RUNNING HEAD: The effects of misinformation on children's recall

The Effects of Misinformation on Children's Recall: The Potential for a "Buffering" Effect in Drawing

MA Thesis

Leanne M. Fitzgerald ©

Lakehead University

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Abstract

Kindergarten children participated in a magic show and then responded to direct questioning about the details. The children were then asked to draw (N = 52) or tell (N = 56) about their favorite part of the show. Two weeks later, they were exposed to misinformed details about the event. Judgements were then relayed to the children concerning the memory of the misinforming interviewer, which were reinforcing, disregarding or neutral. One and six months after the event, the children were questioned about the details. Results indicated that children who had an opportunity to draw had reported fewer errors for details that were misled. However, these children had more errors on the untampered items than the children who did not have an opportunity to draw.

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The Effects of Misinformation on Children's Recall: The Potential For a "Buffering" Effect in Drawing

Being a witness to or a victim of abuse has a profound impact on the trajectory of a child's development. A child may be directly involved in an unfortunate event (e.g., sexual abuse) or may witness the event occurring as a third party (e.g., spousal abuse). As a result, children are increasingly called as witnesses in court to provide accounts about a particular incident. Ceci & Bruck (1993) estimate that about 13, 000 children a year testify in sexual abuse cases, with many thousands more providing unsworn statements and dispositions to judges, law enforcement officials and social workers. Often, especially in the case of sexual abuse they may be the only witness. The accuracy of their testimony is therefore of utmost importance. The details recounted by the child can have a profound impact on the lives of other individuals as well (e.g., whether an individual goes to court or receives punishment for the alleged crime). Because of this, there has been an increase in investigations during the past two decades that are targeted towards examination of children's memory processes and the factors that influence recall accuracy (see Bruck & Ceci, 1999 for a review). Furthermore, research concerning suggestibility in children is moving out of the laboratory and into more "real world" settings, allowing for an increase in the generalizability of findings, as well as more direct practical applications in therapeutic and forensic contexts.

Of particular interest here is the observation that children are exposed to a continuous barrage of information after any event they have witnessed or participated in. Consequently it is important to consider the possibility of incorporating this additional information into the original memory for the event and the nature of its impact on later recall. One area that has been the target of recent investigations is the factors that influence the accuracy of children's recall (e.g.,

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Bruck & Ceci, 1999; Pipe & Wilson, 1994; Marche, 1999). Research has shown that these factors include whether the child was a participant in the event or an observer (Rudy & Goodman, 1991), the type of questioning, where asking too many highly specific questions has been found to increase the number or errors in younger children's recall (Ceci & Bruck, 1993; Poole & Lindsay, 1995, 2001; Salmon & Pipe, 2000), and repeated questioning (e.g., Poole & White, 1991, 1993). These characteristics of the interview process itself and the number of interviewers also contribute to the reliability of children's testimony (e.g., Bjorklund, Bjorklund, Brown, & Cassel, 1998; Bruck, Ceci, Francoeur, & Barr, 1995; Marche, 1999; Poole & Lindsay, 2001; Poole & White, 1991, 1993; Portwood & Reppucci, 1996; Roberts, Lamb, & Sternberg, 1999; Schwartz-Kenney & Goodman, 1999). Additionally, when examining the accuracy of children's recall, the possibility of incorporating misinformation from exposure to other accounts of the event (see Bruck & Ceci, 1999 for a review) is a necessary consideration. Determining strategies that increase reliability and reduce the impact of receiving additional information from various sources could lead to an increase of the reliability of children's testimony.

In what follows, research on children's ability to provide reliable recall of events is summarized. Specifically, factors affecting accuracy of recall are reviewed then the effects of drawing on memory are discussed. An experiment is then described in which the effects of drawing on preserving memory in the face of misinformation are examined in young children.

Factors Influencing Accuracy of Recall

Children have been called to testify to provide an account of details of an event that they may have witnessed or been directly involved in. These children are often subject to clinical and legal investigations that involve a number of interviewers. It is estimated that on average children receive between 4 – 11 forensic interviews, and the majority additionally receive many

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more in the course of other professionals (therapist, social worker, physician) involved (Gray 1993; McGough, 1994). Through the course of these investigations, which may extend several months or even years, they interact with many people in "authority", potentially including the alleged perpetrator.

Any distortions regarding the event provided by other individuals could be influential with respect to the child's tendency to incorporate that information into their memory for the event (e.g., Poole & Lindsay, 1995, 2001). For example, Jackson and Crockenberg (1998) looked at suggestibility in four-year-old girls in response to misinformation provided by a "parent stranger" (another child's parent) or their own parent (mother). Children were exposed to misleading information embedded in interview questions immediately after exposure to the target event. The results indicated that the children were better able to resist parental misinformation in the questions than they were in the "parent stranger" interviews (Jackson & Crockenberg, 1998). They concluded that the children displayed less comfort when interviewed by the "parent stranger" than when interviewed by their own parent, and therefore were better able to resist parental misinformation in the questions than they were in the "parent stranger" interviews (Jackson & Crockenberg, 1998). Children's level of comfort influenced their ability to disagree with the misinformation, which in turn impacted the degree to which this postevent information revealed itself it later recall. Related to this finding is the research of Ceci, Ross and Toglia (1987), who found that when misleading questions were presented by a peer as opposed to an adult, children were less susceptible to misleading information. The findings highlight the importance of the role of the interviewer in eliciting reliable information from children during an interview.

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Children are also susceptible to social demand characteristics, and may comply with the interviewer in order to seek approval according to what they perceive the individual is asking (Ceci & Bruck, 1993; Ceci et al., 1987). Pipe and Wilson (1994) had six- and ten-year-olds participate in or observe a magic show and were told by the "Magician" to keep secret "an accident" that had occurred during the show. Results indicated younger children were less likely to report details about the event that they had been instructed to keep a secret. This effect was evident for both free recall and in response to direct questioning. Additionally, if a child was an observer of the event, they were less likely to report that "an accident" had occurred than a child who was a participant.

Individuals may also influence the accuracy of children's reports by exposing them to credibility judgments about the persons involved in the target event. The credibility ascribed to the provider of postevent information by the child, or those persons in contact with the child, may influence the impact that the postevent information has on later recall accuracy. For example, Leichtman and Ceci (1995) examined children's recall of a visit by a strange man to a classroom for a story. Children were assigned to receive either (1) direct recall assessments, (2) negative stereotypes before recall, (3) suggestive recall questions, or (4) stereotype induction in addition to suggestive questioning. Results indicated that suggestion and stereotyping resulted in the most errors at retention, followed by suggestive questioning alone, and having received negative information about the man. The opinion of others may have considerable influence on children's recall of the event details, thereby influencing the reliability of children's recall, although this effect was found to decrease with age.

