UNIVERSITY OF CALGARY

The Effects of Elaboration on Binding and Source Monitoring in Preschool Children

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF PSYCHOLOGY

CALGARY, ALBERTA

AUGUST, 2007

UNIVERSITY OF CALGARY

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Effects of Elaboration on Binding and Source Monitoring in Preschool Children" submitted by Valerie San Juan in partial fulfilment of the requirements of the degree of Master of Science.

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July 24, 2007
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Abstract

The present study was designed to examine the effects of binding processes on children's source monitoring performance. Four- and 6-year-old children participated in a source monitoring task that involved attributing actions from an initial event to two external sources. Binding was manipulated through the use elaboration strategies (i.e., strategies that produce associations between co-occuring event details). During the initial event, half the participants were prompted to form elaborations while the other half were not. Test expectancy was also manipulated so that half the children were told in advance about the subsequent source memory test. Results indicated a significant improvement in the source memory of both 4- and 6-year-old children following elaboration strategy instruction. Manipulations of age and test expectancy, however, did not yield significant differences in source monitoring performance.

Acknowledgements

There are many individuals I would like to thank for their assistance with this research and their help in completing my degree. Although I have taken to ordering these individuals below (unfortunately this is how I think best), I do not intend to suggest that my gratitude varies by individual. I am equally grateful to all the following people and credit my accomplishments to their invaluable contributions!

First, I would like to thank my supervisor, Dr. Suzanne Hala, and my colleagues in the Cognitive Development lab for their incredible help and insight during the design and implementation of this research. Your thoughtful input was always a great benefit to me during this process and I thank you for taking the time to listen to my many questions throughout. Importantly, your support was instrumental in the success and completion of this project and for this I am thoroughly indebted.

Similarly, I would like to sincerely thank the wonderful children, parents, and daycare workers who dedicated their time and efforts to make this research possible. Testing over 120 participants is never an easy task but the creativity and enthusiasm brought forth by my fellow "child scientists" made the experience entirely worthwhile. Collection of all this data would also not have been possible without the wonderful parents and daycare administrators who volunteered to assist with participant recruitment. Thank you for being so encouraging of this study and of all research related to the understanding of children's cognition.

To Ben, my ever-patient husband and friend, I would like to thank you for supporting me through several long nights in front of the computer and for partaking in countless discussions about statistics, methodology, and source monitoring (i.e., topics I know you are keenly interested in). Even though you claimed to not always know "what I was talking about", I appreciate you for listening and making this whole experience less stressful than it otherwise could have been.

Finally, I would like to thank the Natural Sciences and Engineering Research Council of Canada for their financial support of this research.

Table of Contents

List of Tables

List of Figures and Illustrations

CHAPTER 1: INTRODUCTION

Although children are able to form rich memories for semantic, or factual, information from a remarkably early age, they are not able to effectively retrieve information related to specific events until much later in childhood (Oakes & Bauer, 2007). For example, a young infant may have the capacity to recall a complex sequence of actions (Barr, Dowden, & Hayne, 1996) but even children as old as 6-years can have difficulty recalling the contexts in which actions have occured (Roberts & Blades, 1998). Memory for the details associated with a specific event, or episode, is known as *episodic memory* (Tulving, 1993) and the type of episodic memory that assists children with the storage and retrieval of event origins is *source memory* (Drummey, & Newcombe, 2002; Sluzenski, Newcombe, & Ottinger, 2004). The development of source memory is not only critical in allowing children to recall the sources of their memories and beliefs, it also assists them with the evaluation of retrieved information. For example, recalling the source of a fact can help children determine the validity of that information. Source memory is also important throughout the lifespan as it can help individuals evaluate the source of a biased judgement (e.g., racial stereotypes) before it is improperly acted upon.

To date, much of the research examining the development of source memory has focused on contextual factors that influence the accuracy with which children retrieve source information. For example, there have been extensive studies on the effects of source similarity, suggestibility, source identity, and collaborative interaction on children's source memory abilities (see Roberts, 2002 for review). What currently remains unclear, however, are the underlying cognitive processes that children engage in when making source decisions (Foley, Ratner, & House, 2002; Roberts, 2002). In particular, research to date has yet to identify the kinds of information that children encode and retrieve in relation to specific events (Kovacs & Newcombe, 2006; Sluzenksi et al., 2006). The present research was designed to address these issues by examining the role of binding and elaboration processes in children's source memory development. In particular, this research focuses on the encoding strategies used by 4- and 6-year-old children to assist in later source memory retrieval. Before describing the design of the current study, however, related findings in the area of source memory development will first be reviewed.

Source Monitoring Theory

Although different theories of cognitive development have offered descriptions regarding the underlying mechanisms of source memory, the most comprehensive account to date is that offered by *source monitoring theory* (Johnston, Hashtroudi, and Lindsay, 1993; Johnson & Raye, 1981). Source monitoring theory provides a detailed description of the cognitive factors that might influence both the encoding and retrieval stages of source information. The design of the current study was consequently based upon assumptions brought forth by this theory, however, it is important to note that these assumptions do not negate the value of alternative theories in explaining source memory findings.

According to the model originally put forward by Johnson, Hashtroudi, and Lindsay (1993), *source monitoring* refers to the set of cognitive processes involved in making source attributions for memories, knowledge, and/or beliefs. Source monitoring theory proposes that source information is not encoded or retrieved as a specific event detail. Instead the model suggests that source is inferred via a process of evaluation between potential event sources and retrieved event details. The underlying assumption is that specific sources are characterized by different kinds of details, allowing for source inferences to be made based on the quality and quantity of event information. For example, when retrieving information about an *externally-generated*, or perceived event, a person is far more likely to recall details that are perceptual in nature (e.g., colours, sounds, scents, etc.). Conversely, when retrieving information about an *internally-generated* event (e.g., an imagined action), perceptual details may also be retrieved but it is less likely that these details will be as abundant as those associated with an actual perceived event. In addition, records of the cognitive effort that are associated with internally-generated events are more likely to be retrieved in relation to memories for imagined versus perceived events. As a result, the nature and quantity of event details retrieved from memory is critical for the making of accurate source attributions. Specifically, the types of memory information that are most critical for source monitoring, according to the model, are details of perception, context, affect, cognitive operations, and semantic understanding for event items.

In terms of decision-making processes, Johnson and her colleagues (1993) propose two mechanisms by which source monitoring judgments can be made. The first mechanism is automatic, or heuristic, in nature and relies on pre-existing criteria for the amount and type of information typically associated with different sources. For example, when trying to determine whether an event was perceived vs. imagined, retrieved details can be rapidly evaluated using criteria that specifies the type of information associated with each event (e.g., more perceptual details would be indicative of a perceived event). The closer that retrieved details match pre-existing criteria, the more rapidly source attributions can be made. Alternatively, Johnson and her colleagues also propose that source judgments can be made using more strategic decision-processes. Specifically, these processes involve a more stringent evaluation of retrieved memory details and comparisons between event information and supporting background knowledge. For example, in cases where insufficient event information is retrieved from memory or details fail to match pre-existing source criteria, individuals may have to resort to making source decisions based on judgments of plausibility (e.g., "Which source is more likely given what I know?").

Although the framework states that source attributions are made during the retrieval of memory information, source monitoring accuracy can be influenced by cognitive processes that occur at both the encoding and retrieval stages of memory. At encoding, processes that affect the quantity, quality and manner in which event details are represented in memory can in turn affect the efficacy with which source-specifying information is later retrieved. Similarly, at retrieval, factors that influence the efficacy with which automatic and strategic processes are applied will affect the accuracy of source decisions.

Depending on the kinds of sources that are evaluated during the decision-making process, source monitoring can be further broken down into three types (Johnson et al., 1993): (a) reality monitoring, (b) external source monitoring, and (c) internal source monitoring. *Reality Monitoring* refers to the process of discriminating between an internally-generated event or action and an externally-generated event or action (e.g., "Did I do that or did you do that?"). *External Source Monitoring* refers to the process of discriminating between two or more externally- generated events or actions (e.g., "Did person A do that or did person B do that?"). Finally, *Internal Source Monitoring* refers to the process of discriminating between two or more internally-generated events or actions (e.g., "Did I do that or did I just think about doing that?").

Overall, source monitoring theory predicts that effective source monitoring depends on three critical factors (Johnson et al., 1993). First, source decisions depend on the quality and amount of event information that is encoded and retrieved from memory. Second, the effectiveness with which source decisions are made depends on the extent to which retrieved event details match pre-existing criteria for source characteristics. Finally, accurate source monitoring in different contexts depends on the effectiveness of with which decision-making processes, both heuristic and strategic, are applied at the stage of memory retrieval.

Development of Source Monitoring in Childhood

Source monitoring abilities typically develop throughout childhood, but the most dramatic changes typically occur between the ages of 4- and 6-years (Drummey & Newcombe, 2002; Roberts, 2002). Importantly, the ability to identify and attribute source information does not develop uniformly across the three source monitoring types (Roberts, 2002). The first two types of source monitoring to develop are reality and external source monitoring. Reality source monitoring has typically been found to develop by the age of 5-years (Foley, Ratner, & House, 2002; Ratner, Foley and Gimpert, 2002) but in supportive contexts can be demonstrated in children as young as 2.5-years (Hala, Turner, San Juan & Rostad, 2005; Hala, Brown, & San Juan, 2007). Similarily, external source monitoring abilities emerge early in childhood, with children as young as 6-years of age performing comparably to adults on certain tasks (Foley & Johnson, 1985;

Lindsay, Johnson, & Kwon, 1991). Finally, the last type of source monitoring to develop is internal source monitoring, where children's performance does not become comparable to adults' until the approximate age of 11-years (Foley & Johnson, 1985; Sussman, 2001).

Although certain contextual factors affect source memory similarly across different age groups (e.g., source similiarity, time delays, attentional demands, etc.) it is unclear whether the cognitive mechanisms that underlie the source monitoring of young children is qualitatively similar to those underlying the source memory of adults and older children. In particular, it is uncertain whether young children's deficiencies in source memory are primarily due to errors formed during the encoding and/or retrieval of memory information (Roberts, 2002; Foley et al., 2002). One way in which this question has recently been addressed is by examining the relationship between developing source monitoring abilities and coinciding cognitive processes (Drummey & Newcombe, 2002; Sluzenski, Newcombe, & Ottinger, 2004). For example, by associating children's performance on source monitoring tasks to their performance on cognitive tasks that have a similar developmental trajectory (e.g., executive functioning abilities), researchers have recently begun to identify the types of cognitive abilities that may underlie source memory development (Ruffman, Rustin, Garnham, & Parkin, 2001). Similarly, by manipulating children's ability to engage in different cognitive processes at both encoding and retrieval stages of source memory, researchers are beginning to clarify the mechanisms by which children's source attributions are made (Kovacs & Newcombe, 2006; Bright-Paul, Jarrold, & Wright, 2005). In the current study, encoding strategies were directly manipulated during the encoding of an event in order to assess which cognitive abilities may assist children with the representation of source information.

Factors that Influence Source Monitoring at Encoding

Attending to Relevant Source Information. One factor that may affect children's source monitoring performance is the ability to selectively attend to source relevant information during the encoding of an event. According to source monitoring theory, the accuracy of source attributions is dependent not only on the quantity of event characteristics that are encoded but also on the quality of these of characteristics (i.e., how uniquely related they are to a specific source). Improvements in children's source monitoring abilities may, therefore, be dependent on their increased abilities to attend to unique source characteristics during the initial processing of event information. The importance of attending to source specifying information is best supported by research examining the effects of source similarity and goal directed tasks (Johnson et al, 1981; Lindsay et al., 1991; Foley et al., 1987; Foley, Ratner & House, 2002; Ratner, Foley, & Gimpert, 2002; Roberts and Blades, 2002).

Research on the effects of source similarity has shown that both children and adults perform significantly worse in tasks where potential sources share multiple characteristics (Ferguson, Hashtroudi, & Johnson, 1992; Lindsay et al, 1991). For example, in a study conducted by Lindsay and his colleagues (1991) both children and adults showed declines in source monitoring performance when they had to attribute the source of previously heard statements to sources that were highly similar (e.g., two females of similar age, appearance and voice tone) vs. sources that were distinct. This pattern remains consistent in contexts where children must attribute sources to similar actions (Foley, Aman, & Gutch, 1987; Roberts & Blades, 1998). Source similarity may, therefore, affect children's ability to attend to source specifying information in two possible ways. First, by decreasing the amount of information that can be used to discriminate between sources, source similarity reduces the likelihood that children will notice source distinguishing information and encode it in memory. Secondly, young children may only attend to the most salient features during an event because they typically have trouble considering multiple features simultaneously (Roberts, 2002; Jacques, Zelazo, Kirkham, & Semcesen, 1999). Features that are shared between sources might subsequently appear more salient than unshared features because they occur in multiple instances within an event. Successful source monitoring would therefore require that children be able to selectively switch their attention to features that provide a basis for later discrimination.

The goals of an event may also influence children's attention to source information. Specifically, children are less able to attend to source specifying details when the goal of a task is not conducive to this type of encoding. For example, research has shown that young children have particular difficulty attributing sources to actions when they were previously engaged in a collaborative task (Foley et al., 2002; Hala et al. 2005; Ratner et al., 2002). Because collaborative contexts often require children to engage in *prospective processes* (i.e., processes that are involved in the planning and execution of future actions) young children may therefore have limited resources to attend to source relevant information (Foley et al., 2002).

