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Why do young children forget where they learned information? The relation between source monitoring, theory-of-mind understanding and suggestibility

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Why Do Young Children Forget Where They Learned Information? The Relation Between Source Monitoring, Theory-of-Mind understanding and Suggestibility

By

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Abstract

In Study one, Fifty young children (3- to 5- year-olds) watched a video and were then interviewed about the video by a Knowledgeable interviewer, who had watched the video with the children, and a Naïve interviewer, who had not see the video. Children were asked yes/no recognition questions, half of which contained misleading suggestions. After five to seven days, children were asked the same yes/no recognition questions by a third Naïve interviewer. Children then completed a source-monitoring task Followed by three theory-of-mind tests. Study two followed the same methodologies as Study one but with an increased sample size (72 children), more differentiated interviewers, an increased number of target items in the video, and forced-choice questions were used instead of yes/no questions. We predicted that a) children who passed the theory-of-mind tasks would have more accurate source-monitoring scores than children who failed the theory-of-mind tasks, and b) children who passed the theory-of-mind tasks would be more resistant to the suggestions of the Naïve interviewer than the Knowledgeable interviewer.

Although children's source monitoring scores were quite low, children more often correctly identified the video as the source of their memories than either of the interviewers. It was found that children who failed the theory-of-mind task reported suggestions from both interviewers equally often, while children who passed were unexpectedly more resistant to suggestions from the Knowledgeable interviewer than the Naïve interviewer. However, in Study 1, as children's source-monitoring skills increased, they were more likely to resist suggestions from the Naïve interviewer than the Knowledgeable interviewer.

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Children can often be critical witnesses during court cases especially in situations where the child is the only witness, such as abuse cases. Having children take the stand has raised important questions about children's accuracy, honesty and, the focus of this paper, suggestibility. Suggestibility is defined as "the degree to which children's encoding, storage, retrieval, and reporting of events can be influenced by a range of social and psychological factors." (Ceci & Bruck, 1993, p. 404). The present investigation focuses on the cognitive skills that assist children in resisting such suggestions.

When attempting to recall a memory we often rely on many different cognitive skills. For example, we may ask ourselves simple questions that help us accurately recall the event that took place. We may ask ourselves, "Did I actually do that or did I just think about doing it?" (source monitoring) or "Amy said that it happened, but is her perspective reliable?" (theory of mind). As adults we often implicitly use these cognitive skills and take them for granted.

Young children are not always able to use these cognitive skills when recalling the details of an event. The development of children's cognitive skills in relation to memory and suggestibility has been the focus of interest for many researchers over the past decade (Ceci & Bruck, 1993). The present study focuses on two of these cognitive skills, source monitoring and theory of mind, and their relation to children's ability to accurately recall an event after being provided with false information by adults. Specifically, the investigation examines how the development of these skills relates to children's resistance to suggestions when recalling an event.

Welch-Ross' (2000) Mental-State Reasoning Model suggests a relation between theory-of-mind understanding and children's source-monitoring skills (see Figure 1). More specifically, Welch-Ross suggests that source monitoring moderates the relation between theory-of-mind understanding and suggestibility. This investigation attempts to further assess this relation in order to find support for the model.

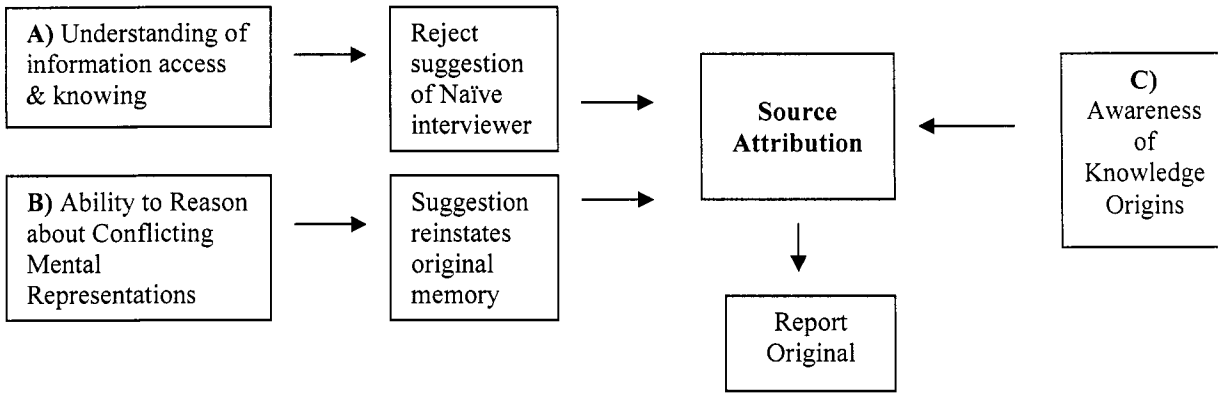

Figure 1 Welch-Ross' (2000) Mental-State Reasoning Model of Suggestibility

Source Monitoring

Source monitoring is "the set of processes involved in making attributions about the origins of memories, knowledge, and beliefs" (Johnson, Hashtroudi & Lindsay, 1993, p1.). Sources of information can range from the television to friends, from your own actions to your own thoughts. For example, after telling a friend about a recent news event they may ask you, "Where did you learn about that?" and you have to determine whether you heard it on the news or read it in the paper that morning. Source-monitoring errors occur when we confuse or forget the source of our memories or information we have obtained. For example, telling your friend that you learned about the news event from the paper when in fact you had seen it on television.