It has been debated whether or not younger children are more susceptible to incorporation of misinformation than older children (Greenstock & Pipe, 1996; Howe, Courage, & Peterson,

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1995; Pipe & Wilson, 1994; Poole & Lindsay, 1995, 2001 Portwood & Reppucci, 1996; Schwartz-Kenney & Goodman, 1999). A review of the research provides evidence that proneness to suggestibility may decrease with age (Ceci & Bruck, 1993; Howe et al., 1995; Ornstein et al., 1992). There exists a developmental difference in memory capabilities in children (e.g., Brainerd & Reyna, 1995, 2002), whereby, younger children are particularly susceptible to forgetting information, regardless of whether it is considered correct or incorrect. This tendency for the faster demise of information in memory in younger children cannot be appropriately attributed to the amount of information encoded during the initial acquisition of the information (e.g., Greenstock & Pipe, 1996; Ornstein, Gorden & Larus, 1992) as it has been demonstrated that young children are capable of accurate initial encoding of an event (see Howe, 2000 for a review).

Although young children have the ability to accurately encode information presented to them, the tendency for faster forgetting lays the groundwork for an increased potential for alteration in the original memory when exposed to postevent information. Research involving memory accuracy and reliability have demonstrated that exposure to postevent information has a negative impact on accuracy during later recall, both for children (e.g., Marche & Howe, 1995; Pipe & Wilson, 1994; Poole & Lindsay, 1995, 2001) and adults (e.g., Loftus, Miller, & Burns, 1978). This 'misinformation' effect has been related to interference in one's memory processes, due to receiving additional information after the original event has been experienced (Mezzoni, 1998). The incorporation of new postevent information, or alteration of old information, has been demonstrated by research in areas of suggestibility effects (e.g., Mazzoni, 1998; Portwood & Reppucci, 1996), misinformation effects (e.g., Jackson & Crockenberg, 1998; Roberts & Lamb,

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1999), and retroactive interference with similar information (e.g., Bower, Thompsen-Schill, & Tulving, 1994; Howe, 2000, 2002).

Increasing Event Memory through Drawing

It is essential not only to determine whether children are capable of remembering and the factors that contribute to memory errors, but also to identify the conditions under which they are more likely to express memories and details of an event that are both accurate and reliable. Modifications can be been made to the interviewing procedure, ones that facilitate accurate recall. For example, one technique that is used both in interviews and research practice is provision of nonverbal cues. Nonverbal cues are beneficial in that they are developmentally appropriate for different aged children and one could speculate that the use of these props (anatomically correct dolls, puppets, etc.) may diminish some social anxiety through their similarity with play. However, research on their utility reveals both advantages and disadvantages. For example, the use of anatomically correct dolls has been linked to an increase in accuracy of information recalled coupled with a corresponding increase in the recall of inaccurate details (e.g., Bruck, Ceci, Francoeur, & Renick, 1995; Salmon & Pipe, 2000). It has been speculated that perhaps children's imaginations and the props' similarity with play may account for these findings. In addition the interviewer would need a priori knowledge of the event in question in order to provide the child with appropriate and relevant cues to elicit reliable reports (Ceci & Bruck, 1993). Identifying cues or props that increase recall accuracy without the corresponding increase in inaccurate details is imperative. One such method is to use self-generated props, perhaps reducing the amount of additional information introduced.

It is important to identify possible interview techniques that may help to not only elicit accurate information in a nonsuggestive manner, but perhaps strengthen memory for the original

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event. Given that drawing is a form of expression often used in therapy and in testimony when children are recounting events, the influence of drawing in decreasing suggestibility and increasing the reporting of accurate information has been seen as important to investigate (e.g., Burgess & Hartman, 1993). Research in the past decade has examined use of drawing in both strengthening memory for an event (e.g., Davison & Thomas, 2001; Foley, Aman, & Gutch, 1987; Gross & Hayne, 1995; 1999) and to obtain information in the interview process (e.g., Burgess & Hartman, 1993; Salmon & Pipe, 2000). Drawing provides a self-generated cue from the child instead of a cue from an external source, something that may possibly reduce suggestibility and increase the likelihood of generating events that are personally salient (Bruck, Melnyk, & Ceci, 2000). This alteration in the interviewing strategy may result in a considerable increase in the strength of their memory representation.

Burgess and Hartman (1993) describe this process: "Drawings are an associative tool for assessing memory, a view of how the child represents experiences to themselves and to others". Drawing utilizes the child's ability to express themselves through visual and motoric representations as well as utilizing internal memorial processes in forming an accurate representation of the target event (Burgess & Hartman, 1993). Foley et al. (1987) demonstrated that merely tracing the image with a finger was insufficient to reveal a facilitating effect on memory for later recall. Only when a drawing was produced did this effect reveal itself. Foley et al. (1987) suggested that the kinesthetic feedback in conjunction with the external markers with visible consequences of their actions increasing memoribility. The act of drawing may also increase availability for accurate recall through "tagging" of the components in memory (Foley et al., 1987; Pavio, 1968), thereby making them readily available for recall. This may provide information on how a child represents the experience and the possible cognitive structures

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involved through relationships with other people and objects, selection of content, and their assumptions and beliefs (Burgess & Hartman, 1993; Klepsch & Logie 1982). Children would likely spend more time thinking about the picture, and expend greater mental effort in completing the task that is relevant to the event than they would by merely talking about it. Additionally, the drawing itself may provide personally salient cues for the event that would facilitate recall, potentially triggering recall of additional information (Bruck et al., 2000; Butler, Gross, & Hayne, 1995).

Although there have been no statistics published on the frequency that children are asked to draw, it is apparent that they are often asked to draw in both forensic and therapeutic contexts (Burgress & Hartman, 1993). Because of this, it is important to determine the effects of drawing on later recall in the presence of questions or interviews relating to the event that may not occur for weeks or months after the drawing has taken place. Having children draw during the course of an interview process requires little or no preparation. It reduces the possibility of the interviewer introducing potentially irrelevant cues (e.g., props, pictures) due to their limited knowledge of the details surrounding the event. It also permits and encourages children to use self-generated, important, and salient (distinctive, unique and having personal relevance; Howe, Courage, & Peterson, 1994) aspects of the event for recall. In turn, this may increase the opportunities for other aspects of the event to be recalled, through the strengthening their representation of the event in memory, and act to buffer memory against the effects associated with exposure to misinformation (Marche, 1999).

Review of Past Research on the Effects of Drawing

Drawing is one method that may generate more information during the interview process with younger children. Although drawing has been used extensively in the course of therapy and

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interviewing practices, it is only within the last decade or so that there have been a handful of empirical investigations examining its utility in increasing the amount and accuracy of the information reported. Butler et al. (1995) examined the effect of having children (5 & 6-year-olds) draw or tell the interviewer about an event (visit to a fire station) witnessed one day prior to testing. Results indicate that children in the draw group provided more information compared to those children who told about the event in response to direct questioning, without a corresponding decrease in accuracy. In a second experiment, thirty-two 5- to 6- and thirty-two 3- to 4-year-olds were assessed for their memory of an event one month later. Only the draw group for the older age group produced more information with respect to the tell group during the retention assessment, drawing did not lead to an increase in errors for either of the two age groups (Butler et al., 1995).

