoon in the puppet show or did you just hear about the spoon in the storybook? (yes in puppet show)	Did you hear that a frog's tongue as long as a spoon in the storybook? (no)
	Implicit	Did you learn that a frog's tongue is as long as a spoon?	Did you really see that a frog's tongue as long as a spoon or did you just hear about the spoon?	Did you hear that a frog's tongue as long as a spoon? (no)

			(yes saw)	
	Control	Did you learn that a frog's tongue is as long as a ruler? (no)	N/A	N/A

Appendix E: The Target Interview Script

Implicit Condition

"You did a great job with those questions! Some questions were really hard but you could answer them! You were smart! Now let's talk about what happened when [name] visited you. I understand that you learned about bees. Do you remember learning about bees? Good. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart."

Explicit Condition

"You did a great job with those questions! I can see that you can remember what you saw in the puppet show and what you heard in the storybook. You learned to tell me what you saw in the puppet show with the frog and what you heard in the storybook with the frog. Some questions were really hard but you could answer them! Sometimes I tried to ask you a funny question by saying that you heard something in the storybook when you really and truly saw it in the puppet show. Sometimes I tried to ask a funny question by saying that you saw something in the puppet show when you really and truly heard it in the storybook! But you spotted funny questions that mixed up the puppet show and the storybook! You were smart!"

"Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I heard that you saw a puppet show about bees and that you heard a storybook about bees. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. Remember to look out for the funny questions. Can you remember what a funny question is?

[Yes,] it's a question that asks if you saw something in the puppet show when you really heard about it in storybook or if you heard something in the storybook when you really saw it in the puppet show. I know that you'll do a good job because you spotted the funny questions about frogs. So now you have to look out for funny questions that mix up what you saw in the puppet show and what you heard in the storybook about bees."

Memory Control Condition

"You did a great job with those questions! Some questions were really hard but you could answer them! You were smart!"

"Now let's talk about what happened when [name] visited you. I heard that you learned about bees. Do you remember learning about bees? Good. I'm going to ask you some questions about what happened with the bees. If you don't know the answer you can say 'I don't know'. I know that you'll do a good job because you're really smart."

Target Interview Questions

Target Questions: Version 1

1 Was it Benny's birthday?
Was it Benny's birthday *in the storybook*?

2 There was a creature called Bob. What kind of creature was Bob?

3 Did Benny count his legs?
Did Benny count his legs *in the puppet show*?

4 How did Benny clean his eyes with the leaves? (cleaned eyes in puppet show, but leaves were in storybook only)

5 Did Benny chase a black fly?
Did Benny chase a fly *in the storybook?*

6 Benny needed a drink and got some water. Where did Benny get the water from?

7 Was there a red flower?
(if yes) Was there a red flower *in the puppet show*?

8 Benny was hungry and ate some fruit. What kind of fruit did he take out of the basket and eat? (blueberries in puppet show, but no picnic basket)

9 Did Benny store honey inside his stomach?
Did Benny store honey *in the storybook*?

10 Benny had a duty at the hive. What was his duty?

11 Did Benny count some worker bees?
Did Benny count worker bees *in the puppet show*?

12 Benny used his antennae to touch the tree. How big was the piece of bark that Benny knocked off the tree with his antennae?

13 Did Benny fly to a white birdhouse?
Did Benny fly to a white birdhouse *in the puppet show*?

14 What colour was the bird that Benny saw in the tree?

15 Did [name] tell you that Bees see things differently from what humans see? Did she tell you that bees see things differently from humans *in the storybook*?

16 The wind blew Benny onto a rock. What was the name of the ladybug that lived under the rock?

17 Did Benny the Bee see a puppy?
Did Benny see a puppy *in the puppet show?*

18 Benny said that the tree was green. What part of the tree was green?

19 Did Benny hide in the hole in the tree?
Did Benny hide in the tree hole *in the storybook?*

20 When Benny bumped into the tree, which part of him hit the ground first?

21 Did Benny the bee talk to the caterpillar?
Did Benny the bee talk to the caterpillar *in the puppet show*?

22 Why did Benny do a dance for Kelly?

23 Did Benny fly into a blue box?
Did Benny fly into a blue box *in the storybook*?

24 When the queen threw a party for Benny, what did she put on his head?

Target Questions: Version 2

1 Benny was excited because there was going to be a party that night. What kind of dancing was

Benny going to do at the party?

2 Did Benny say goodbye to his friend Insecto?

Did he say goodbye to his friend Insecto *in the puppet show*?

3 Why did Benny count his wings?

4 Did Benny clean his antennae because there was something sticky in them?

Did Benny clean his antennae *in the storybook*?

5 Benny chased a ladybug. When he chased her he went through something and got stuck. What did he go through?

6 Did Benny drink some coke?

Did Benny drink some coke *in the puppet show*?

7 Benny wanted to make some honey and so he flew to a flower. What colour was the flower?

8 Did Benny find some 4 leaf clovers

Did Benny find some clovers *in the storybook*?