Given that the accuracy of children's source memory decreases in contexts where they are less able to attend to source relevant information, it is possible that increasing their attention to such details at encoding would lead to subsequent improvements in source monitoring performance. In support of this idea, previous research has indicated that the source monitoring performance of both children and adults is sometimes improved by explicit instructions to attend to source information (Chalfonte & Johnson, 1996; Kelley et al., 1989; Russell and Jarrold, 1999). No study to date, however, has examined the effects of explicit source memory instruction on the source memory accuracy of preschool aged children. This issue was therefore addressed in the current study by including a manipulation of *test expectancy* – i.e., whether or not children were told in advance that they would be tested on their memory for source information.

Binding Processes. Preschool children's ability to make accurate source attributions may also be related to their developing abilities to form complex memory representations (Chalfonte & Johnson, 1996). A complex memory is a mental representation comprised of multiple event features. Complex memories can include information that is central to the meaning of a recalled event (i.e., information about what happened) as well as information regarding the physical and social context in which the event took place. (Chalfonte & Johnson, 1996; Kovacs & Newcombe, 2006). In order for such a diverse set of information to be stored and retrieved in a coherent manner, representations for complex memories must be encoded in a way that relates event features with one another (e.g., happy, loud, and colourful may all be features associated with a child's birthday party). These associations are achieved through the application of binding, an encoding process that represents co-occuring event features together in memory (Chalfonte & Johnson, 1996; Lorsbach & Reimer, 2005; Mitchell, Johnson, Raye, Mather, & D'Esposito, 2000; Sluzenski et al., 2006).

According to Chalfonte and her colleagues (1996), binding could facilitate source monitoring in one of two ways. First, by increasing the strength of association between independently encoded event details (e.g., source and event information), binding could increase the likelihood that source specifying characteristics are later retrieved together in combination. Alternatively, binding could combine multiple event characteristics (e.g., all the perceptual features associated with a given source) to produce novel, more complex representations of an event. This type of representation would also increase the likelihood of retrieving multiple source cues, particularly if unique event characteristics are appropriately bound together with their initial source.

Evidence supporting a relation between source monitoring and binding abilities was first obtained through research with older adults (Cohen & Faulkner, 1989; Chalfonte & Johnson, 1996; Dywan & Jacoby, 1990; Hashtroudi, Chrosniak, & Johnson, 1990; Mitchell et al., 2000). For example, Chalfonte & Johnson (1996) found that older adults were significantly worse than younger adults in recognizing object features that had co-occurred during a previous study phase (e.g., the colour and type of object in a visual display). When asked to recall object features in isolation (i.e., only the colour or type), however, older adults were no worse than younger adults. Importantly, when asked to recall source-specifying information (e.g., the location on the display where an object had appeared during the study phase), older adults were less accurate than younger adults and performed worse in conditions where they had to bind source-specifying information with object features. The authors subsequently concluded that age differences in source monitoring abilities may be due to the effectiveness with which certain types of event features are retrieved and encoded (i.e., memory for location versus memory for colour and shape). More importantly, they suggested that deficits in binding abilities appear to be more pronounced with older age and may therefore play an influential role in the source monitoring deficits of older adults.

In terms of the role that binding processes play in the development of children's source monitoring, little research has been conducted that links the two abilities together. Available findings, nevertheless, do coincide with the adult research in that developmental shifts in the use of binding processes appear to map onto similar developmental shifts in source monitoring (Lorsbach & Reimer, 2005; Sluzenski et al., 2006). For example, Sluzenski and her colleagues (2006) found that 6-year-old children were significantly better at recalling feature information that had co-occurred in previously viewed photographs (e.g., combinations of different animals in different backgrounds) than 4-year-old children. These differences were found despite the fact that both groups of children did not differ significantly from one another in their memory for individual features (e.g., memory for just the animal or the background). In addition, Sluzenski and her colleagues found that a positive correlation existed between children's recognition for bound information (i.e., items in combination) and their ability to freely recall information from a more natural event (i.e., a story that had been told to them prior to the test phase). The authors concluded that improvements in the ability to bind related event features together at encoding had positive effects on children's memory for contextualized information. Importantly, Sluzenski and her colleagues suggested that binding plays an important role in episodic memory development and, by association, would also benefit children's source monitoring.

Although the relation between source monitoring and binding processes requires a good deal more clarification, findings from the research conducted to date appears to consistently support the importance of bound feature information in the making of source judgments. What remains unclear is the extent to which binding processes are *directly* linked to source monitoring performance. This is particularly important to address because the research to date has only examined the effect of binding on memory using indirect measures of source (e.g., memory for the location or background) but not using direct measures of source (e.g., asking "who" or "what" was the source of a given event). In addition, no study to date has examined the exact mechanisms by which children begin to use binding processes in their encoding of event information. These issues were consequently addressed in the current study.

Elaboration Strategies. One of the ways by which related event features may be bound together in memory is through the use of *elaboration strategies*. Elaboration is the process of associating two or more independent event features in memory through the creation of a novel semantic representation (Pressley, 1982; Bjorklund & Douglas, 1997). For example, if a child needed to remember the individual items of "book" and "chair", he/she could form a mental elaboration consisting of a book lying on a chair in order to facilitate their memory for both items. Similarly, elaborations can be verbal in nature such that the items "book" and "chair" could be framed together in a sentence (e.g., "The book was lying on the chair") or a question (e.g., "Why was the book lying on the chair?".)

Early studies looking at the development of elaboration strategies have shown that children are able to effectively use verbal elaboration before they can use mental elaboration to recall associated item pairs (Bender & Levin, 1976; Levin, McCabe, & Bender, 1975; Pressley, 1982). For example, when instructed, children as young as 4-years are able to use verbal elaboration to recall items that appeared together during a study phase (Levin et al., 1975) however they cannot benefit from simple instructions to generate mental images during encoding (Bender & Levin, 1976). In terms of using verbal elaborations, other studies have shown that children as young as five are able to effectively generate their own verbal elaborations in response to interrogative prompts (i.e., questions that prompt the child to form a verbal association between two items). Specifically, early research has demonstrated that children who produce verbal elaborations in response to interrogative prompts perform comparable to, and sometime better than, children who simply repeat verbal elaborations provided by an experimenter (Buium & Turnure, 1977; Pressley & Bryant, 1982; Turnure, Buium, & Thurlow, 1976). Overall, it appears that regardless of elaboration type, a number of studies have shown that children's recall of associated items significantly improves when elaboration strategies are applied during encoding (Guttentag, 1995; Greeson, 1984; Zimmerman & Rocha, 1984; Zimmerman & Rocha, 1987).

One way in which elaboration processes have been linked to source monitoring is through explanations of the *generation effect*, or findings that individuals are more likely to attribute source correctly for self-generated events than for events generated by another person (Baker-Ward, Hess, & Flannagan, 1990; Foley, Santini, & Sopasakis, 1989; Roberts, 2002). Specifically, elaboration accounts of the generation effect state that because individuals are more likely to form rich elaborations of event information that is familiar and supported by rich background knowledge, pre-existing representations of the self will similarly promote the superior elaboration and encoding of self-generated event details (Baker-Ward et al., 1990). Studies examining the role of agent identity in source memory have subsequently provided support for such accounts, demonstrating that memory for information related to familiar agents (e.g., friends, peers, or family members) is recalled better than information related to unfamiliar agents (Baker-Ward et al., 1990; Foley, et al., 1989; Roberts & Blades, 1998).

As suggested by research on binding processes, elaboration strategies may also play an important role in source monitoring by producing associations between related event features and individual source details. Research into this type of application for elaborations strategies has not been as extensive as other applications, nevertheless, current findings suggest that elaboration may be a means by which source-specifying information becomes encoded and represented in memory.

For example, research with adults has demonstrated that source monitoring accuracy can significantly improve when individuals adopt different perspectives to encoding information related to different sources (Kelley, Jacoby, & Hollingshead, 1989; Johnson, Nolde, & DeLeonardis, 1996). For example, in a study conducted by Johnson, Nolde, and DeLeonardis (1996), adults were instructed to either focus on their own feelings or the feelings of speakers while encoding the content of spoken statements. During a later test of source monitoring, participants who focused on the speakers' emotions showed better source accuracy than participants who had focused on their own emotions. Importantly, because the manipulations in this study could lead individuals to produce source associations that were both correct (e.g., between statements and speaker) and incorrect (e.g., between statements and self), the findings suggest that elaboration effects on source monitoring are dependent on the types of features that become associated through elaboration. A similar study conducted with 4- and 5-year-old children (Kovacs & Newcombe, 2006) yielded comparable results. Specifically, Kovacs & Newcombe (2006) found that the source monitoring performance of 5-year-old children also benefited when they elaborated on the emotions of different sources. Conversely, source monitoring in 4-year-old children did not appear to improve as a result of emotion-focus manipulations. In the end, these results raise the possibility that children under the age of 5-years may not be able to benefit from the use elaboration strategies to improve the subsequent accuracy of source judgments. It is also unclear whether the source monitoring improvements shown by 5- and-6-year-old children in this study would generalize to contexts where bound information is not affective in nature.

The current research was designed to clarify the relation between source monitoring and elaboration strategies. Specifically, this research addressed whether elaborative processing could be used as an effective means of binding external source information. This research also examined whether children under the age of 5-years could in fact use elaboration to effectively bind related event features in memory.

Present Study

The central purpose of the present study was to clarify the role that encoding processes play in the development and accuracy of source monitoring. In particular, this research focused on the effects of binding and elaboration processes on the external source monitoring of 4- and 6-year-old children. It was intended that this research would address three key questions in relation to the topic: (1) whether the explicit use of elaboration strategies at encoding would improve the binding and subsequent source monitoring of preschool children, (2) whether elaboration strategy instruction would have differential effects on the source monitoring performance of 4- and 6-year-old children, and (3) whether the effects of elaboration strategy instruction on source monitoring performance is attenuated by test expectancy or recall of verbal elaborations. The age groups of 4- and 6-years were specifically selected because previous research has already demonstrated the coinciding development of binding and external source monitoring abilities within this age range (Sluzenski et al., 2006; Roberts, 2002).

Key issues were addressed by presenting both 4- and 6-year-old children with an external source monitoring task and manipulating the degree to which elaboration strategies could be applied during the encoding of the initial action event. Specifically, all children viewed a puppet show consisting of two puppets shopping for items in a store and later, were tested on their memory for the sources of actions related to this event. Importantly, both age groups were tested using four between-subjects strategy conditions (see Table 1 for summary of conditions) that varied the degree to which item features could be associated with the features of each source. In the *No Elaboration/Surprise* condition, children watched the puppet show and later were given a surprise source memory test where they were asked to remember which items were selected by each character. In the *No Elaboration/Expected* condition, children were informed prior to the start of the puppet show that they would later be asked to remember which items had been selected by each protagonist. In the *Elaboration/Surprise* condition, children were prompted during the course of puppet show to form verbal associations between the protagonists and each item that was selected. Finally, in the *Elaboration/Expected* condition, children were again prompted to provide explanations for each character's item selection during the puppet show and were also informed of the proceeding source memory test. A test of elaboration recall was additionally given to children in both elaboration conditions to clarify the relationship between children's memory for verbal elaborations and their source memory accuracy.

Hypotheses. With regards to the effect of elaboration instruction on source monitoring, it was hypothesized that across both age groups, source memory would be significantly more accurate in the elaboration conditions (Elaboration/Surprise and Elaboration/Expected) than in conditions where no explicit elaboration strategy instructions was provided (No Elaboration/Surprise and No Elaboration/Expected). This hypothesis was based on previous research demonstrating a significant improvement in memory recall when elaborations strategies are applied at encoding (Pressley, 1982). Importantly, this prediction was also based on an assumption that elaboration strategies would assist children in the binding of source related event characteristics. In the current task, children were specifically prompted to form associations between each potential source and the items that they acted upon. Elaboration strategy instructions were therefore designed to produce associations, or binding, between related event characteristics.

With regards to developmental differences in elaboration strategy use, it was predicted that both 4- and 6-year-olds would be able to engage in elaboration strategy instruction but that 4-year-olds may not exhibit a significant increase in source monitoring accuracy as a result. This prediction is based on the fact that 6-year-old children have been shown to perform significantly better than 4- year-olds on both binding (Sluzenski, Newcombe, & Kovacs, 2006) and source monitoring tasks

(Drummey, Newcombe, 2002; Lindsay et al., 1991). Children older than 5-years have also been shown to benefit from instructions that encourage binding at encoding (i.e., the emotion-focus instructions utilized in Kovacs & Newcombe, 2005). Although children as young as 4-years can effectively use elaboration strategies (Buium & Turnure, 1977; Turnure, et al., 1976) to improve recall of associated item pairs, no research to date has shown that children younger than 5-years can effectively bind source-related event characteristics. Taken together, these results suggest that while elaboration strategy instruction may lead to improvements in 4-year-old's source memory accuracy, these improvements may not be significant if children lack the underlying conceptual ability (i.e., the ability to form complex memory representations) needed to utilize the strategy. This type of deficiency in memory strategy use is also known as a *utilization deficiency* (Bjorklund & Douglas, 1997).