In a related experiment, Gross and Hayne (1999) interviewed a group of 5- 6-year-old children at retention intervals of one day and six months; half of each of the groups were instructed to draw and the other half asked to tell about an event (visit to a Cadbury's chocolate factory). They found that drawing did not lead to an increase in the number of errors and resulted in greater amounts of information recalled than when asked to tell about the event only, regardless of the timing of testing (i.e., 1 day and 6-months). These children were assessed again at a delay of one year. They found that children in the draw group produced additional information during this one year test interview compared to children in the tell group, and this increase in information recalled did not occur at the expense of accuracy. However, those children who had a previous drawing interview (i.e., 1 day and 6 months) did not display an increase in the amount of information recalled, even when they were presented with their own original drawing. It was concluded that an increase in the amount and accuracy of the details of

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an event may be related to an "online facilitation effect" when utilizing interview techniques such as drawing. Specifically, drawing may enhance recall accuracy and amount when used at the time of the recall interview.

The research of Salmon and Pipe (2000) demonstrate conflicting results with that of Gross and Hayne (1999). They examined the recall of 5 – 6 year old children by means of free recall, prompts and direct question about specific aspects of a routine health assessment. Children were interviewed at delays of three days and 1 year after the target event. Children were assigned to draw, tell or use props for reporting information during the interview. Results revealed that recall accuracy and the amount of information reported both decreased at the one year interview. The amount of information recalled for children who drew was found to be less than those children who used props, while verbal recall was somewhere in between the two. Additionally, drawing elicited less accurate information for the combined assessments of free and prompted recall than the other two groups. Further research is needed to examine and clarify the influence of drawing on children's recall.

Only one study to date has examined drawing with respect to its influence on misinformation. Bruck et al. (2000) examined the impact of drawing on later incorporation of misinformation, whereby the children either drew or told the interviewer what happened during both free recall and structured recall questioning. They assessed eighty-seven preschoolers who either drew or told the interviewer about a magic show they had experienced previously. They were interviewed again two weeks later and provided with "four true" reminders and four "false" reminders for the details of the event, and then asked to either talk about or draw these reminders. On a subsequent interview twelve days later, the children were seen again in a similar interview setting, whereby they again drew or talked about the false and true reminders. In the

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last and final interview, again twelve days later, a different interviewer who assessed the accuracy of their memory through free recall and a set of direct recognition questions interviewed the children. At this time they also assessed whether the children were aware of the source of the information they were reporting, either the false statements by the previous interviewer, or the magic show. Their results indicated that drawing had both a facilitating and a detrimental effect on recall for the last retention interview. Drawing was found to promote accurate recall and revealed better source monitoring where the information was originally learned (event or interviewer in this case). However, the children in the draw group also increased their acceptance of misinformation (i.e., false reminders) and this tendency was not reduced with source monitoring. Although the children were aware of the source of the information, this knowledge did not inoculate against the effects of reporting misinformation when asked about their experience during the interview.

Insert Table 1 about here

Implementing interview techniques such as drawing has to date revealed limited and conflicting results (refer to Table 1 for review). Although some of the research outlined previously indicated that drawing has a facilitative influence on children's recall in the amount reported without a corresponding decrease influence on accuracy (e.g. Butler et al., 1995; Gross & Hayne, 1999), the results obtained in other studies have not (e.g., Salmon and Pipe (2000). Gross and Hayne (1999) demonstrated that drawing may be beneficial after long delays. Conversely, Salmon and Pipe (2000) found that drawing had no long term facilitation of reporting with respect to accuracy, or the amount of information reported. Drawing aspects of an

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event also facilitates source monitoring abilities (e.g., Bruck et al., 2000), which increases children's ability to discriminate between what was experienced during an event and what was due to postevent exposure, perhaps reducing the impact of misinformation on recall (Poole & Lindsay, 2001). Interestingly, however, the conclusions reached by Bruck and others (2000) indicate that drawing does not enhance recall of an event, if a child was drawing misleading information during an interview process, even if they recognized the source of the misleading information. This is similar to other research concerning children's memory; despite display of accurate memory, children are prone to report misinformation (Marche & Howe, 1995). These limited and conflicting findings spur the need for further investigations about the influence of drawing on later recall.

Rationale for the Current Study

Given that children often engage in drawing about an event, whether self initiated or as a process of therapy and court proceedings, there is a need to examine the potential influence of this practice on later recall. This study differs from the previously reviewed studies, in that children respond to direct questions about the event prior to engaging in a "self-generated" drawing or telling activity in response to an open ended question. This procedure would allow for the specific examination of direct questions answered verbally, ones that are often used in legal settings, tend to elicit more information for children in this age range, and have been related to increases in inaccurate information when compared to free recall questioning. This research clarifies and extends the past work in drawing in three main areas.

- First, we will examine the influence that drawing during the initial interview has on assisting recall accuracy during subsequent interviews after exposure to misleading postevent information. Research to date has not examined children's suggestibility with a *prior* experience

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of drawing about the event. In contrast to Bruck et al. (2000) who had the children draw a specific aspect of the event, either experienced or non-experienced, this study will have children self-generate aspects of the event in response to an open-ended question prior to receiving misleading information. The intent here was to examine children's self-generated choice as it relates to "real life" situations, where the content of the drawing may not be directed specifically at one aspect of the event. Additionally, it may minimize the suggestive influence of the interviewer in not providing externally supplied cues (Gross & Hayne, 1999) and increase the benefits associated with recall of self determined, salient aspects of the event (Marche, 1999). Given that drawing is presumed to be a tool that facilitates representation of an event in memory, we wanted to determine whether this facilitating effect was restricted to information witnessed or does it provide protection against the subsequent incorporation of postevent information. Specifically, does drawing an event inoculate memories against the effects of postevent misinformation on later recall accuracy?

Second, because the effects of suggestibility depend on the characteristics of the provider of the postevent misleading information, it is important to consider the effects of credibility of the interviewer. We will examine the influence of having an authority (person who participated in the event with the child) provide discrediting or enhancing statements regarding the misinforming interviewer's memory after the child has been provided with that misinformation. As children have been found to be influenced by the opinions and expectations of others, especially adults (e.g., Leitchman & Ceci, 1995), those children who received discrediting statements about the misinforming interviewer will be less susceptible to suggestion as indicated by fewer errors during recall than those children who received positive judgments about the misinforming interviewer.

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Third, although studies of the influence of drawing after long delays has revealed conflicting results with respect to recall accuracy (Gross & Hayne, 1999; Salmon & Pipe, 2000), it may be that having children draw a portion of the event they believed to be salient would result in increases in accuracy compared to those children not provided with an opportunity to draw. Therefore, accuracy will be assessed during recall at two retention intervals (i.e. ~1 month & ~6 months) after witnessing and drawing about the event. Given the content of the drawing is generated by the child, this would facilitate and strengthen both central and peripheral details related to the event, because the child has deemed it to be an important aspect. Additionally, repeated interviews have been found to assist recall over long delays, perhaps functioning as reinstatement for the event details, therefore strengthening memory (e.g., Howe, Courage, & Byrant-Brown, 1993). This facilitative influence of drawing is presumed to exist even after long delays (i.e., 6 months), however, the number of errors will increase as a function of time, according to the general processes of memory with respect to forgetting.