9 After Benny stored honey in the honeycombs, why did he look at himself in the mirror?

10 Did Benny guard the beehive?

Did Benny guard the beehive *in the puppet show*?

11 Benny got an idea to make honey from something. Benny flew over to it and counted it. What did he count?

12 Did Benny use his antennae to smell something?

Did Benny use his antennae *in the storybook*?

13 Something frightened Benny. When Benny flew over to the black birdhouse, what frightened him?

14 Did Benny see a bird inside the tree?

Did Benny see a bird inside the tree *in the storybook*?

15 What does Benny see instead of red?

16 Did Benny land on a picnic basket?

Did Benny land on a picnic basket *in the puppet show*?

17 Why did the rabbit make Benny cry?

18 Did Benny see a tree with big red leaves?

Did Benny see a tree with big red leaves *in the storybook*?

19 Benny flew around something. What did he fly around?

20 Did Benny the Bee bump into a child?

Did Benny the Bee bump into a child *in the puppet show*?

21 When Benny was talking to Kelly, what did he notice about the sky?

22 Did Benny Buzz for the caterpillar?

Did Benny buzz for the caterpillar *in the storybook*?

23 -Kelly brought out a box. What colour was the box?

24 Did the Queen give Benny a medal for being so helpful?

Did the Queen give Benny a medal *in the puppet show*?

Table 1

Target Event Items (Example)

Question	Source	
	Story	Puppet Show
1. Was it Benny's birthday ?	Benny's birthday	Party
2. What kind of creature was Bob?	Insecto	Bob
3. Did Benny count his legs?	Legs	Wings
4. How did Benny clean his eyes with the leaves?	Cleans Antennae	Eyes
5. Did Benny chase a black fly?	Chases Fly	Ladybug
6. Where did Benny get the water from?	Drinks Coke	Water
7. Was there a red flower?	Red Flower	White Flower
8. What kind of fruit did he take out of the basket and eat?	Clovers	Blueberries
9. Did Benny store honey inside his stomach?	Stores Honey in Stomach	Honeycombs
10. Benny had a duty at the hive. What was his duty?	Guards Hive	Keeps Hive Cool
11. Did Benny count some worker bees?	Counts Worker Bees	Counts Flowers
12. How big was the piece of bark...?	Uses antenna to smell	Uses antenna to touch

Table 2

Training Event Items

Question	Source	
	Story	Puppet Show
1 Did Frankie the Frog eat a fly with his tongue	Fly	Dragon Fly
2 Did Frankie the Frog stay in the mud during the winter	Summer	Winter
3 Did a Raccoon chase Frankie the Frog	Raccoon	Fish
4 Was the biggest frog was as big as a Telephone?"	Telephone	Toy Truck
5 Did Frankie the frog puppet show hide and seek?	Hide and Seek	Tag
6 Did you learn about a frog called a bullfrog?	Bullfrog	Turtle
7 Did you learn that a frog's tongue is as long as a pencil?	Pencil	Spoon
8 Was a tadpole swimming in green water?	Green Water	Blue Water
9 Was there a white flower on a lily pad?	White Flower	Yellow Flower
10 Was Frankie the Frog sitting on a log?	Log	Rock

Table 3

Percentage of Correct Responses to Target Questions

Question Type	Condition					
	Explicit		Implicit		Memory Control	
	Mean	SD	Mean	SD	Mean	SD
Recognition Questions	77.63	17.98	75.00	27.75	77.43	21.26
Follow-up Source Questions						
Non-Misleading	84.72	18.06	70.55	38.26	52.30	38.78
Misleading	24.17	30.42	30.56	38.82	40.77	39.56
Open-Ended Questions						
Non-Misleading	16.67	17.40	13.89	11.96	15.38	18.16
Misleading	.00	.00	.00	.00	.00	.00

Table 4

Percentage of Don't Know Responses to Target Questions

Question Type	Condition					
	Explicit		Implicit		Memory Control	
	Mean	SD	Mean	SD	Mean	SD
Recognition Questions	1.39	4.81	0.00	0.00	1.28	4.62
Follow-up Source Questions						
Non-Misleading	1.39	4.81	0.00	0.00	0.00	0.00
Misleading	1.39	4.81	0.00	0.00	1.28	4.62
Open-Ended Questions						
Non-Misleading	37.50	27.64	40.28	27.94	25.64	25.10
Misleading	38.89	28.72	54.17	31.88	19.23	20.24

Table 5

Percentage of Incorrect Responses to Target Questions

Question Type	Condition					
	Explicit		Implicit		Memory Control	
	Mean	SD	Mean	SD	Mean	SD
Recognition Questions	13.88	17.95	21.52	29.84	21.15	20.06
Follow-up Source Questions						
Non-Misleading	11.11	12.97	13.88	17.16	33.33	29.65
Misleading	58.33	31.38	56.94	38.57	48.72	35.66
Open-Ended Questions						
Non-Misleading	45.83	23.70	40.28	24.05	52.56	28.74
Misleading	61.11	28.72	41.67	28.87	74.36	26.89