Our ability to monitor sources develops during childhood and is quite stable during adulthood. There is a clear development in children's performance on source-monitoring tasks between 3- to 8- years of age (Poole & Lindsay, 2002). O'Neill and Gopnik (1991) found that 3-year-old children had difficulty identifying the source of their beliefs whereas the 4- and 5-year-olds were successful. Even after training 3-year-olds' difficulty persisted. O'Neill and Gopnik's findings are consistent with the literature indicating that older children (e.g., 5-years-old and up) are better at source monitoring than younger children (Foley, Harris & Hermann, 1994; Foley, Johnson & Raye, 1983; Lindsay, Johnson & Kwon, 1991; Poole & Lindsay, 2001, 2002).

Much of the source-monitoring research has pointed to a link between children's ability to monitor source and their resistance to suggestions. Giles, Gopnik and Heyman (2002) presented 3- to 5- year-olds with a story in two source forms (video and a spoken narrative). Each source presented unique information about the same story (a boy feeding his dog). Children were then asked a series of general recognition questions ("What colour is the farm house?") followed by source questions ("Did I tell you what colour it was, or did you see it on the tape?"). Children also completed a suggestion task where children were asked leading questions to assess their resistance to suggestions (e.g., "The little boy and the dog were standing in the mud, weren't they?"). Results indicated that children's performance on the source-monitoring questions was highly correlated with their resistance to suggestions.

Poole and Lindsay (2002) attempted to train young children to use source-monitoring skills when recalling events to improve their resistance to such suggestions. Children ages 3 to 8 participated in a science experiment and then listened to their parents

read a story about the same event. The story contained items that they had experienced and items they had not experienced about the science experiment. After a delay children were given source-monitoring training and were interviewed about the science demonstration. Source-monitoring training reduced false reports made by 7- to 8- year olds but had no impact on younger children's reports. These results are consistent with previous studies conducted by Poole and Lindsay (1995, 2001). Poole and Lindsay (2002) suggested that children progress through developmental phases in their ability to resist suggestions. In the early phase, younger children (3- to 4- years-old) do not benefit from source-monitoring training. Intermediate children (5- to -6 years-old), the second phase, perform well when sources are distinct and benefit from source training when specific sources are provided but not when general instructions are given. Finally, older children (7- to 8- years-old), the more mature phase, do not spontaneously use source-relevant information but can be trained to source monitor.

When assessing these developmental differences in children's ability to source monitor it appears as though there may be another cognitive skill underlying source monitoring, a skill that is only present in children aged 5-years and older. Lindsay and Johnson (1987) suggested that source monitoring may require a metacognitive component. Recently, a number of researchers have suggested that there may be a relation between source monitoring and aspects of theory-of-mind skills, such as understanding conflicting mental representations and false beliefs (e.g., Gopnik, 1990; Gopnik and Graf, 1988; Welch-Ross, 1999a, 2000). Welch-Ross' (2000) Mental-State Reasoning Model indicates specific relations between source monitoring, theory–of-mind understanding and suggestibility. This model is further discussed below.

Theory-of-Mind Understanding

Theory of mind can be described as "a set of principles that structures our understanding about how individuals represent and interpret experiences, and it provides a conceptual basis for comprehending, explaining and predicting human behaviour" (Welch-Ross, 2000, p.229). For the purposes of this paper, theory-of-mind understanding specifically assesses the cognitive ability to understand that others may have differing perspectives to one's own and reasoning about these perspectives. Between the ages of 3 and 6 years of age children's theory-of-mind understanding increases dramatically (Templeton & Wilcox, 2000). Within these developmental years children gain the ability to consider multiple perspectives of a single situation and an understanding that these representations form the foundation for how people comprehend the world around them (Perner, 1991; Wimmer & Perner, 1983). Wimmer and Perner (1983) developed a False-belief task which conservatively measured children's representational ability. They found that half of the children between 4 and 5 years of age did not understand that a person who was not looking when an object was moved would still look in the original location for the object whereas the majority of 6 to 9 year olds correctly identified that the person would look in the original location. Other tasks, including the appearance-reality task (Flavell, 1988) and the mistaken contents tasks (Astington & Gopnik, 1988) have also been used to measure children's representational abilities. All of these tasks suggest that younger children tend to hold a single mental representation or perspective of an event whereas older children are able to consider multiple perspectives of the same event.