Method

Design

Children enrolled in junior and senior kindergarten classes individually participated in a magic show with a female confederate (magician). Immediately after the event, they were interviewed and given an opportunity to draw or tell the interviewer about their favorite part of the show. Two weeks later they met the same interviewer who told them misinformation statements about the magic show. Afterwards, the magician appeared and relayed judgments about the interviewer and the reliability of her memory. A different interviewer met these children two weeks later and asked them a set of questions about the show. After six months, a

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third interviewer asked a portion of these children the same set of questions during another interview session. Table 2 provides on over view of this procedure.

Insert Table 2 about here

Participants

One hundred and eight English-speaking (48 males and 60 females) children enrolled in Kindergarten programs were recruited. These children attended either Junior (N = 46) Kindergarten (age in months M = 57.86, SD = 4.08) or Senior (N = 62) Kindergarten (age in months M = 69.93, SD = 4.06) programs at their school (age range = 52 – 80 months); an overall average age of 64.9 months (SD = 7.23). The children were predominantly from middle-class socioeconomic backgrounds. In addition to parental consent from each child (see Appendix A), consent was obtained from the local school board, the particular school and teachers, and ultimately, from the children themselves.

Materials

The study used a "Magic kit" called the "Henry Gordon's Magic Show" (1996). Along with the props included in the kit, a "Magician's Cape" (black cape with yellow stars), a "Magic Box" (18in. x 8in.), and a "Magic Bag" (12in. x 6in.) were used. The "Magician" also used a yellow "happy face" paper plate, salt shaker and a pen that has an elephant on top that lights up when used for writing during the "Magic Show". There were small toys of various types (party favors) that were given to each child after completion of the magic show and stickers given after completion of the acquisition interview. If the children were asked to draw about the event they used a box of 64 different colored crayons and a piece of blank paper (81/2 in x 11 in).

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The recording of the information elicited by the children was completed on three different interview sheets, which consisted of direct open-ended questions related to the "Magic Show". The first sheet contained eighteen questions which were separated into three events, resulting in six questions from each event (see Appendix B), and was used during the acquisition phase. For a comparison measure of originally retained information, immediate recall was assessed to generate a baseline to compare with subsequent retention measures. These items were used as covariates within the analyses, to distinguish between errors that were a result of the manipulations, and those that are generated merely because the information was never encoded or remembered initially during the acquisition phase. The second sheet that was used, during the misinformation phase, contained eighteen misinformation statements that related to the initial eighteen acquisition questions (see Appendix C). However, only three statements from each of the three events in the "Magic Show" were randomly selected for each child, resulting in a total of nine for exposure. The third and final recording sheet involved in the two retention phases, was identical to the sheet used during the acquisition phase, with the questions asked a total of four times, instead of one time, as was done in acquisition (see Appendix D).

Procedure

The "Magic Show" and Initial Acquisition Interview. All the children had a "Magic Show" performed individually for them. This included assisting the Magician with parts of the performance. The Magician was a female confederate who escorted each consenting child to a room in their school that was designated as the magic room. The Magician introduced herself and chatted briefly with the child about interests before beginning the performance. The "Magic Show" consisted of three events; a card trick, a spooky salt trick, (see Henry Gordon's Magic Show (1996) for details) and the clean up. After "the show" they were then given a small toy,

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thanked and escorted to another room. They were told that they would be meeting with a lady who happened to love magic shows, and wanted to ask them some questions related to the event.

The interviewer introduced herself and asked the child a couple of questions about themselves in order to establish rapport. She then explained that she would be asking some questions about the show, and they should answer them as best they can, so that she could know everything there was to know about the magic show. She then proceeded to ask them eighteen questions (Appendix B) about the "Magic show", which contained six questions from each of the three events. After these questions were answered, half of the children were asked to draw a picture or tell the interviewer about their favorite part of the "Magic Show". It was explained that this would allow her to share the stories (drawings) with other boys and girls who didn't see the magic show. Each child, irrespective of whether they drew or told the interviewer about their favorite part was given three minutes to complete their story or drawing. As it has been demonstrated that children's accounts during free recall are not often detailed (e.g., Peterson & Bell, 1996; Steward & Steward, 1996), the interviewer would ask if there was anything else they would like to tell her, until the three minutes had expired, in order to approximate the time that the children who drew spent on the task. The child was then thanked for their participation, given a sticker and then escorted back to the classroom by the first interviewer. During all parts of the interview, minimal "encouragers" and support was given.

The Misinformation Phase. The misinformation phase occurred two weeks after the acquisition phase, at which time each child was asked by the first interviewer to help her remember the events of the "Magic Show". It was during this phase that the child was exposed to nine counterbalanced misleading statements (Appendix C) that were directly related to the questions administered during the acquisition phase. The interviewer explained that she had lost

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her notes and that she would really appreciate if she could tell the child what she remembered them telling her about what happened in the magic show. The interviewer then stated 'a misinformation statement' that required a response of agreement or disagreement from the child. Whether the child agreed or disagreed with the statement was recorded and then the interviewer proceeded to the next statement, until the child had been exposed to them all. It was at this point that the children were further distinguished by their membership in one of three different conditions.

The Credibility Statements. The "Magician" entered the room and greeted the child after the misinforming interviewer had thanked the child and left the room. She offered to escort the child back to their classroom and during that time stated one of three types of judgments about the misinforming interviewer. The children were randomly assigned to have the "Magician" tell them that the interviewer had a terrible memory for the event (Disregard); that the interviewer had a great memory for the event (Reinforce), or not to say anything at all. For example:

Disregard: "I overheard what you and *the interviewer* talked about. She is getting this Magic show confused with another one! Forget what she told you and just remember what you and I did for our Magic show! You were great!"

Reinforce: "I overheard what you and *the interviewer* talked about. She has a great memory for the Magic show. She remembered everything exactly as it happened. Thanks so much for helping her out! That was really nice of you." The child was then escorted back to the classroom by the Magician, and thanked for their time.

The Retention Interview. For the third phase of the study, new female interviewers questioned the child. The first retention interview occurred two weeks after the presentation of the misinformation (4 weeks after the initial exposure of the "Magic Show"). This interviewer

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administered a set of eighteen questions (Appendix D) that were utilized in the acquisition phase, and recorded the responses. The only difference between the two phases (acquisition vs. retention) was that the set of questions were administered four times to each child. The child then returned to class. Some of the children (N = 31) were involved in a second retention interview (~ 6 months after the Magic Show), which was identical to the first. In addition to asking the child a little about themselves, both interviewers again explained that they knew the child had participated in a Magic show and they really wanted to know what happened during their time with the Magician.

Each of the interviewers and the Magician were trained for the procedure and the scripts used for eliciting the information, and were blind to the correct responses to the questions asked. Having different interviewers for various assessments was to minimize the possibility of the credibility of the first interviewer being reduced due to the comments of the Magician during the misinformation phase. This may also result in a decrease in the impact of any social demand characteristics perceived about the interviewer by the child. It also provided an opportunity to mimic the effects of multiple interviewers that is common during questioning procedures involved when eliciting pertinent information from children.