Finally, in relation to the effect of test expectancy on source monitoring, it was predicted that an interaction might be found between elaboration instruction (i.e., elaboration vs. no elaboration conditions) and test expectancy (i.e. surprise vs. expected conditions). Specifically, differences between No Elaboration and Elaboration conditions might decrease when children expect to be tested on source information. This prediction was based on previous research suggesting that older children may benefit from instructions that encourage them to attend to source relevant information (Foley et al., 2002; Russell and Jarrold, 1999). Indirect instructions to attend to source information might also have lead some children to engage in the spontaneous binding of event characteristics, particularly if those children had already begun to develop binding strategies of their own.

CHAPTER 2: METHODS

Participants

Children who participated in both the item selection and source monitoring task were all recruited from within the Calgary area. Children were recruited through volunteer preschool and childcare facilities or via the ChILD (Child and Infant Learning and Development) Research Group database at the University of Calgary. The ChILD database is a collection of parent and child contact information acquired through advertisements at various health clinics, online parent newsletters, and family oriented trade shows.

Item Selection. Ten 4-year-olds (M = 49.39 months, SD = 3.45; range: 45.80 to 58.22 months) and seven 6-year-olds (M = 76.81 months, SD = 3.08; range: 73.48 to 82.36 months) participated in a picture labelling task before data was collected for the main study. Children who participated in the labelling task did not also participate in the source-monitoring procedure. Overall, the sample consisted of seven females and ten males.

Source Monitoring Task. A summary of participants' age and gender for the source monitoring task is presented in Table 2. Data was collected from 64 4-year-olds (*Mean age* = 54.27 months, SD = 3.65; Range: 48.19 to 60.46 months) and 64 6-year-olds (*Mean age* = 78.07 months, SD = 3.13; Range: 73.19 to 83.91 months). Approximately equal numbers of males and females were also obtained for each group. The 4-year-old sample was comprised of 29 males (*Mean age* = 54.00 months, SD = 3.51) and 35 females (*Mean age* = 54.46 months, SD = 3.80). The 6-year-old sample was comprised of 32 males (*Mean age* = 78.08 months, SD = 3.34) and 32 females (*Mean age*

= 78.06 months, *SD* = 2.94). Within each age group, participants were then equally distributed between conditions (*n* = 16).

Of the 4-year-olds that were included in the final analysis of both elaboration strategy instruction conditions (*N* = 32), 15 children required additional prompts during the puppet show in order to generate elaborations. Twelve of these children required prompts to generate elaborations because they initially failed to come up with a response (e.g. *"I don't know"*) to the experimenter's initial interrogation (e.g., *"Why does Fred/Sally need to buy an..."*). Three of the 15 children, however, required additional prompts during the puppet show because they perseverated in generating the same elaboration for multiple test items (e.g., repeating *"because the other one was broken"* for more than one item). In all 15 cases, children were not excluded from the final analysis because the number of prompts required did not exceed 50% of the total test trials. Two children who were additionally tested in the *Elaboration/Expected* condition were excluded from the final analyses because they perseverated in generating the same elaboration for more than 50% of the test items.

Elaboration Test. All children that received elaboration instruction during the source monitoring task (*N* = 64) also participated in an elaboration memory test. This sample was initially comprised of 32 4-year-olds (*Mean age* = 54.21 months, *SD* = 3.59, Range: 48.72 to 60.46 months) and 32 6-year-olds (*Mean age* = 78.26 months, *SD* = 3.21, Range: 73.39 to 83.36 months) with equal numbers of males and females in each age group. Four 4-year-olds (3 females and 1 male) were subsequently excluded from the analysis due to their failure to comply with the elaboration test instructions (i.e., did not understand the instructions or did not provide verbal responses). One 4-year-old was additionally excluded due to experimenter error (i.e., failure to record the entire session). This yielded a final sample that consisted of 27 4-year-olds (*Mean age* = 54.73 months, *SD* = 3.58, Range: 48.72 to 60.46 months) and 32 6-year-olds.

Materials

Puppet Show. Materials for the puppet show consisted of two puppets (Fred and Sally), one miniature grocery cart, four miniature store shelves, and 24 picture cards (see Appendix A and B for a sample of the study display and props). The puppets were handheld and manipulated by a single experimenter who provided a distinct voice for each character during the show. The cart was comprised of a semi-opaque container (small slits were visible from the sides of the cart) and was always placed in the center of the display. The shelves were 8 ½" x 11" in dimension and were arranged on either side of the cart. The picture cards (i.e., test items) were 2" x 2" in dimension and were equally distributed between the four shelves (i.e., six items per shelf). A second set of cards was also mounted on the shelves, behind the primary set, to ensure that no empty spaces appeared on the shelves as items were progressively removed. This controlled for the number of visual-spatial cues available to children during the puppet show and minimized the saliency of items selected near the end of the show.

Test Items. All pictures displayed on the test cards were obtained using Microsoft clipart (see Appendix D for final list). Test items were chosen from a larger set of 48 objects (see Appendix C for the complete list) that shared minimal semantic associations and were conducive to the formation of elaborations (i.e., had obvious functional affordances). The criteria for selecting the final 24 items was, however, primarily dependent on 4- and 6-year-old children's responses to the item labelling task. Only items that were accurately recognized and given the same label by at least 90% of the children were considered as test items. Eight pre-randomized lists were then created to determine the order in which items would be selected during the puppet show (see Appendix E). Participants were randomly assigned to each list.

Procedure

All testing procedures were conducted in a quiet room where children were seated at a table across from the experimenter. Children were tested individually and sessions for both the puppet show and source monitoring test were videotaped to allow for offline transcription of elaboration responses.

Item Selection. A separate group of 4-and 6-year-old participated in a picture labelling task that was used to select test items for the source monitoring task. Children were individually presented with 48 picture cards and asked to provide a label for each item. The experimenter recorded the children's responses online and later coded these responses for accuracy (see Appendix F for sample scoring sheet). Children's responses were considered accurate if the label provided during the task matched the label that was pre-determined by the experimenter. Synonyms were also accepted as accurate responses (e.g., "Lego" in place of "blocks"). For each item, the proportion of accuracy was then calculated by dividing the sum of correct responses by the total number of children sampled ($N = 17$).

Source Monitoring Task. At the beginning of each session, children were randomly assigned to one of four strategy conditions (No Strategy/Surprise, No Strategy/Expected, Elaboration/Surprise, and Elaboration/Expected) and were invited to view a show of two puppets shopping for items in a store. For all conditions, puppet shows began with an introduction of the main characters, Fred and Sally, and a brief description of the event context (e.g., *"This is Sally and this is Fred. Sally and Fred are shopping today and they both need to buy things from this store.")*. Following the introduction, the puppet shows varied depending on the condition that children were assigned to (see Appendix G for condition protocols).

In the *No Elaboration/Surprise* condition, the experimenter completed the introduction by generally instructing children to attend to the puppet show (e.g., *"Watch them as they pick different things from the store"*). The puppets then proceeded to take turns selecting items from the store shelves. As each puppet went to choose an item, they made a general statement of the form *"I need to buy a(n)..."* before removing the item from the shelf and placing it in the grocery cart. This procedure was repeated until all 24 items had been selected and each character had removed an equal number of cards from the shelves.

In the *No Elaboration/Expected* condition, the experimenter completed the introduction by instructing children to pay special attention to the items that each character picked out. Importantly, children were told to attend to this information so that they could later remember the items associated with each puppet (e.g., *"Pay attention to what Sally picks out and what Fred picks out because, later, I will ask you to remember what each of them bought.")*. The puppet show then proceeded in the same manner as the No Elaboration/Surprise condition.

In the *Elaboration/Surprise* condition, the experimenter completed the introduction by instructing children to provide reasons for each puppet's item selections (e.g., *"Every time Sally or Fred chooses something, I want you to tell me why you think* *they need to buy it."*). To ensure that children do not give the same response for each selection, children were additionally instructed to provide a different reason for each item (e.g., "*Try to think of a different reason each time."*). The puppet show then proceeded with a slight variation to the procedures outlined above. After each item was selected by a given character, an interrogative prompt was provided by the experimenter (e.g., "*Why do you think Fred/Sally needs to buy a(n)... ").* Children were then given an opportunity to respond with an elaborative statement before the puppet placed the item in the cart. If children failed to give a response or repeated an answer from a previous selection, the experimenter either repeated the question or prompted the child to think of a different explanation (e.g., *"Good, but can you think of a different reason why Fred/Sally needs to buy a(n)...?"*). If the child still failed to give a response, the experimenter would prompt the child to think of a functional purpose for the test item (e.g., "*What do you think Fred/Sally wants to do with the ___?"*). This procedure was continued until all 24 items had been selected from the store shelves.

Finally, in the *Elaboration/Expected* condition, children were instructed to both remember the items that each character picked out and provide reasons for each selection prior to the onset of the puppet show. The puppet show was then conducted using the same procedure as the Elaboration/Surprise condition, where children were prompted to produce a verbal elaboration with each item that was selected.

All puppet shows were videotaped and transcribed offline for elaboration responses. Any spontaneous elaborations made during the No Elaboration conditions were also recorded in the event that children engaged in spontaneous strategy use.

After the show was completed, props and puppets were put aside and children were engaged in a 5-minute distracter task with the experimenter. The distracter task consisted of either drawing or coloring a picture that was unrelated to the puppet show.

Source Memory Test. Following the distracter task, an external source monitoring test was administered to children from all four strategy conditions. The experimenter placed the grocery cart in the centre of the table with all the original test items still inside. Each puppet was then seated on either side of the cart and was assigned an opaque shopping bag that matched the color of his/her shirt. The shopping bags were used to sort items according to the puppet that they were selected by.

The experimenter introduced the test by telling children that they needed to return the appropriate items to Fred and Sally by correctly sorting all the items that were in the cart (e.g., "*Now we need to give Fred and Sally back all the things they bought from the store. The problem is that the things are mixed up in the cart. Let's see if you can remember what things Sally bought and what things Fred bought so that we can give them back the right things.*"). The experimenter then proceeded to randomly select items from the cart and present them to the child individually. As each item was presented, the experimenter asked the child to recall which of the two characters had selected the item from the store during the puppet show (e.g., "*Did Fred buy the ...or did Sally buy the ...?*"). Children were given an opportunity to respond after each item was presented and were prompted to give their "best guess" if they failed to respond. After a response was given, the experimenter passed the picture card to the child so he/she could place it inside the appropriate shopping bag. In order to avoid response biases, the order in which protagonists were presented in the interrogation (i.e., whether Fred or Sally was mentioned first in the question) was counterbalanced across trials. Responses were coded online but all tests were videotaped to maintain records of participant's responses. The procedure was continued until all 24 cards had been sorted.

Elaboration Test. Immediately following the source memory test, children in both elaboration conditions were also given a memory test for elaboration responses. This test was included to assess whether the effects of elaboration instruction were related to children's ability to recall the verbal associations made during the puppet show. The experimenter introduced the elaboration test by bringing out a second set of cards that were identical to the set used in the source memory test. The experimenter would then tell the child that they were going to play a "*new game*" and that for this task they would be required to remember what they had originally said during the puppet show (e.g., *"Do you remember how you came up with all those excellent reasons during the puppet show? I want to see now if you can remember what you told me during the puppet show. I'm going to show you pictures of things that Fred and Sally bought in the store and I want you to remember the reasons for why they had to buy these things."*). Before presenting the items, the experimenter would then shuffle the cards so that the order of presentation would be random and would be different from the order presented during the source memory test. The experimenter would then proceed to show the child each card individually and ask, "*Do you remember? Why did they have to buy the _____?*". If a child failed to respond or said that they did not remember, the experimenter would proceed with the subsequent item. This procedure was then repeated until all 24 items had been presented. All responses were videotaped and transcribed offline.

Scoring of Data

Source Monitoring Task. Scores for both correct and incorrect source attributions were determined by comparing children's responses to the source monitoring question (e.g., *"Did Fred buy the…or did Sally buy the …?"*) to actual records of what each character selected during the puppet show (i.e., as dictated by the pre-randomized lists). A sample scoring sheet is provided in Appendix H. A correct source response was one that correctly attributed a test item to the puppet that had selected it during the show. An incorrect response was one that attributed a test item to a puppet that had not selected it during the show. Each child received a separate score for correct and incorrect responses. Both scores were divided by the total number of test items (i.e., 24) to produce a proportion score that ranged in value from 0 to 1.0.

To ensure that a bias to attribute items to one puppet over the other did not exist when source errors were made, the number of items incorrectly attributed to each source (i.e., Fred or Sally) was also recorded and given a proportion value. An *error bias* would occur if a disproportionate number of items were incorrectly attributed to one puppet over the other. Conversely, if the numbers of items incorrectly attributed to each puppet were not significantly different from each other, then it could safely be concluded that source errors were randomly distributed between sources. The total number of items that could have been misattributed to each source was 12.

Elaboration Test. Children's responses to the elaboration prompt during the puppet show (i.e., *"Why do you think Fred/Sally needs to buy a(n) ___?"*) were transcribed and compared to their responses to the elaboration test question (*"Why did they buy a(n)?"*). Each child received a separate score for the total number of matches and the total number of errors that they produced (see Appendix I for Elaboration coding criteria). These scores were then divided by the total number of possible responses (typically 24) to produce a proportion score ranging in value from 0 to 1.0. Trials were not included if the child did not give a verbal response to the elaboration question (e.g., if they provided a motion or hand gesture instead) or if the experimenter could not understand what was said.