Scoring of the Information

The responses were scored correct as long as the answer was correct with respect to the appropriate question. Incorporation of additional incorrect information and/or misinformation resulted in the scoring of an error. The number of errors for each child were tabulated and used for the analysis. A response was coded as an error if it contained any misinformation, or any additional information not previously exposed within the context of this study. This stringent criterion was set as a standard, in order to determine the absolute correct response, without any

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possible incorporation of misinformation. As in the judicial process, any misinformation could be detrimental to the persons involved, so by the same token it was considered incorrect.

Results

Preliminary analyses revealed no significant differences due to gender, grade in Kindergarten (Junior, Senior), or types of credibility instruction given by the "Magician" after exposure to the misleading information. Therefore, subsequent analyses were performed with these cells collapsed across conditions. A more stringent significance level of $p < 0.01$ was accepted for all the analyses and comparisons due to the nature of the study itself and the number of comparisons made within the analyses.

The results were analyzed using a repeated measures (trial 1 - 4, retention ~1 vs ~6 months) analysis of covariance (ANCOVA) where the between-subjects factor was modality of reporting (drawing vs telling) and items (questions) that were misled versus those that were not misled forming a third within-subject factor. Total errors at the acquisition phase (misled and control items separated) were the covariates. The number of errors made for each of the four retention trials during the retention phase was the dependent variable of interest.

The results showed that the covariates were significant for both the control, $F(1, 27) = 16.86$, $Eta^2 = .38$, $p < 0.01$, and the misled items, $F(1, 27) = 27.61$, $Eta^2 = .51$, $p < 0.01$. As well, although there were no main effects for item, trial or modality, there was a significant main effect for retention interval, ~1month ($M = 2.32$, $SE = 0.15$) and ~6 months ($M = 3.48$, $SE = 0.18$), $F(1, 27) = 9.93$, $Eta^2 = .27$, $p < .01$, where there were fewer errors after ~1 month than after ~6 months.

Finally, the analyses revealed an Item X Modality interaction, $F(1, 27) = 10.45$, $Eta^2 = .28$, $p < 0.01$. As can be seen in Figure 1, children who had an opportunity to draw the event

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revealed a decrease in the number of errors for the misled items (M = 2.48; SE = 0.28) when compared to the children who only told about the event (M = 3.26; SE = 0.25). This supports our prediction that drawing about an event prior to receiving misinformation and later recall interviews can inoculate memories against the impact of misinformation. Interestingly, this same figure also shows that those children in the draw group had more errors for the items not previously misled (M = 3.37; SE = 0.28), than the children in the tell group (M = 2.48; SE = 0.26). It would appear that drawing resulted in significantly lower accuracy rates on information that was never misinformed.

Insert Figure 1 about here

Discussion

Previous research has focused on characterizing the accuracy of children's event memory (e.g., Brainerd & Reyna, 1995, 2002; Ceci & Bruck, 1993; Howe, 2000), the effects of misinformation on children's recall (e.g., Howe, 1995; Howe et al., 1995; Marche & Howe, 1995), and factors that potentially reduce the effects of misinformation on children's recall (e.g., Butler et al., 1995; Gross & Hayne, 1999). This study attempted to extend and clarify those processes by examining the impact of drawing on reducing the effects of misinformation on children's recall. Specifically, it was thought that drawing would inoculate memories against misinformation across long-term retention intervals (i.e., ~6 months) and that manipulating the credibility of the misinforming interviewer would influence later recall. Each of these predictions will be discussed in turn.

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Credibility Manipulations

Although previous studies have indicated the importance of the persons involved in the act (e.g., Jackson & Crockenberg, 1998; Leichtman & Ceci, 1995), the provision of additional instructions to each child regarding the credibility of the interviewer who delivered the misleading information resulted in negligible differences at recall in the current study. This could have happened because the children may not have perceived the magician in this study as having the appropriate authority or the manipulation of merely passing judgment on the interviewer in a nonformal manner was not a powerful enough manipulation to elicit the children's attention (e.g., Roberts, Lamb, & Sternberg, 1999). The event was also experienced in an intimate setting (i.e., the child and the magician) and they were active participants in aspects of the show, perhaps increasing the strength of the memory representation (e.g., Portwood & Repucci, 1996; Rudy & Goodman, 1991), something that might have facilitated recall accuracy beyond the potential influence of mere exposure to credibility judgements.

Misinformation and the Retention Assessments

The majority of previous research scored responses at the time of the presentation of the misleading information (e.g., Portwood & Reppucci, 1996; Jackson & Crockenberg, 1998). This is often accomplished through repetition of the postevent information and the use of misleading questions (e.g., Leichtman & Ceci, 1995; Poole & Lindsay, 1995; 2001). Although, the current research examined the influence of misleading statements and later incorporation of the information in subsequent recall with nonleading questions, the children in this study did agree with about half of the misinformation statements at the time of presentation. This is not unexpected as children are sensitive to social demand characteristics and have a tendency to want to comply with authority (e.g., Ceci et al., 1987; Ceci & Bruck, 1993). From a motivation to

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please, children will often respond to questioning, even if it is not congruent to their own beliefs. It represents 'a gap' in their memory and will most likely not correct the misinformation due to these tendencies (Binet, as cited in Ceci & Bruck, 1993).

Timing of both the misinformation presentation and the retention assessments influences the reliability of memory, especially children's memory (Roberts, Lamb, & Sternberg, 1999). Exposures to details about an event have been speculated to increase attention (Jackson & Crockenberg, 1998) and trigger additional details of the event that were never originally cued, thereby enhancing recall (Marche & Howe, 1995; Roberts et al., 1999). Repeated interviews have also been found to assist in recall over long delays, perhaps functioning as reinstatement for the event details, therefore strengthening memory (e.g., Howe, Courage & Byrant-Brown, 1993). Given the high memoribility of the event, recall assessments conducted in the short term may not be sensitive enough to reveal the impact of drawing and introducing post-event information.

Participation in the event has been demonstrated to increase the salience of that event, thereby increasing the probability for accurate recall, and a durable representation of the event in memory (e.g., Portwood & Repucci, 1996; Rudy & Goodman, 1991). Rudy and Goodman have speculated that it may also decrease children's susceptibility to incorporation of misinformation. This is supported by the initial measures of retention completed at acquisition, whereby almost all participants reached ceiling, regardless of whether they had an opportunity to draw. Due to the combination of these two characteristics, any differences in recall accuracy for the children who drew and those who told, may only be evident at long-term retention.

The misinformation effect displayed here was robust after a long delay, regardless of the intimate setting that was experienced. At this time the memory representation for the highly salient event may have deteriorated somewhat. When interviewed at a later date with a different

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interviewer, the tell group decreased in accuracy on the misled items, a phenomenon that has been demonstrated in previous research concerning misinformation effects on children's recall (e.g., Greenstock & Pipe, 1996; Gross & Hayne, 1999; Marche, 1999; Pipe & Wilson, 1994; Poole & Lindsay, 1995, 2001). As predicted, having a prior opportunity to draw an aspect of the event appeared to inoculate the effects of the misinformation exposure during later recall assessment. These findings are consistent with results from some previous studies (e.g., Greenstock & Pipe, 1996; Gross & Hayne, 1999) whereby drawing was found to facilitate accurate recall.

Drawing Acts as a "Buffer"

It appears that having engaged in the activity of drawing resulted in an ability to ignore the usual effects of misinformation exposure and resulted in recall accuracy similar of that for children who told about the event on non-tampered items. Drawing may operate as a rehearsal activity strengthening the representation within memory (Burgess & Hartman, 1993; Foley et al., 1987; Kelpsch & Logie, 1982; Paivio, 1968) or increase efficiency in organization, therefore diminishing the effects of misinformation exposure on later verbal recall. Factors argued to be responsible for the favorable effect from drawing include an increase in time, therefore increases in the amount of information reported (Butler et al., 1995) and facilitation of memory through provision of their personal retrieval cues (Bruck et al., 2000). Others have argued that drawing enhances the organization of the narrative, assisting recall amount and accuracy (Burgess & Hartman, 1993). Aside from these cognitive factors, the activity of drawing may alleviate social demand anxiety, improving recall performance (Bruck & Ceci, 1999).

However, the majority of these speculations are explanatory of children who drew as a part of the recall assessment (e.g., Butler, Gross & Hayne, 1995; Gross & Hayne, 1999), as

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opposed to the current research that examined the influence of drawing a personally salient aspect prior to later verbal interviews. Engaging in the act of drawing does indeed bolster the resistance to the impact of postevent information on later recall accuracy (e.g., Burgess & Hartman, 1993). It is possible that this is related to the spreading activation effect that occurs when remembering one particular item from an event increases the probability of recalling the other items in the same event (Marche & Howe, 1995). Therefore, drawing one personally salient part of the event (i.e., magic show) is sufficient enough to provide those children with a self-generated recall cue that initiates a spreading effect to the other items surrounding the event. This may help with the storage and organization of the event in memory (Burgess & Hartman, 1993).

This "buffering" effect of drawing was not the only impact on verbal recall during the interview. When children merely told the interviewer about the events of the magic show, they performed poorly on items that were misled and demonstrated high accuracy for those items that were not tampered with (control items). Conversely, children who engaged in drawing after witnessing the event were less likely to incorporate the misinformation into recall; however their performance on the control items was significantly diminished compared with their peers who merely told about the event previously. Potential reasoning for this discrepancy and unanticipated confounds of drawing on memory will be discussed next.

The Impact of Drawing

Interestingly, and unpredictably, the recall accuracy for the children in the draw group was substantially poorer than those children who told about the event for those items that were not previously misinformed. The spreading effect of misinformation is not uncommon (Bruck et al., 1995; Poole & Lindsay, 1995, 2001). Children may even change their previously correct

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responses about an event when faced with the inconsistency of misinformation, in order to create a consistent recollection of the event (Poole & White, 1991, 1993). However, this does not explain the results obtained here. Examination of the performance of the tell group in this current study reveals that decreases in accuracy were found only on the items that were misled with recall remaining high on the control or nonmisled items. Here, there is no evidence of a spreading effect from misled items in the same event.

Consideration of retrieval induced forgetting paradigms may assist in providing an explanation (Anderson, Bjork, & Bjork, 1994; Anderson, Green, & McColloch, 2000). During a long retention interval, memory is thought to be influenced by similarity and inhibition, whereby retrieval of one particular memory impairs the recall of similar memories. Retrieval of certain items in recall impairs the retrieval of items that are considered similar or as competing traces in memory. This serves to inhibit competing memory representations (see Anderson et al., 1994, 2000 for complete review and explanations of this theory). To demonstrate this effect, Anderson and others (1994) had individuals exposed to word lists that were generated from eight general categories, six words in each. The persons practiced three of the words from only four of the categories. Recall accuracy was then assessed with the entire list of words, that is, all eight categories, with six words in each. Results indicate that accuracy was the highest for the practiced words in the practiced category, followed by the unpracticed categories with the unpracticed words. Recall accuracy was impaired for the unpracticed words in the practiced categories. Retrieval practice has been found not only to improve recall of practiced items, but also to impair retrieval of similar unpracticed items. So what does this mean in light of the results found in this current study?

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We can consider that the drawing of the 'favorite part' of the magic show in this study is similar to the exposure to the categories and words in the retrieval practice design. Presentation of the misinformed items may act like a practice session for only half the items (Jackson & Crockenberg, 1998; Marche & Howe, 1995). During retention assessments, retrieval of accurate responses for items previously misled behaves like the practiced category, practiced words in Anderson et al. (1994). Therefore accuracy is enhanced for the draw group on these items. A corresponding impairment is found for the control items, items they are familiar with, but unpracticed according to the retrieval inhibition paradigm (see Table 3 for direct comparisons). One question that may arise is why performance in the tell group, who seemingly operated under a similar design as the draw group and should be similarly affected by retrieval-induced forgetting, did not have their recall inhibited?

Insert Table 3 about here

The reason for this is straightforward. Drawing strengthens memory for an event through a "practice effect" (Foley, et al., 1987; Pavio, 1968). In order for presentation of misinformation to be considered a re-familiarization of the information or a practice session, the original event would have to have a stronger presence in memory (e.g., Jackson & Crockenberg, 1998). Perhaps the opportunity to draw, as opposed to merely telling about the event, results in a stronger memory trace for the event overall, thereby making it more prone to the effects of retrieval inhibition. If we accept this line of reasoning, then the explanation offered by Anderson and colleagues (1994) that, "Highly accessible items would be the most vulnerable to retrieval induced forgetting" maintaining that, "the critical variable is the strength of the unpracticed item"

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would characterize the findings from the current research. The strength of the control item is stronger due to the practice effects of drawing, thereby causing a greater chance of retrieval induced forgetting. Conversely, telling does not provide the same opportunity to strengthen a trace, resulting in the misinformation exposure not having the same impact on recall and retrieval errors.

If we assume the weaker memory status of the event for the tell group, exposure to misinformation rendered judgments that the two bits of information, the target and competitor (true event and misinformation) were not similar enough in strength to act as a competing details for retrieval inhibition. In fact, the presentation of postevent information may be the stronger of the two, given it was the most recent information. Therefore, disruption in the retrieval of the actual event memories occurred and the stronger influence of misinformation was revealed during the retention test, as opposed to the correct response. Perhaps weakening of the original memory details occurred over time, allowing the misinformation item either to alter the event in storage, or provide obstacles in its accurate or unhindered recollection. This is merely speculation into the underlying mechanisms, and its determination would need further investigation.

Implications

The results of this study provide important information with respect to increasing the understanding of the processes involved in children's memory, specifically, whether previous drawing of an event provides protection from the impact of postevent information. The experience of being both a participant and a witness, drawing about the event, hearing details distorted according to another's account, and multiple interviews with different people are all part of the real life process that occurs when a child is questioned about events legally or

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clinically. It is important to note that many of the components in this experimental design were developed to mimic those found in the "real world." The rationale for this study was fueled both by the apparent lack of investigations in the area and the complex reality of the increasing numbers of children being involved in clinical and legal inquiry. What was found was that drawing proved to be beneficial in inoculating memory against the effects of misinformation on later personal accounts of an event in response to direct questioning. This benefit however, was not without expense to accuracy for items recalled that had not been misled. Research on the use of other interviewing props to elicit information from children has demonstrated similar tendencies (e.g., Bruck, Ceci, Francoeur, & Renick, 1995; Salmon & Pipe, 2000). The results of this study indicate that drawing interacts with the nature of the item to be recalled, the underlying memorial processes, and perhaps even the nature of the interview itself. This may be detrimental in real life situations, particularly, in both clinical and legal applications.