An error was defined as an instance when the *gist*, or general meaning, of the statement made during the elaboration test did not match the statement made during the puppet show. Four specific criteria were used to further define instances of elaboration recall error. First, an error was coded if the action denoted by the child's statement at test did not match the action denoted by their statement during the show (e.g., *"to play the with the kite"* vs. *"to fly it"*). Second, an error was coded if the intended purpose of the test item denoted at test did not match the intended purpose denoted during the show (e.g., *"because it's his birthday"* vs. *"because someone is hungry"*). Third, an error was coded if a child specified both an action and a purpose at test (e.g., *to call a friend for a birthday"*) but did not specify the same action and purpose during the show (e.g., *"to call a friend to come over")*. Finally, if a child could not remember their initial response during the elaboration test (e.g., *"I don't remember"* or *"I don't know"*) then it was also coded as an error. This final type of error was additionally coded as an *error or omission* because the child chose not to provide a response during test. The first three types of errors were conversely coded as *errors of commission.*

Similar criteria were used to define instances of statement matches. Specifically, matches were coded in one of two ways: verbatim and gist. A *verbatim* match was defined as any instance where the statement made during test was identical or *near identical* to the statement made during the show (e.g., *"to eat"* vs. *"to eat"*). Near identical matches were defined as instances where only the tense (e.g., *"she wants to play with it"* vs. *"she wanted to play with it"*) or pronoun used (e.g., *"because he has to go to school"* vs. *"because they had to go to school"*) varied between test and show statements. These responses were coded as verbatim matches because the elaboration test question incorporates the pronoun "they" and refers to the puppet show in past tense, thereby warranting minor changes in the statement structure. Similarly, verbatim matches were also coded if the statement made at test and the statement made during the show only varied by the inclusion of the words "because", "so", or "to" at the beginning of the statement (e.g., *"because she wants to play music"* vs. *"she wants to play music"*).

Whenever two statements were similar in content but failed to meet the above criteria, the instance was coded as a gist match. Specifically, a *gist* match was defined as any instance when the general meaning of the statement made at test was the same as the general meaning of the statement made during the show. Similar to the coding of errors, gist matches were also coded according to three specific criteria. First, a match was coded if the action denoted by the statement at test matched the action denoted by the statement during the show (e.g., *"to phone people"* vs. *"to call people"*). Second, a match was coded if the intended purpose of the test item denoted at test match the intended purpose denoted during the show (e.g., *"he doesn't have a chair for himself"* vs. *"for Fred…they didn't have a seat for them"*). Finally, a match was coded if a child provided a more detailed statement during either the test or the show, but the gist of the smaller statement was embedded in the larger statement (e.g., *"because he's thirsty and he has to put it in his cereal"* vs. *"because they were thirsty"*).

CHAPTER 3: RESULTS

Homogeneity of Age

For each age group, a one-way between-subjects analysis of variance (ANOVA) was performed to ensure that children did not vary significantly in age across conditions. Age in months was the dependent variable while type of strategy condition (No Elaboration/Surprise, No Elaboration/Expected, Elaboration/Surprise, and Elaboration/Expected) was the independent variable (see Table 2 for summary of age means).

Within the 4-year-old sample, equal variances were assumed because the Levene's test for equality of variances was not significant $F(3, 60) = .22$, $p = .89$. Results indicated that there was not a significant difference in age between strategy conditions, $F(3, 60) = .133$, $p = .940$.

Similarly, within the 6-year-old sample, equal variances were assumed because the Levene's test for equality of variances was not significant $F(3, 60) = .40$, $p = .76$. Results indicated that there was not a significant difference in age between strategy conditions, $F(3, 60) = .098$, $p = .961$.

Analysis of Source Memory Accuracy

A 2(Age: 4-year-olds vs. 6-year-olds) x 2(Elaboration: No Elaboration vs. Elaboration) x 2 (Test Expectancy: Surprise vs. Expected) x 2(Gender: Male vs. Female) x 8(List Order) between-subjects factorial analysis of variance (ANOVA) was initially conducted with proportion of correct source attributions as the dependent variable. Effect sizes are reported as Cohen's f values (Cohen, 1992). Although neither gender nor the order of test item selection was a main variable of interest in this study, both were included as factors in the analysis to assess for their potential effects on source memory performance. List order was removed from all subsequent analyses after it was determined that the proportion of correct source attributions did not significantly vary across the eight lists of item orders, $F(7, 43) = 1.28, p = .28$ (Cohen's $f = .46$).

A 2(Age: 4-year-olds vs. 6-year-olds) x 2(Elaboration: No Elaboration vs. Elaboration) x 2 (Test Expectancy: Surprise vs. Expected) x 2(Gender: Male vs. Female) between-subjects factorial analysis of variance (ANOVA) was then conducted using the proportion of correct source attributions as the dependent variable. Table 4 summarizes the proportion of correct source scores obtained across age, elaboration, and test expectancy conditions.

The Levene's test was not significant, $F(15, 112) = 1.67, p = .07$, indicating equal variance across groups. Results indicated no significant main effect of test expectation, $F(1, 112) < .00$, $p = .99$ (Cohen's $f = .05$), or age group, $F(1, 112) = 1.19$, $p = .28$ (Cohen's $f = .01$). A significant main effect was found, however, for both gender and elaboration instruction. Girls produced a significantly greater proportion of correct source attributions ($M = .86$, $SD = .12$) than boys ($M = .83$, $SD = .12$), $F(1, 112) = 4.03$, $p = .05$ (Cohen's $f = .44$). Children in the elaboration conditions also produced a significantly greater proportion of correct source attributions ($M = .88$, $SD = .10$) than children who did not receive elaboration instruction ($M = .81$, $SD = .13$), $F(1, 112) = 10.97, p = .001$ (Cohen's $f = .37$). No interactions were significant.

Although age did not significantly interact with either test expectation or type of elaboration strategy instruction, planned effects tests were conducted within each age group to assess for group differences. Specifically the interaction between elaboration strategy instruction, test expectation, and gender was assessed for each age group. In order to control the family-wise error rate, a Bonferroni correction was applied, yielding a critical alpha level of .025.

For 4-year-old children, neither the main effect of test expectation $F(1, 56) = .12$, $p = .73$ (Cohen's $f = .05$), nor gender $F(1, 56) = .15$, $p = .70$ (Cohen's $f = .06$) were significant. The main effect of elaboration strategy instruction, however, was significant. Children in the elaboration conditions made significantly more accurate source attributions ($M = .88$, $SD = .12$) than children who did not receive elaboration strategy instruction ($M = .79$, $SD = .12$), $F(1, 56) = 8.14$, $p = .006$ (Cohen's $f = .38$). No interactions were significant.

For 6-year-old children, neither the main effect of test expectation $F(1, 56) = .20$, $p = .66$ (Cohen's $f = .06$), nor elaboration strategy instruction $F(1, 56) = 3.0$, $p = .09$ were significant, although the main effect of elaboration instruction did approach significance and showed a moderate effect size (Cohen's $f = .23$). The main effect of gender was significant. Girls were significantly more accurate ($M = .89$, $SD = .08$) than boys in the source memory test ($M = .82$, $SD = .12$), $F(1, 56) = 7.39$, $p = .009$ (Cohen's $f = 0.36$). No interactions were significant.

Performance Against Chance. A one-sample t-test was conducted within each age group to compare children's performance against chance. The dependent variable was the proportion of correct source attributions. Because the probability of correctly attributing source to a given test item was 50% in the current task (each character selected half of the test items during the puppet show), proportion scores were compared to a chance value of .5.

Results indicated that both 4- and 6-year-old children performed significantly above chance. Across all conditions, four-year-olds had a mean score of .83 (*SD* = .13), $t(63) = 20.83, p < .001$. Across all conditions, six-year-olds had a mean score of .85 (*SD* = .11), $t(63) = 25.99, p < .001$.

Spontaneous Elaborations. Only five participants, out of a total of 64, produced spontaneous verbal elaborations in the no elaboration conditions. This sample consisted of three 4-year-olds and two 6-year-olds. In all five cases, elaborations were only produced for a few items during the puppet show and did not necessarily associate the items with the protagonist that was acting upon them (e.g., *"I have lego at home", "I wonder what the book is about").* Given that spontaneous elaborations were so rare in the no elaboration conditions, it was not possible to conduct further analysis to see if the production of spontaneous elaborations was related to performance on the source memory test.

Analysis of Source Memory Errors

A one-way within-subjects analysis of variance (ANOVA) was conducted to assess for potential biases in children's source attribution errors. Source error type was analysed as a within-subjects factor so that the number of items that were misattributed to the male puppet (Fred) could be compared to the number of items misattributed to the female puppet (Sally). The dependent variable was the proportion of source errors.

Results indicated that there were no significant differences between the number of errors attributed to Fred (*M* = .07, *SD* = .07) and the number of errors attributed to Sally (*M* = .08, *SD* = .07), $F(1, 127) = 1.473, p = .227$.

Analysis of Elaboration Test Scores

Reliability of Elaboration Coding. The elaboration test scores of 14 participants were coded twice by separate researchers to assess the reliability of elaboration coding. The 14 participants comprised 23.73% of the total sample (N = 59) and were randomly selected from both age groups and elaboration conditions. Inter-rater agreement was calculated by summing the number of items that both researchers agreed upon and dividing it by the total number of items coded. Initially, this yielded a very high inter-rater agreement value of 97%. Consensus on items that were initially disagreed upon was reached, however, using criteria outlined in Appendix H. The final proportion of inter-rater agreement was 100%.

Effect of Elaboration Recall on Source Memory Performance. To assess whether children's recall of verbal elaborations was predictive of their source memory performance, source memory scores for children who participated in both elaboration conditions were regressed against their scores on the elaboration memory test. The proportion of response matches made by each participant during the elaboration test was used as a measure of accurate elaboration recall. The proportion of correct source attributions made by children during the source memory test was used as a measure of accurate source memory. Figures 1 & 2 illustrate the distribution of scores for both the elaboration recall and source memory test respectively. On average, children of both age groups were able to recall their original elaborations 86% of the time (SD = .09). When recall errors were made, only 4% of them were errors of omission (i.e., when a child failed to give any response because he or she could not remember).

Results from the linear regression indicated that elaboration recall did not account for a significant amount of variance in children source memory performance, $R^2 = .006$, $F(1, 57) = .345$, $p = .56$. A scatterplot showing the relation between elaboration recall and source memory is shown in Figure 3. Because elaboration recall did not significantly predict source memory performance, further analysis of verbatim and gist recall was not conducted.

CHAPTER 4: DISCUSSION

The present study was designed to answer three critical questions with regards to children's source monitoring abilities: (1) whether explicit elaboration strategy instruction could lead to improvements in children's source monitoring performance, (2) whether elaboration instructions differentially affect the source monitoring performance of 4- and 6-year-old children, and (3) whether the effects of elaboration strategy instruction are attenuated by children's test expectancy or their ability to recall previously made verbal elaborations. In the following section, each of these questions will be addressed in relation to the current findings. Implications for current theories of source monitoring development will also be discussed, followed by a discussion of practical applications for the current research. This section will then conclude with a suggestion for future research that would clarify the relationship between source monitoring and associative encoding processes.

The Effects of Elaboration Instruction on Source Memory

It was initially hypothesized that across both age groups, source monitoring performance would be significantly better in conditions where children were given explicit elaboration strategy instruction vs. conditions where they were not. This prediction was largely based on previous research (Pressley, 1982) indicating that children could effectively use verbal elaboration strategies to improve recall for previously associated item pairs. What was previously unclear, however, was whether elaboration strategies could be used as an effective means of binding source related information. There was also no research to date that had examined the direct effects of elaboration strategy use on source monitoring.

Results from the present study indicate that elaboration strategies can be used as an effective means of increasing children's source memory accuracy. Regardless of age or test expectancy condition, children in both Elaboration Conditions produced significantly more accurate source attributions than children in either of the No Elaboration conditions. Moreover, because the elaborations made during the puppet show were verbal associations between source relevant characteristics (i.e., between the puppets and the items they selected), elaboration strategies may have effectively assisted children in the binding of source information at encoding.

Age Differences in Source Monitoring Performance

Although it was initially predicted that both 4- and 6-year-old children would be able to utilize elaboration strategies, it was not entirely clear if 4-year-olds would significantly benefit from this instruction (i.e., demonstrating a utilization deficiency). Although previous research in the area of memory strategy development has shown that children as young as 4-years can effectively be trained to use elaboration instructions (Pressley, 1982), research in the areas of binding and source monitoring has suggested that 4-year-olds may lack a conceptual ability to represent multiple event characteristics in combination (Kovacs & Newcombe, 2006; Sluzenski, et al., 2006). Findings from the current study did not support this argument.

Across both age groups, children demonstrated significant improvements in source monitoring accuracy following explicit elaboration strategy instruction. Although not qualified by a significant age by elaboration interaction, patterns in children's source memory performance also suggest that 4-year-olds exhibited equal, if not larger, gains in source memory performance when compared to 6-year-olds (see Table 4). Four-year-olds demonstrated slightly, but not significantly, less accurate source memory scores than 6-year-old children when explicit elaboration strategy instruction was not provided. When elaboration instruction was provided, however, 4-year-olds were equally as accurate as 6-year-old children. These results indicate that 4-year-olds do not lack the ability to encode and represent event characteristics in combination. In contrast, findings from the current study demonstrate that children as young as 4-years can benefit from elaboration strategy instruction to increase their performance on source monitoring tasks.