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Table 1

Descriptions of Research that Examined the Impact of Drawing on Children's Reports

Study	Age Group (N)	Drawing a Part of Interview	Retention Interval	Drawing Time in Interview Process	Type of retention	Result
Butler, Gross & Hayne	5 & 6 yrs (32)	Yes	1 day	1 day	Free recall	▶Draw group reported more information for direct recall
(1995)	5 & 6 yrs 3 & 4 yrs (32)	Yes	1 month	1 month	Direct Recall Photo Recognition	▶Drawing increased amount of information for the older children
Gross & Hayne	5 & 6 yrs (28)	Yes	1 day	1 day	Free Recall	▶ Draw group reported more information for direct recall for all time intervals
(1999)	5 & 6 yrs (27)	Yes	1 month	1 month	Direct Recall	▶At one year drawing increased information reported during free recall
	5 & 6 yrs* (52 of original)	Yes*	1 year*	1 year* (some did not draw, even if drew on initial interview)	In addition to above, drawing recognition*	▶Previous drawing did not increase amount information during verbal interview, even with original drawing
Bruck, Melnyk & Ceci	3 – 6 yrs (87)	Yes*	2 weeks* 4 weeks*	2 weeks 4 weeks	Free Recall (at 2 & 6 weeks)	▶Children who drew true and false reminders were more likely to report them in their recall.
(2000)		No	6 weeks		Recognition Test (at 6 weeks) Source Monitoring (at 6 weeks)	▶Were less likely to reject false reminders in recall if previously drew them. ▶Were better able to identify the source of the reminded items, although they still reported the false information in recall.

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Salmon & Pipe **(2000)**	5– 6 yrs *(46)** 6 – 7 yrs *(101, 46 of which tested at 3 days)*	Yes	3 days* 1 year	3 days 1 year	Free Recall Prompted Recall Direct Recall	▶ Drawing during the interview, reported less information than verbal and props in interview ▶ Demonstrated more errors at one year than other groups ▶ Smaller proportion of correct information repeated during one year for drawing condition ▶ New information reported in one year retention was inaccurate, especially for children who drew
Current Research **(2000)**	4– 6 yrs *(108)* 4 – 6 yrs* *(31)*	No No	Immediately after event 1 month 6 months*	Immediately after event	Direct Recall	▶ ▶ ▶

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Table 2
Outline of Procedure Used for the Current Study

Time I	~2 Weeks	~1 Month	~6months
Junior Kindergarten	MP, then $CI_{(disregard)}$ (N=5)	RI - I	RI - II
Magic Show/	MP, then $CI_{(reinforce)}$ (N=9)	RI - I	RI - II
$AI_{(draw)}$	MP, then $CI_{(control)}$ (N=7)	RI - I	RI - II
Magic Show/	MP, then $CI_{(disregard)}$ (N=7)	RI - I	RI - II
$AI_{(tell)}$	MP, then $CI_{(reinforce)}$ (N=9)	RI - I	RI - II
	MP, then $CI_{(control)}$ (N=9)	RI - I	RI - II
Senior Kindergarten	MP, then $CI_{(disregard)}$ (N=11)	RI - I	RI - II
Magic Show/	MP, then $CI_{(reinforce)}$ (N=11)	RI - I	RI - II
$AI_{(draw)}$	MP, then $CI_{(control)}$ (N=9)	RI - I	RI - II
Magic Show/	MP, then $CI_{(disregard)}$ (N=14)	RI - I	RI - II
$AI_{(tell)}$	MP, then $CI_{(reinforce)}$ (N=8)	RI - I	RI - II
	MP, then $CI_{(control)}$ (N=9)	RI - I	RI - II

Note: AI - Acquisition $Interview_{(modality\ of\ reporting)}$ MP - Misinformation Presentation CI - Credibility $Instruction_{(type)}$ RI - Retention Interview

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Table 3

Similarities between the Practice Inhibition Paradigm (Anderson et al., 1994) and current study.
* 1 – most accurate recall 2 – less accurate recall 3 – poor recall

Exposure	Practice	Recall	Performance
8 categories/6 items in each	4 categories/ 3 items	All categories/all items	*1 – practiced categories/practice items *2 – unpracticed categories/unpracticed items *3 – practiced categories/unpracticed items
18 questions/Drawing of the "magic Show" (stronger representation in memory)	9 misinformation statements (functions as practice)	18 questions (recall practiced items better, poorer performance with exposed unpracticed items)	*1 – misinformed information questions *2 – control items questions
18 questions/Telling of the "magic Show" (weaker representation in memory)	9 misinformation statements (functions as interference)	18 questions (recall un-interfered items better, poorer performance with interfered)	*1 – control items questions *2 – misinformed information questions

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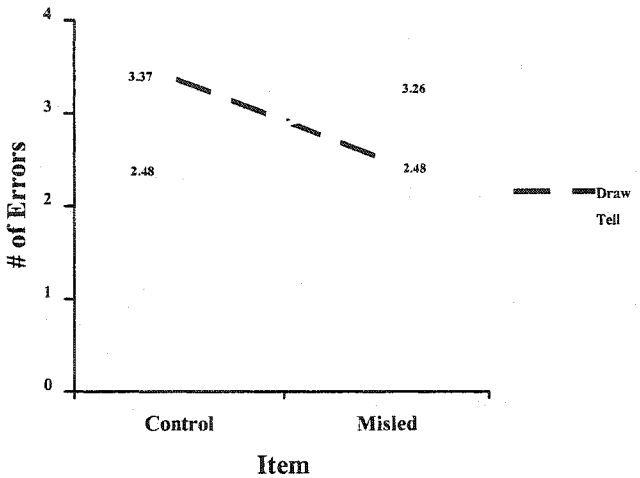

Figure 1. The number of Errors for the control and misled items for modality of reporting

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Appendix A

Sample Consent Forms (document printed on Lakehead University letterhead)

Winter 2000

Dear Parent,

It is well known that children and adults are susceptible to what are known as misinformation effects - that is, when questioned about an event that you have witnessed, you may be persuaded to falsely remember things that did not happen. Children are particularly susceptible to these influences. One way of diminishing these effects is to increase the distinctiveness of the memory for that event. Although we know that distinctiveness helps adults, there is little research on these effects in young children. In order to fill this gap and find more about the role of distinctiveness in children's learning, we are requesting your permission to have your child participate in a study on memory in young children. In this study, we are using a technique to enhance distinctiveness that not only has been demonstrated to improve children's memory in areas other than event memory, but that is also something they enjoy doing, namely, drawing a picture of an event they have just witnessed.

The study (and your child's participation is straightforward and has the approval of the University as well as your child's school and school board. A researcher will visit your child for approximately 15-20 minutes in a room in their school. Your child will watch a brief magic act that has three parts - a card trick, a trick with salt, and a clean up. Following this, children will be asked to draw or tell about what happened in the magic show. Two weeks later, children will be asked questions that will contain information about the event that did not occur (misinformation). Finally, after another two week interval (a total of 4 weeks since the original magic show was seen), children will be asked to remember what they can from the original magic show. The second and third sessions should only last 5-10 minutes. In this way, we will be able to evaluate how much drawing helped children resist the misinformation and facilitate recall of the correct facts about the magic show.

This project will begin immediately and run through April 2000. Following analyses of the data, a summary report will be made available to those who are interested (e.g., parents and teachers). **NOTE:** The identities of the individual children will be kept in the strictest confidence. All reports on this research, published or otherwise, will safeguard the identities of the individuals who participated in this project. The data concerning this project will be securely stored at university (on computer media, both on hard drive and removable backup storage) for a 10 year period following its collection.

Again, we would appreciate your permission to have your child's participation in this project. Let me assure you that there is no risk associated with this project and that your child is free to withdraw from this study at any time. Please fill out the attached page and return that portion to your child's school. Should you have any questions, please do not hesitate to contact your child's school or Dr. Mark L. Howe 9343 - 8793). Thank you very much for your cooperation!

Cordially,
Mark L. Howe, Ph.D.
Professor of Psychology
Dean of Graduate Studies and Research

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Appendix A cont'd.

Fall 2000

Dear Parent,

This is a follow-up request to the study your child participated in earlier this year in which your child watched a brief magic act and was later asked to remember what they could from the magic show. Although our results from this early part of the study are very preliminary (a copy of which available after this follow-up study), they are very promising and indicate that considerable knowledge can be gained if we can interview them one more time to see what they remember from the magic show. This would represent a test of their very long term retention and will help us understand what it is about unique experiences that children remember over more protracted retention intervals.

The study (and your child's participation is straightforward and has the approval of the University as well as your child's school and school board. A researcher will visit your child for approximately 10 minutes in a room in their school. Like last time, your child will simply be asked what they remember of the magic show they saw when they were in school last year.

This project will begin immediately and run through November 2000. Following analyses of the data, a summary report will be made available to those who are interested (e.g., parents and teachers). **NOTE:** The identities of the individual children will be kept in the strictest confidence. All reports on this research, published or otherwise, will safeguard the identities of the individuals who participated in this project. The data concerning this project will be securely stored at university (on computer media, both on hard drive and removable backup storage) for a 10 year period following its collection.

Let me again take this opportunity to thank you for allowing your child to participate last year in this project and let you know how much we would appreciate your permission to have your child's participation in this new (and last) phase of the project. Let me assure you that there is no risk associated with this project and that your child is free to withdraw from this study at any time. Please fill out the attached page and return that portion to your child's school. Should you have any questions, please do not hesitate to contact your child's school or Dr. Mark L. Howe 9343 - 8793). Thank you very much for your cooperation!

Cordially,

Mark L. Howe, Ph.D.
Professor of Psychology
Dean of Graduate Studies and Research

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Appendix B

Questions for Acquisition

Participant # _____ **Condition #** _____

Questions (scene)	Correct	Misled	Notes
1. What did the Magician give you to help with the Magic Show? (G)	hat	wand	
2. What color was your card? (1)	red	black	
3. Who picked the card from the deck? (1)	child	Magician	
4. Who cut/split the deck? (1)	Magician	child	
5. Where did the Magician knock? (1)	cards	table	
6. What color was the cloth for the cards? (1)	red	green	
7. What did the Magician wear? (G)	black cape	white sparkly gloves	
8. What did the Magician drop? (2)	plate	cards	
9. What did the Magician pour into her hand? (2)	salt	pepper	
10. What did the plate look like? (2)	smile face	frown face	
11. What did the Magician do to make the "stuff" in her hand disappear? (2)	wave wand /tap "spot"	say magic words	
12. Where was the "magic spot"? (2)	hand	head	
13. What does the Magician's box look like? (G)	stars	flowers	
14. What did the Magician hurt/bang? (3)	elbow	knee	
15. Did the Magician have a rabbit? (3)	no	yes	
16. Where did the Magician put the magic props/stuff? (3)	box	bag	
17. Who picked the treat from the "magic bag"? (3)	child	Magician	
18. What kind of pen did the Magician have? (3)	elephant	hippo	

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Appendix C

Statements of Reinforcing and Misleading Information

Scene 1 – The Card Trick

Actual Event	Misled
1. Magician gives child a magic hat to wear	1. Magician gives child a wand to hold
2. Your card was red.	2. Your card was black.
3. The child picks a card from the deck	3. Magician picks a card from the deck
4. Magician cuts/splits the deck	4. The child cuts/splits the deck
5. The Magician knocks on the deck of cards	5. The Magician knocks on the table
6. The cards are wrapped in a red cloth	6. The cards are wrapped in a green cloth

Scene 2 – The Spooky Salt Trick

Actual Event	Misled
7. The Magician wore a black cape	7. The Magician wore sparkly gloves.
8. The Magician dropped a plate	8. The Magician dropped the cards
9. The Magician poured salt in her hand	9. The Magician poured pepper in her hand
10. The Magician's plate was a "smiley face"	10. The Magician's plate was a "frowning face"
11. The Magician waved magic wand	11. The Magician said magic words
12. Magician taps "magic spot" on hand	12. Magician taps "magic spot" on head

Scene 3 – The Clean Up

Actual Event	Misled
13. Magician's box has stars on it	13. Magician's box has flowers on it
14. The Magician hurt/banged her elbow	14. The Magician hurt/banged her knee
15. The Magician did not have a rabbit	15. The Magician had a rabbit.
16. Magician puts the props/stuff in a magic box	16. Magician outs props/stuff into a magic bag
17. Child picks a reward from the treat bag	17. Magician gets reward for child in the treat bag
18. Magician shows her elephant pen	18. Magician shows her hippo pen

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Appendix D

Questions for Retention

Participant # _____ **Condition #** _____

Questions (scene)	Correct	Misled	Trials 1 2 3 4
1. What did the Magician give you to help? (G)	hat	wand	
2. What color was your card? (1)	red	black	
3. Who picked the card from the deck? (1)	child	Magician	
4. Who cut/split the deck? (1)	Magician	child	
5. Where did the Magician knock? (1)	cards	table	
6. What color was the cloth for the cards? (1)	red	green	
7. What did the Magician wear? (G)	black cape	white gloves	
8. What did the Magician drop? (2)	plate	cards	
9. What did the Magician pour into her hand? (2)	salt	pepper	
10. What did the plate look like? (2)	happy	sad	
11. What did the Magician do to make the "stuff" in her hand disappear? (2)	wave wand /tap "spot"	say magic words	
12. Where was the "magic spot"? (2)	hand	head	
13. What does the Magician's box look like? (G)	stars	flowers	
14. What did the Magician hurt/bang? (3)	elbow	knee	
15. Did the Magician have a rabbit? (3)	no	yes	
16. Where did the Magician put the magic props/stuff? (3)	box	bag	
17. Who picked the treat from the "magic bag"? (3)	child	Magician	
18. What kind of pen did the Magician have? (3)	elephant	hippo	

Is there anything else you would like to tell me about the magic show?

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