A possible reason why 4-year-olds were able to associate event characteristics in the current study but not in previous research (i.e., Kovacs & Newcombe, 2006) is that children were prompted to produce unique elaborations for each test item during the initial encoding task. In the study conducted by Kovacs and her colleagues (2006), children were far more restricted in the types of elaborations that could be formed (e.g., "*Do you feel the same as my friend?*" vs. "*How does my friend feel about that*") which may not have assisted them with the encoding and subsequent binding of *unique* source information. In contrast, children in the current study were encouraged to come up with different reasons for each protagonist's actions (e.g., *"Why do you think Sally wants to buy a book?"*). This led children to produce associations that were more specific to the sources and test item characteristics (e.g., *"To read and have some private time by herself with a fire"*). Given the robust nature of these findings, the role of associative processes in children's source monitoring development will be further revisited in a later section.

Factors That Could Attenuate the Effects of Elaboration Strategies

Test Expectancy. It was initially predicted that the benefits of elaboration strategy instruction on source monitoring performance might be attenuated by children's knowledge of an impending source memory test. This was based on previous research indicating that older children sometimes benefit from instructions to attend to source relevant information during encoding (Foley et al., 2002; Russell and Jarrold, 1999). Results from the current study did not, however, support this prediction. Across both levels and elaboration strategy instruction (no elaboration and elaboration conditions), manipulations of test expectancy had no significant effect on children's source memory accuracy.

There are two possible explanations for why children's source monitoring performance was not affected by test expectancy in the current study. First, it is possible that test expectancy increased children's attention to source relevant information but this was not sufficient to produce significant improvements in source memory accuracy. Additional processes, such as binding, may have therefore been necessary to assist children in the proper representation and retrieval of source relevant information. Alternatively, the manipulations of test expectancy used in the current study may have been too subtle to induce 4- and 6-year-old children to attend to source relevant characteristics during encoding. This explanation would coincide with previous literature suggesting that children younger than 7-years of age have difficulty constraining their attention to relevant event details when trying to improve their subsequent recall (DeMarie-Dreblow, & Miller, 1988; Hall, Miskiewics, & Murray, 1977). Children in the current study may have, therefore, failed to benefit from test expectancy manipulations because they were unable to use them as effective encoding cues. Because the current study was not designed to assess these two possible explanations, it is not possible to determine which is most representative of the current data.

Elaboration Recall. A prediction was not initially made regarding the relation between elaboration recall and source monitoring, however, data from the elaboration recall test may still provide valuable insight into how elaborations assist with the binding and representation of source information. Specifically, the degree to which elaboration recall is predictive of source memory accuracy may be indicative of the manner in which bound information is represented in memory.

As mentioned previously, binding processes may assist with the representation of source information in one of two possible ways: (a) by forming conjoined representations that incorporate both source and event characteristics, or (b) by increasing the strength of association between independently represented source and event characteristics (Chalfonte & Johnson, 1996). Because verbal elaborations *are* complex event representations that conjoin both source and event information, then it is possible that these unique associations need to be retained in memory in order for improvements in source monitoring to occur. Alternatively, if binding works to increase the strength of association between related but independently represented event details, then it may not be as necessary to retain elaborations in memory after they have been produced.

Results from the current study indicated preliminary support for the latter of the two accounts. No significant relation was found between elaboration recall and source monitoring performance. Memory for a previously formed elaboration was, therefore, not found to be necessary for children to experience improvements in source memory accuracy. In addition, these findings suggest that elaboration strategies may assist with the binding of source relevant information by increasing the strength with which co-occurring event characteristics are associated in memory.

Gender. Although not initially predicted, a main effect of gender was found in the current study. When averaged across age and strategy conditions, a small yet significant difference was found between the performance of girls (86% accuracy) and boys (83% accuracy), although gender did not significantly interact with any other variables. This finding is difficult to interpret because previous literature has not typically shown a gender difference in children's source memory performance (Roberts, 2002). Gender differences are also not typically seen in relation to children's encoding and retrieval abilities (Oakes & Bauer, 2007). When gender effects do appear in children's memory, they are sometimes due to the fact that children are better at remembering information that is more typically associated with their own gender than with the opposite gender (Cherney & Ryalls, 1999; Bennett & Sanio, 2003). Gender differences in the current study may have, therefore, been related to the theme of the source monitoring task. Because shopping is a behaviour that is more typically attributed to females than to males, it is possible that the context provided girls with slight memory advantage. This conclusion is difficult to assess, however, because there is no evidence suggesting that girls attended more to the puppet shown than boys in the current study.

Implications for the Development of Source Monitoring

The findings from the current study have important implications for the current understanding of source monitoring development. In particular, the results from this study highlight the importance of encoding processes to the source monitoring performance of preschool children. In addition, these findings underscore the importance of associative processes to the encoding and representation of source information. In the following section, each of these implications will be discussed in relation to children's developing source monitoring abilities.

The Role of Encoding Processes in Children's Source Monitoring. Because source attributions are thought to occur during the retrieval of memory information, much of the research on children's source monitoring has focused on the development of strategic retrieval processes (Roberts, 2002; Roberts, Evans & Parker, 2007). Although findings from the current study do not negate the importance of retrieval processes, they do indicate that the quality of encoding processes can also have significant effects on the accuracy of children's source attributions. In particular, results from this study illustrate how important it is for children to encode source specifying information during an event to make accurate source judgments at retrieval. The findings also suggest that the encoding of source specifying information can be significantly improved through strategies that assist children in the association of event characteristics.

The Role of Associative Processes in Children's Source Monitoring. Although previous research has shown a potential relationship between binding and source monitoring abilities (Chalfonte & Johnson, 1996; Sluzenski et al., 2006) no study to date has directly examined the means by which binding processes may be used in early childhood. This issue was addressed in the current study by directly manipulating children's use of binding processes through the use of elaboration strategies. The fact that elaboration strategy instruction produced significant improvements in children's source monitoring performance consequently provides strong evidence for the role of binding processes in source memory. In addition, the fact that instructions to attend to source information did not produce any differences in children's performance suggests that binding processes may be more important to source monitoring than selective attention.

Findings from the current study also provided some insight into the mechanisms by which elaborations might assist with the binding of source information. First, current results lend preliminary support to the account that elaborations increase the strength of associations between co-occurring, but independently represented event details. Although it is still possible that elaborations can form complex event representations between source and event characteristics, results from the elaboration recall test demonstrate that source memory is not dependent on the recall of verbal associations. Furthermore, it may be the case that elaborations formed between source and event characteristics must be *unique* in order to produce significant benefits at retrieval. Unlike previous research, children in the current study were encouraged to produce different associations for each test item that they were presented with. This factor may have contributed to the effects of elaboration instruction because it additionally increased the *distinctiveness* of each association that was made. As outlined by source monitoring theory (Johnson et al., 1992), factors that increase the distinctiveness of source characteristics may in turn lead to increases in source memory accuracy.

In terms of developmental implications, the current study is also the first to date that has successfully manipulated the use of binding processes in children as young as 4-years-of age. Previous research examining the relation between binding and source monitoring abilities has demonstrated that only children older than 5-years can benefit from binding processes at encoding (Kovacs & Newcombe, 2006). Results from the current study, however, negate this previous conclusion. When children as young 4-years are consistently instructed to form verbal associations between event characteristics and potential sources, they are more likely to make accurate source attributions at retrieval. Results from this study therefore demonstrate that children are capable of effectively binding source information at a younger age than was previously believed.

Finally, it is possible that changes in children's ability to engage in spontaneous binding processes may account for development improvements in children's source monitoring abilities. Although 6-year-olds did not appear to benefit any less from elaboration strategy instruction in the current study, it is possible that children older than 4-years require less consistent prompting in order to engage in elaborative processes at encoding. Previous research, after all, has indicated that 6-year-olds posses more advanced binding abilities than 4-year-old children (Sluzenksi et al., 2006). The ability to spontaneously engage in elaboration strategies also improves with age during later childhood (Pressley, 1982). Age differences may, therefore, not have been observed in the current study because the same amount of strategy instruction was provided to both age groups, regardless of how much was actually needed. Future research could further address this issue by examining whether older children can benefit from less consistent prompting of strategy use. Similarly, future research could examine whether older children are more capable of generalizing elaboration strategies to novel contexts following an initial phase of instruction.

Implications of Current Findings for Applied Contexts

Eye Witness Testimony. Source monitoring research has typically been applied to forensic contexts and the assessment of children's eye witness testimonies (Roberts, 2002; Thierry & Spense, 2002). When asked to provide testimony in legal settings, children are often asked to recall details related to specific events in their past. In the case of repeated criminal events (e.g., cases of abuse), children must additionally distinguish between multiple events that are similar in nature in order to describe the appropriate information. Given the importance of making accurate source attributions in these contexts, it is not surprising that the role of strategic processes have also been examined in relation to children's eye-witness testimony (Thierry & Spence, 2002). Unlike the current study, however, research on children's eye witness testimony is far more focused on the role of retrieval strategies in children's source monitoring performance. This focus is understandable given the fact that legal investigators cannot go back and change the manner in which children encode criminal events after they have happened. What the current research does contribute to the area of forensic psychology, however, is an understanding that children's accuracy in making testimonies is just as affected by the processes they engage at encoding as they are by the manner in which they retrieve information. In addition, the current research clarifies the ages at which children are capable of forming reliable event representations. Specifically, this research indicates that children as young as 4-years of age are able to effectively associate related source characteristics in contexts that are supportive of this type of encoding.

Educational Settings. The current findings are perhaps most directly applicable to contexts of education and strategy instruction. The development of episodic and source memory abilities are important to early education because they assist children in the evaluation and retention of learned information. For example, children's ability to attribute origin (e.g., textbook vs. tv) to their knowledge of certain facts may assist them in evaluating the validity of that information. Strategies that are found to assist children in source monitoring tasks could consequently be applied in educational contexts to assist with children's retention of new information.

In the current study, it was demonstrated that elaboration strategy instruction can produce significant improvements in the source monitoring of young children, even before they are of school age. This finding builds upon early research in strategy development which, to date, has only demonstrated the effectiveness of elaboration strategy instruction on children's recall of associated item pairs (Bjorklund & Douglas, 1997; Pressley, 1982). More importantly, the effectiveness of elaboration strategy instruction on children's source memory for actions suggests that similar instructions could be applied to different types of source monitoring, such as memory for the source of one's knowledge. Instructing children to associate related event details during the learning of a task could therefore produce significant improvements in both the quantity and quality of information that they retain.

Social Biases. Factors that increase the accuracy of source judgements, such as elaboration and binding, might also have important implications for the understanding of social biases. Social biases are pre-existing beliefs or stereotypes can influence not only the way in which information is cognitively processed (e.g., the formation of decisions and beliefs) but also the behaviours that arise from such processing (e.g., instances of overt discrimination) (Nisbett & Wilson, 1977; Govorun & Payne, 2006; Payne, 2006). Although the effects of social biases can be very difficult to overcome (Nisbett & Wilson, 1977), the strength of their effects may be reduced by the degree to which individuals can exert cognitive control over their decision-making processes (Govorun & Payne, 2006; Payne, 2006). Source monitoring may, therefore, reduce social bias effects by providing individuals with a means by which to control and evaluate the information that they obtain from their environment. In particular, source monitoring may increase the likelihood that individuals would attribute their inaccurate judgements to pre-existing sets of beliefs.

Based on the finding of the current study, it is possible that the effects of social biases might also be influenced by the way in which event information is initially encoded. For example, individuals who are better able to associate environmental cues to their pre-existing biases may be more likely to engage in controlled cognitive processing. Increasing the strengths of those associations may consequently increase the accuracy with which source attributions are made and reduce the effects of social biases.

Future Directions

Although the current study lends strong support for the role of binding processes in source monitoring, it is still unclear whether encoding processes must be associative in nature in order to produce significant improvements in children's source memory. Alternatively, it is possible that children's source monitoring performance may influenced by the strength with which individual details are encoded and represented in memory. This issue was somewhat addressed in the current study by including a manipulation of test expectancy. This manipulation allowed for a comparison between the effects of elaboration and selective attention strategies. As previously discussed, however, the manipulation of test expectancy may not have provided a strong enough measure of selective attention. Selective attention is also not a direct measure of representation strength and, therefore, could not be used to fully examine its role in source monitoring.

A more direct way of comparing associative processes and representation strength would be to compare the effects of elaboration strategies to other strategies that do not explicitly promote associations between event characteristics. Specifically, the contribution of elaboration strategies to children's source monitoring performance could be compared to the contribution of rehearsal strategies – i.e., repeated encoding of individual event details. Rehearsal is an effective means of increasing the strength with which event details are encoded and, importantly, is a strategy that is known to develop very early in childhood (Bjorklund & Douglas, 1997). By manipulating children's ability to use either rehearsal or elaboration strategies at encoding, it would therefore be possible to compare the relative contribution of each strategy to children's source monitoring performance. Importantly, this design would clarify whether associative processes are necessary for improvements in source monitoring to occur.

Conclusions

Many questions still remain regarding the role of binding and elaborative processing on children's source monitoring development. The purpose of the current study was to clarify the nature of this relationship and provide further support for the importance of associative processing to source monitoring. Overall, it was found that the source memory of both 4- and 6-year-old children significantly improved following instructions to use elaboration strategies at encoding. These results lend strong support for the role of binding processes in children's source monitoring performance. The results also indicate a possible relation between the development of binding processes in early childhood and the development of children's source and episodic memory skills.

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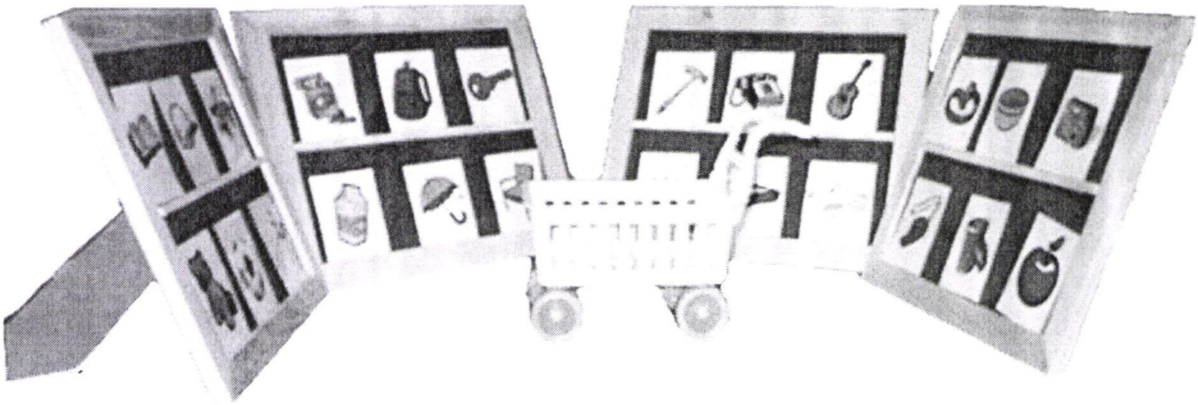
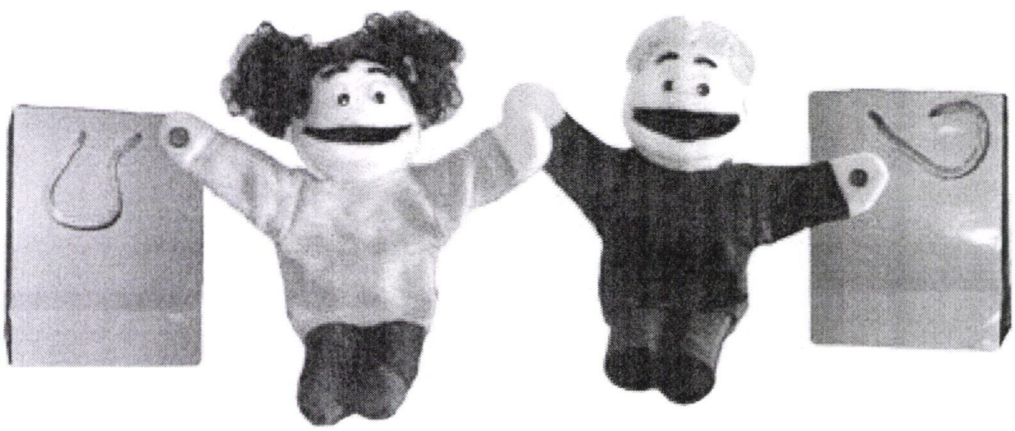
APPENDIX A

Sample Display, Props and Puppets

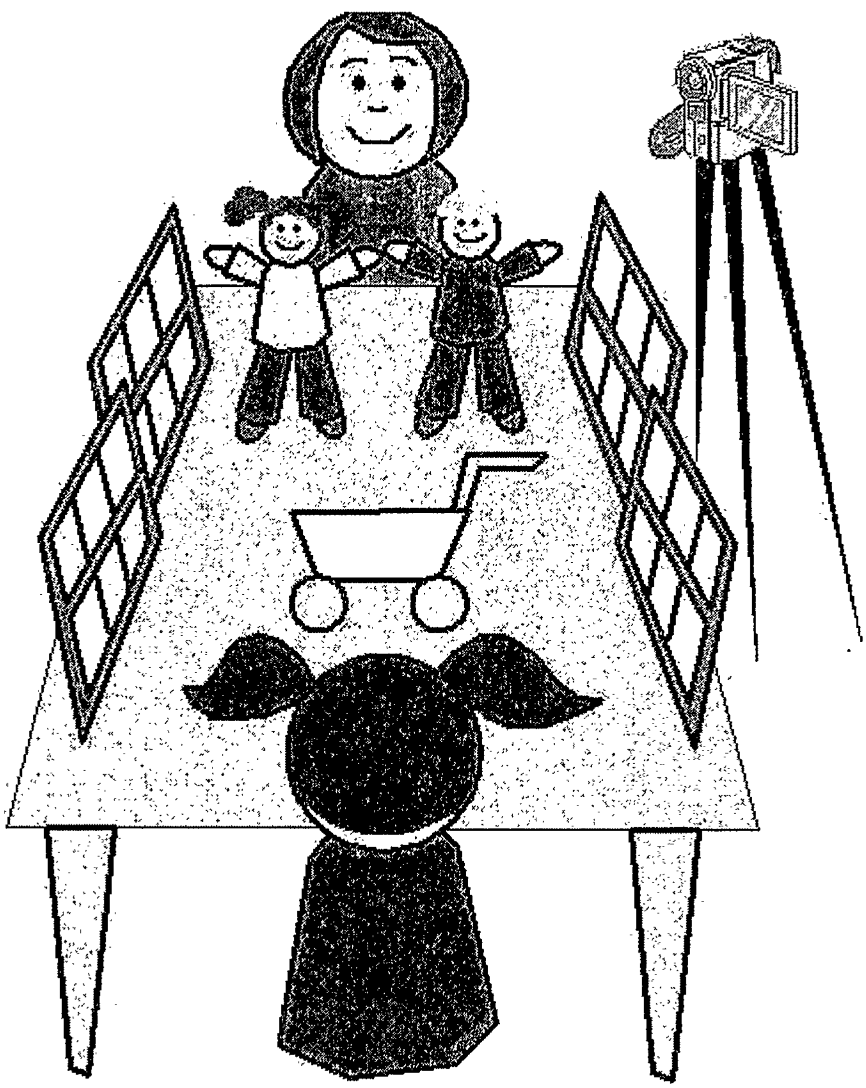




Sally Fred

APPENDIX B

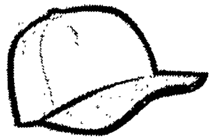
Illustration of Study Setup



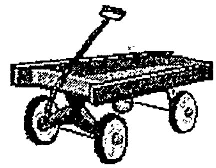
APPENDIX C

Complete Set of Potential Test Items and Labels for Source Monitoring Task

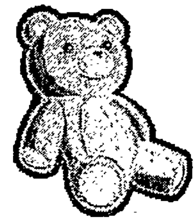
book



hat



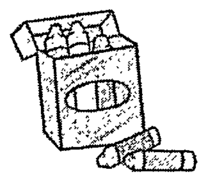
wagon



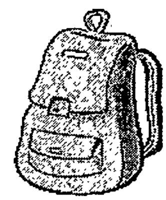
Teddy bear

Soccer ball

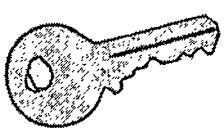
scissors



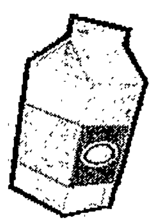
crayons



backpack

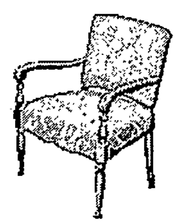


key

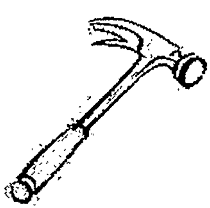


milk

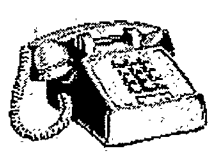
umbrella



chair



hammer

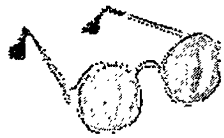


phone

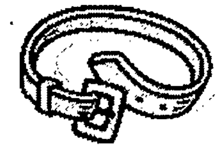
guitar

birthday cake

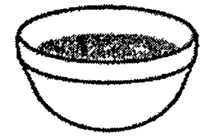
flashlight



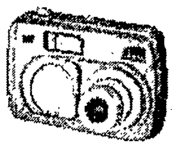
glasses



belt

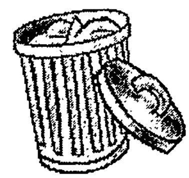


bowl

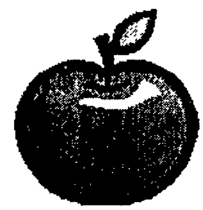


camera

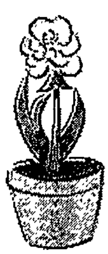
whistle



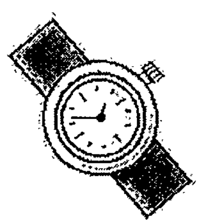
garbage can



apple



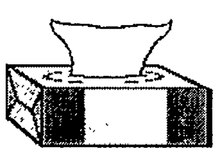
flower



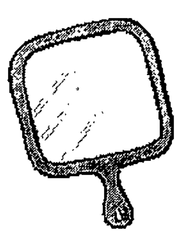
watch

skate

paintbrush

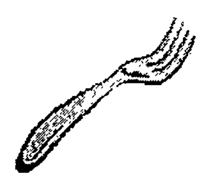


Kleenex or tissue

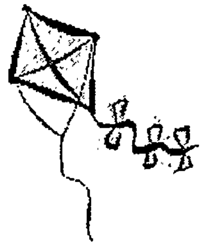


mirror

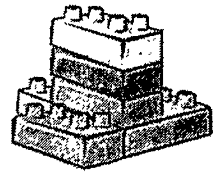
bucket

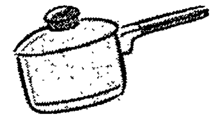


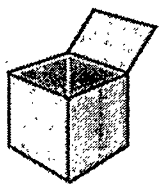
fork

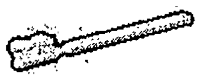

kite


puzzle


Lego or blocks

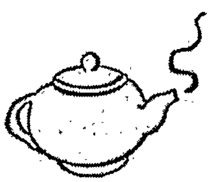

pot


box

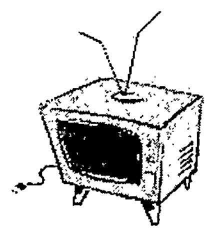

toothbrush

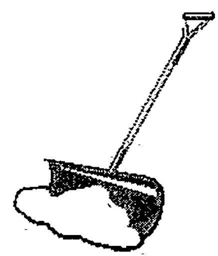

shirt


drum

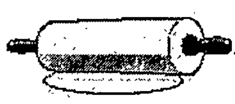

teapot

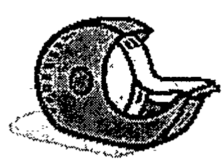

ring

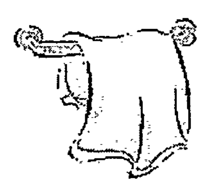

TV


shovel


microphone


Rolling pin


tape


towel

APPENDIX D

Final Set of Test Items and Labels for Source Monitoring Task

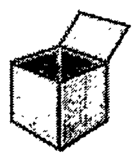

Umbrella


Apple


Whistle

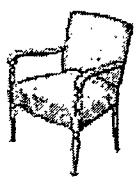

Drum

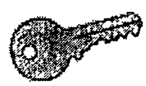

Blocks


Box


Kite


Towel


Chair

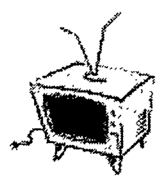

Key

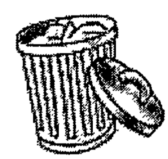

Telephone


Book


Birthday Cake


Milk


TV

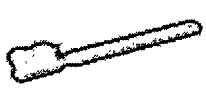

Garbage Can

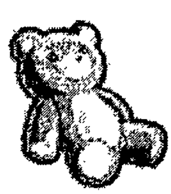

Hammer

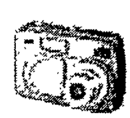

Fork


Scissors


Soccer Ball


Toothbrush


Teddy Bear


Camera


Backpack

APPENDIX E

List Orders for Test Items

List 1	
1	umbrella
2	apple
3	whistle
4	drum
5	birthday cake
6	milk
7	tv
8	garbage can
9	lego
10	box
11	kite
12	towel
13	hammer
14	fork
15	scissors
16	soccer ball
17	chair
18	key
19	telephone
20	book
21	toothbrush
22	teddy bear
23	camera
24	backpack

List 2	
1	teddy bear
2	apple
3	key
4	milk
5	lego
6	soccer ball
7	book
8	birthday cake
9	kite
10	telephone
11	garbage can
12	hammer
13	drum
14	camera
15	fork
16	backpack
17	umbrella
18	whistle
19	chair
20	box
21	scissors
22	tv
23	toothbrush
24	towel

List 3	
1	tv
2	telephone
3	kite
4	lego
5	box
6	teddy bear
7	soccer ball
8	camera
9	drum
10	apple
11	hammer
12	garbage can
13	fork
14	key
15	towel
16	umbrella
17	whistle
18	backpack
19	toothbrush
20	chair
21	birthday cake
22	milk
23	book
24	scissors

List 4	
1	telephone
2	hammer
3	soccer ball
4	apple
5	backpack
6	kite
7	scissors
8	box
9	tv
10	fork
11	garbage can
12	chair
13	lego
14	teddy bear
15	milk
16	birthday cake
17	whistle
18	key
19	toothbrush
20	drum
21	book
22	umbrella
23	camera
24	towel

List 5	
1	scissors
2	umbrella
3	milk
4	whistle
5	fork
6	towel
7	toothbrush
8	chair
9	camera
10	apple
11	key
12	soccer ball
13	teddy bear
14	telephone
15	drum
16	kite
17	tv
18	backpack
19	book
20	box
21	garbage can
22	lego
23	birthday cake
24	hammer

List 6	
1	garbage can
2	chair
3	camera
4	kite
5	scissors
6	milk
7	umbrella
8	whistle
9	key
10	backpack
11	hammer
12	soccer ball
13	teddy bear
14	towel
15	drum
16	book
17	telephone
18	lego
19	toothbrush
20	tv
21	fork
22	birthday cake
23	apple
24	box

List 7	
1	kite
2	milk
3	teddy bear
4	scissors
5	book
6	birthday cake
7	key
8	tv
9	hammer
10	apple
11	backpack
12	lego
13	toothbrush
14	fork
15	camera
16	whistle
17	soccer ball
18	chair
19	umbrella
20	drum
21	telephone
22	box
23	garbage can
24	towel

List 8	
1	towel
2	scissors
3	book
4	drum
5	backpack
6	box
7	birthday cake
8	key
9	garbage can
10	kite
11	camera
12	milk
13	toothbrush
14	lego
15	whistle
16	fork
17	telephone
18	tv
19	teddy bear
20	soccer ball
21	chair
22	hammer
23	umbrella
24	apple

APPENDIX F

Sample Scoring sheet for Item Labelling Task

Participant #: ______

Item Identifcation

Name	Correct Response?	Alternate Name
book		
hat		
wagon		
teddy bear		
soccer ball		
scissors		
crayons		
backpack		
key		
milk		
umbrella		
chair		
hammer		
telephone		
guitar		
birthday cake		
flashlight		
glasses		
belt		
bowl		
camera		
whistle		
garbage can		
apple		
flower		
watch		
skate		
paint brush		
kleenex		
mirror		

Name	Correct Response?	Alternate Name
bucket		
fork		
kite		
puzzle		
lego		
pot		
box		
toothbrush		
shirt		
drum		
teapot		
ring		
tv		
shovel		
microphone		
rolling pin		
tape		
towel		

Gender: ______________

Birthdate: ________________________

Date Tested: _____________________

APPENDIX G

Protocols for Study Conditions

Protocol for the No Strategy/Surprise Condition

Puppet Show:

Experimenter and child sat at a table across from each other and props were set up in advance. The experimenter held up each puppet and said:

"This is Sally (referring to the first puppet) *and this is Fred* (referring to the second puppet). *Sally and Fred are shopping today and they both need to buy things from this store. Watch them as they pick out things from the store."*

The experimenter then proceeded with the puppet show. The experimenter manipulated the actions and provided distinct voices for each of the puppets. The puppets took turns selecting items from each of the four shelves and, before selecting an item, made a statement in the form of:

"I need to buy a(n)... ".

Puppets then placed their selected items in a shared grocery cart that was in the center of the display.

The show continued until each puppet had selected 12 items (approximately 5 minutes). Once complete, all props were placed aside and out of view from the child.

Distracter Task:

Following the puppet show, the experimenter engaged the child in a distracter task that took approximately 5 minutes to complete. This task consisted of either drawing or coloring pictures that were unrelated to either the preceding or subsequent tasks.

Source Monitoring Task:

Immediately following the distracter task, the experimenter placed the grocery cart (with all the item cards that were selected during the puppet show) in the center of the table and positioned each puppet on either side of the cart. She then said:

"Now we need to give Fred and Sally back all the things they bought from the store. The problem is that the things are mixed up in the cart. Let's see if you can remember what things Sally bought and what things Fred bought so that we can give them back the right things."

The experimenter then proceeded to randomly pull out one card at a time from the cart. After pulling out each card the experimenter asked:

"Did Fred buy the ________________ or did Sally buy the ___________________?

(or on alternating trials)

"Did Sally buy the ________________ or did Fred buy the ____________________?

After the child responded, the experimenter passed the card to the child so that they could place it inside the appropriate shopping bag. This procedure was continued until all 24 cards had been sorted.

Protocol for the No Strategy/Expected Condition

Puppet Show:
Experimenter and child sat at a table across from each other and props were set up in advance. The experimenter held up each puppet and said:

"This is Sally (referring to the first puppet) *and this is Fred* (referring to the second puppet). *Sally and Fred are shopping today and they both need to buy things from this store. Pay attention to what Sally picks out and what Fred picks out because, later, I will ask you to remember what each of them bought"*

The experimenter then proceeded with the puppet show. The experimenter manipulated the actions and provided distinct voices for each of the puppets. The puppets took turns selecting items from each of the four shelves and, before selecting an item, made a statement in the form of:

"I need to buy a(n)... ".

Puppets then placed their selected items in a shared grocery cart that was in the center of the display.

The show continued until each puppet had selected 12 items (approximately 5 minutes). Once complete, all props were placed aside and out of view from the child.

Distracter Task:
Following the puppet show, the experimenter engaged the child in a distracter task that took approximately 5 minutes to complete. This task consisted of either drawing or coloring pictures that were unrelated to either the preceding or subsequent tasks.

Source Monitoring Task:
Immediately following the distracter task, the experimenter placed the grocery cart (with all the item cards that were selected during the puppet show) in the center of the table and positioned each puppet on either side of the cart. She then said:

"Now we need to give Fred and Sally back all the things they bought from the store. The problem is that the things are mixed up in the cart. Let's see if you can remember what things Sally bought and what things Fred bought so that we can give them back the right things."

The experimenter then proceeded to randomly pull out one card at a time from the cart. After pulling out each card the experimenter asked:

"Did Fred buy the ___________________ *or did Sally buy the* ____________________*?*

(or on alternating trials)

"Did Sally buy the ________________ or did Fred buy the ____________________?

After the child responded, the experimenter passed the card to the child so that they could place it inside the appropriate shopping bag. This procedure was continued until all 24 cards had been sorted.

Protocol for the Elaboration/Surprise Condition

Puppet Show:
Experimenter and child sat at a table across from each other and props were set up in advance. The experimenter held up each puppet and said:

"This is Sally (referring to the first puppet) *and this is Fred* (referring to the second puppet). *Sally and Fred are shopping today and they both need to buy things from this store. Watch them as they pick things from the store and every time Sally or Fred chooses something, I want you to tell me why you think they need to buy it. Try to think of a different reason each time."*

The experimenter then proceeded with the puppet show. The experimenter manipulated the actions and provided distinct voices for each of the puppets. The puppets took turns selecting items from each of the four shelves and, before selecting an item, made a statement in the form of:

"I need to buy a(n)...".

The experimenter then asked:

"Why do you think Fred/Sally needs to buy a(n) ____________?"

Children were then given an opportunity to respond. If they did not respond or repeat an answer from a previous trial, the experimenter would either repeat the question or prompt the child to think of a different explanation. Puppets then placed their selected items in a shared grocery cart that was in the center of the display. The same procedure was repeated until each puppet had selected 12 items (approximately 5 minutes). Once complete, all props were placed aside and out of view from the child.

Distracter Task:
Following the puppet show, the experimenter engaged the child in a distracter task that took approximately 5 minutes to complete. This task consisted of either drawing or coloring pictures that were unrelated to either the preceding or subsequent tasks.

Source Monitoring Task:
Immediately following the distracter task, the experimenter placed the grocery cart (with all the item cards that were selected during the puppet show) in the center of the table and positioned each puppet on either side of the cart. She then said:

"Now we need to give Fred and Sally back all the things they bought from the store. The problem is that the things are mixed up in the cart. Let's see if you can remember what things Sally bought and what things Fred bought so that we can give them back the right things."

The experimenter then proceeded to randomly pull out one card at a time from the cart. After pulling out each card the experimenter asked:

"Did Fred buy the _________________ or did Sally buy the ___________________?

(or on alternating trials)

"Did Sally buy the ________________ or did Fred buy the ____________________?

After the child responded, the experimenter passed the card to the child so that they could place it inside the appropriate shopping bag. This procedure was continued until all 24 cards had been sorted.

Elaboration Test

Immediately following the source monitoring test, the experimenter pulled out a second set of picture cards that were identical to those used during the puppet show. She then said to the child:

"Do you remember how you came up with all those excellent reasons during the puppet show? I want to see now if you can remember what you told me during the puppet show. I'm going to show you pictures of things that Fred and Sally bought in the store and I want you to remember the reasons for why they had to buy these things."

The experimenter then proceeded to individually show the child pictures of items selected during the puppet show. Cards were shuffled prior to the elaboration test to ensure that the order of presentation was random. As each item was presented, the experimenter asked:

"Do you remember? Why did they have to buy the ______________?

Children were then given time to respond before the subsequent item was presented. Responses were videotaped and coded offline. If the child did not respond or said that they did not remember, the experimenter immediately proceeded with the following item. This procedure was repeated until all 24 cards had been presented.

Protocol for the Elaboration/Expected Condition

Puppet Show:
Experimenter and child sat at a table across from each other and props were set up in advance. The experimenter held up each puppet and said:

"This is Sally (referring to the first puppet) *and this is Fred* (referring to the second puppet). *Sally and Fred are shopping today and they both need to buy things from this store. Pay attention to what Sally picks out and what Fred picks out because, later, I will ask you to remember what each of them bought. Also, every time Sally or Fred chooses something, I want you to tell me why you think they need to buy it. Try to think of a different reason each time."*

The experimenter then proceeded with the puppet show. The experimenter manipulated the actions and provided distinct voices for each of the puppets. The puppets took turns selecting items from each of the four shelves and, before selecting an item, made a statement in the form of:

"I need to buy a(n)... ".

The experimenter then asked:

"Why do you think Fred/Sally needs to buy a(n) ____________?

Children were then given an opportunity to respond. If they did not respond or repeat an answer from a previous trial, the experimenter would either repeat the question or prompt the child to think of a different explanation. Puppets then placed their selected items in a shared grocery cart that was in the center of the display. The same procedure was repeated until each puppet had selected 12 items (approximately 5 minutes). Once complete, all props were placed aside and out of view from the child.

Distracter Task:
Following the puppet show, the experimenter engaged the child in a distracter task that took approximately 5 minutes to complete. This task consisted of either drawing or coloring pictures that were unrelated to either the preceding or subsequent tasks.

Source Monitoring Task:
Immediately following the distracter task, the experimenter placed the grocery cart (with all the item cards that were selected during the puppet show) in the center of the table and positioned each puppet on either side of the cart. She then said:

"Now we need to give Fred and Sally back all the things they bought from the store. The problem is that the things are mixed up in the cart. Let's see if you can remember what things Sally bought and what things Fred bought so that we can give them back the right things."

The experimenter then proceeded to randomly pull out one card at a time from the cart. After pulling out each card the experimenter asked:

"Did Fred buy the __________________ or did Sally buy the ____________________?

(or on alternating trials)

"Did Sally buy the _________________ or did Fred buy the _____________________?

After the child responded, the experimenter passed the card to the child so that they could place it inside the appropriate shopping bag. This procedure was continued until all 24 cards had been sorted.

<u>Elaboration Test</u>

Immediately following the source monitoring test, the experimenter pulled out a second set of picture cards that were identical to those used during the puppet show. She then said to the child:

"Do you remember how you came up with all those excellent reasons during the puppet show? I want to see now if you can remember what you told me during the puppet show. I'm going to show you pictures of things that Fred and Sally bought in the store and I want you to remember the reasons for why they had to buy these things."

The experimenter then proceeded to individually show the child pictures of items selected during the puppet show. Cards were shuffled prior to the elaboration test to ensure that the order of presentation was random. As each item was presented, the experimenter asked:

"Do you remember? Why did they have to buy the ______________?

Children were then given time to respond before the subsequent item was presented. Responses were videotaped and coded offline. If the child did not respond or said that they did not remember, the experimenter immediately proceeded with the following item. This procedure was repeated until all 24 cards had been presented.

APPENDIX H

Scoring Sheet for Source Monitoring Task

Participant #: ____________

Item	Actual Source (circle item)		Child Response (circle item)		Check if Correct
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	
	Sally	Fred	Sally	Fred	

Participant #: ___________

Gender: _______________

Condition: ______________________________

Correct Source Responses: ______________

Incorrect Source Responses: _____________

Errors biased towards Fred: ______________

Errors biased towards Sally: ______________

	Year	Month	Day
Today's Date			
Birthdate			
Age			

APPENDIX I

Criteria for Coding Elaborations

Code	Description	Examples
Error	The *gist*, i.e., general meaning, of the statement made at test does NOT match the gist of the statement made at study	• The action denoted at test does not match the action denoted at study e.g. "to play with the kite" vs. "to fly it" • The purpose denoted at test does not match the purpose denoted at study e.g. "because it's his birthday" vs. "because someone is hungry" • If the child specifies both an action and a purpose at study *and* test but the combination of details do not match e.g. "to call a friend for a birthday" vs. "to call a friend to come over" • If the child fails to give a response e.g. "I don't remember"
Match:		
Verbatim	The wording used at test is identical or *near identical* to the wording used at study	• Identical wording e.g. " to eat" vs. "to eat" • The ONLY difference between statements is the tense and/or pronoun used e.g. "she wants to play with it" vs. "she wanted to play with it" e.g. "because he has to go to school" vs. "because they had to go to school" NOTE: a change in pronoun may necessitate other grammatical changes in the sentences but as long as the structure remains the same, code as verbatim The two statements ONLY differ by the inclusion/exclusion of the words "because" or "so" e.g. "because she wants to play music" vs. "she wants to play music" NOTE: the last two rules cannot be used in combination with each other. In this case, code as a gist match (see below)

Match:		
Gist	The *gist*, i.e., general meaning, of the statement made at test does match the gist of the statement made at study	• The action denoted at test matches the action denoted at study e.g. "to play with the kite" vs. "to play" NOTE: the verbs do not need to match as long as the action denoted by the verbs is the same The purpose of the test item denoted at test matches the purpose denoted at study 1) If the intended use for an item specified at study matches the intended use of the item specified at test e.g. "she's a cheerleader" vs. "she didn't have a whistle to be a cheerleader" 2) If the child specifies that the test item must replace a lost or missing item e.g. "he doesn't have a chair for himself" vs. "for Fred…they didn't have a seat for them" • If the child says more at either test or study but the gist of one the statements is embedded in the other statement e.g. "because he's thirsty and he has to put it in his cereal" vs. "because they were thirsty"

Extra Notes:

- Do not include a trial if:
    - The experimenter did not understand the child's response and noted this on the transcript
    - The child gives a non-verbal response (e.g. a motion or hand gesture)

  If you do exclude any trials, make sure to indicate the new total score when recording the proportion of errors and correct responses
  e.g. Write down 4/23 if there are a total of 23 trials that are being included in the analyses

- If unsure whether or not to code a statement as an error or a match, err on the side of error
- If unsure whether or not to code for a gist or verbatim statement, err on the side of gist

Table 1

Summary of Strategy Conditions

	Test Expectancy Conditions	
Elaboration Conditions	Surprise	Expected
No Elaboration	Child was not given elaboration instruction and was not told in advance about the subsequent source memory test.	Child was not given elaboration instruction but was told in advance about the subsequent source memory test.
Elaboration	Child was given elaboration instruction but was not told in advance about the subsequent source memory test.	Child was given elaboration instruction and was told in advance about the subsequent source memory test.

Table 2

Summary of Participants' Age (in months) and Gender in the Source Monitoring Task

	Mean	SD	Range	N
4-year-olds				
male	54.00	3.51	49.14 to 60.46	29
female	54.46	3.80	48.19 to 60.39	35
Total	54.27	3.65	48.19 to 60.46	64
6-year-olds				
male	78.08	3.34	73.19 to 83.91	32
female	78.06	2.94	73.78 to 83.36	32
Total	78.07	3.12	73.191 to 83.91	64

Table 3

Summary of Participants' Age (in months) by Strategy Condition and Age Group

	Strategy Condition			
Age Group	No Elaboration/ Surprise	No Elaboration/ Expected	Elaboration/ Surprise	Elaboration/ Expected
4-year-olds	54.73 (3.96)	53.92 (3.64)	54.22 (3.83)	54.20 (3.45)
6-year-olds	77.91 (3.39)	77.84 (2.83)	78.121 (3.40)	78.40 (3.13)

Note. Values in parentheses indicate standard deviations.

Table 4

Mean Proportion of Correct Source Attributions by Age, Elaboration, and Test Expectancy Conditions

	Age			
	No Elaboration	Elaboration	Mean	Difference
4-year-olds				
Surprise	.78 (.12)	.88 (.11)	.83 (.12)	
Expected	.80 (.13)	.88 (.14)	.84 (.14)	
Mean	.79 (.12)	.88 (.12)	.83 (.13)	.09*
6-year-olds				
Surprise	.83 (.15)	.88 (.08)	.86 (.12)	
Expected	.83 (.14)	.87 (.07)	.85 (.10)	
Mean	.83 (.13)	.88 (.07)	.85 (.11)	.05
Mean	.81 (.13)	.88 (.10)		.07*

Note. Values in parentheses indicate standard deviations. Test expectancy differences were not analysed as neither the main effect of test expectancy nor the 3-Way interaction were significant.

* $p < .01$

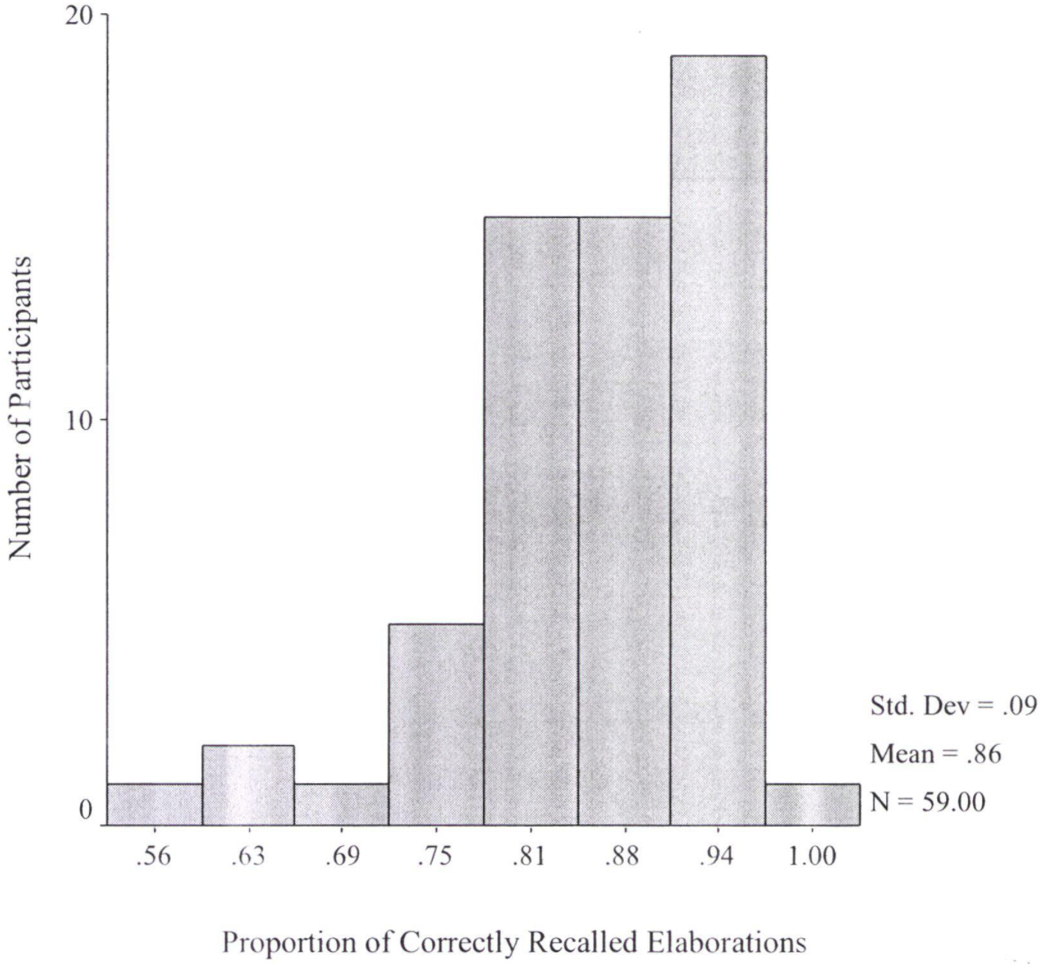

20
10
0
Number of Participants
.56
.63
.69
.75
.81
.88
.94
1.00
Proportion of Correctly Recalled Elaborations
Std. Dev = .09
Mean = .86
N = 59.00

Figure 1.

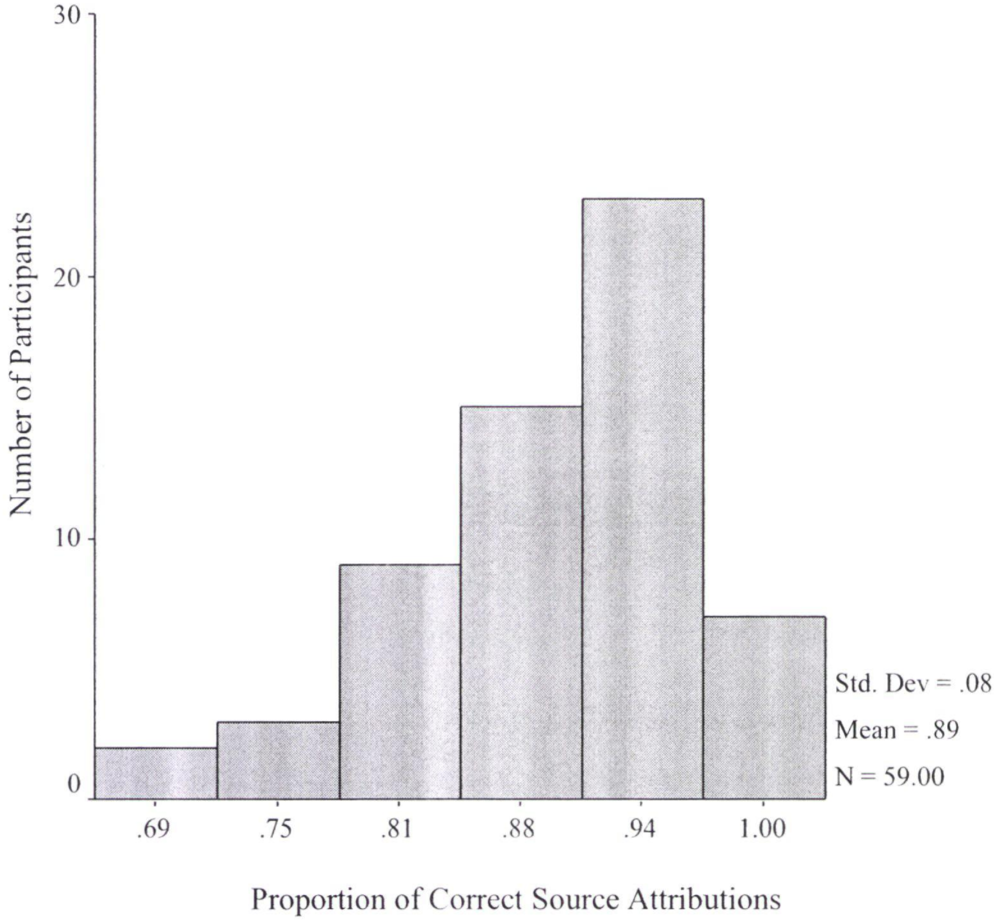

30
20
10
0
Number of Participants
.69
.75
.81
.88
.94
1.00
Proportion of Correct Source Attributions
Std. Dev = .08
Mean = .89
N = 59.00

Figure 2

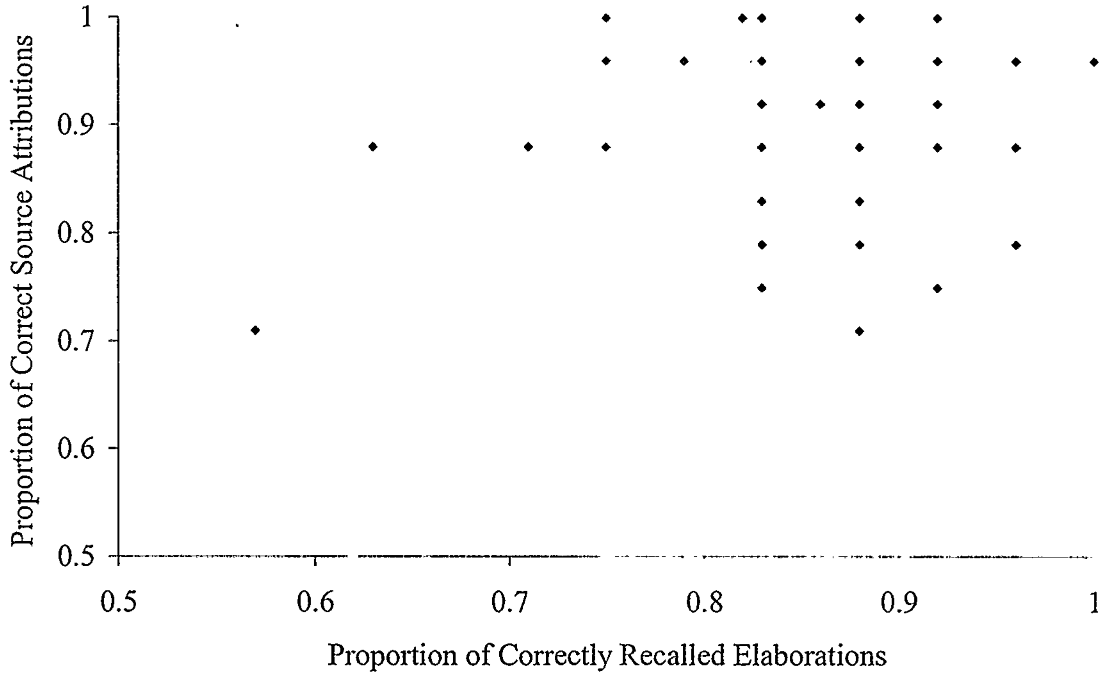

Proportion of Correct Source Attributions
1
0.9
0.8
0.7
0.6
0.5
0.5
0.6
0.7
0.8
0.9
1
Proportion of Correctly Recalled Elaborations

Figure 3.