As children develop the cognitive skill of theory-of mind they progress through different levels of understanding. One of the simplest forms of theory of mind, that is

important for the current investigation, is children's understanding of the connection between experiencing and knowing. Ruffman and Olson (1989) found that 6-year-olds are much better than 3- to 4-year-olds at understanding other people's access to knowledge. More specifically, older children understand that a person who looks inside a box (i.e., had an experience that provided knowledge) knows the contents of the box, whereas someone who has not looked inside the box (i.e., did not have an informative experience), does not know the contents. If a child is able to understand that experience leads to knowledge (e.g., someone who did not witness an event does not have access to information about the event) he/she may be more resistant to suggestions made by an interviewer who presents herself as naive about the event, while accepting suggestions offered by someone who claims to be knowledgeable (Welch-Ross, 1999a, 1999b).

A more complex aspect of theory of mind that is important for this project is children's representational ability. Children's representational ability is assessed as the number of mental representations (or perspectives) of an event they can hold in their memory at a time (Templeton & Wilcox, 2000). False-belief tasks are used to assess children's ability to hold conflicting mental representations in their memory as well as their understanding that representations result from having access to information. In the mistaken contents task (Gopnik & Astington, 1988), a researcher shows a child a crayon box and asks the child what they think is inside the box. Once the child says what they believe to be in the box (crayons), the experimenter shows the child that there is actually a candle inside. The box is then closed up and the child is asked what they previously believed to be inside the box. Most 3-year-olds are not able to hold the two representations (the crayon and the candle) in their memory and often report knowing the

candle was inside all along. When asked what another person who has not looked inside the crayon box will think is inside, most three year olds again say a candle. Conversely, most 5-year-olds accurately report knowing there is a candle inside but that they previously believed a crayon was inside, demonstrating their ability to hold dual representations of the same box.

Another False-belief task that demonstrates children's ability to hold conflicting mental representations in memory at once is the mistaken identity task (Flavell, Green & Flavell, 1986). In the mistaken identity task children are shown a sponge that appears to be a rock. After the child states that it looks like a rock, the experimenter shows the child that the object is really a sponge. Children, while only looking at the sponge, are then asked what the object looks like to their eyes and what the object really is. Three-year-old children will often report that it looks like a sponge and it really is a sponge while 5-year olds accurately report the object looks like a rock but is really a sponge. It appears as though by 5-years-old children are they able to hold conflicting mental representations in memory and reason about these representations. Younger children (3-year-olds) are only able to reason about a single representation, most often the more recent representation presented (Templeton & Wilcox, 2000).

Previous research has linked children's theory-of-mind scores to children's suggestibility. It has been found that children's suggestibility is negatively related to their performance on theory-of-mind tasks (Templeton & Wilcox, 2000; Welch-Ross, 1999a; Welch-Ross, 1999b; Welch-Ross, Diecidue & Miller, 1997). More specifically Welch-Ross (1999b) assessed how interviewers' knowledge of an event (naïve, or knowledgeable) and children's ability to reason about mental states related to children's

suggestibility. Children were read a story from a PowerPoint video and asked both misleading and non-misleading yes/no questions about the story (12 by the same person who initially read the story and is thus a knowledgeable interviewer, and 12 by the naïve interviewer who claimed to have no knowledge of the story). After a one week delay, children were asked 24 recognition forced choice questions about the items they had been questioned on before (e.g. Did Sally fall from the jungle gym at the park or did Sally fall from the seesaw at the park?). In 12 of the questions, children chose between the original item and a suggested item from session 1 (misleading questions). In the other 12 questions, children chose between the original item and a novel item (non-misleading questions). Following the recognition task children completed three theory-of-mind tasks to assess their understanding of knowledge. First, a See-Know task to assess their understanding that experiencing leads to knowing (Welch-Ross 1999b, adapted from Ruffman & Olson, 1989). Children then completed the mistaken location and mistaken identity False-belief tasks that assessed children's reasoning about both the relation between experiencing and knowing and conflicting mental representations.

Results from the Welch-Ross study (1999b) indicated that children, who could reason about conflicting mental representations, differed in their suggestibility from those children who could not reason about conflicting mental representations. More specifically, children who could reason about conflicting mental representations reported more suggestions made by the Knowledgeable interviewer than suggestions made by the Naïve interviewer. Children who did not pass the conflicting mental representations tasks reported suggestions from both types of interviewers (Naïve and Knowledgeable) equally as often. In addition, children's scores on the False-belief tasks were negatively related to

children's suggestibility scores. These results seem to point to the fact that children who can reason about others' mental states understood that the Knowledgeable interviewer had access to information about the video whereas the Naïve interviewer did not have relevant information. Suggestions made by the Knowledgeable interviewer may have been incorporated into the children's memories because the children felt that the Knowledgeable interviewer was a reliable source. Conversely, the Naïve interviewer's suggestions were discounted because the children who passed the False-belief tasks realized that the Naïve interviewer did not have access to information about the video. Since the children who failed the False-belief tasks were unable to recognize a difference in the amount of information each interviewer had about the video, they reported suggestions equally as often from both interviewers.

From Welch-Ross' (1999b) study it is clear that children must understand that experiencing an event leads to having access to information about the event and that the number of mental representations a child can hold in their memory is negatively related to suggestibility. If a child does not understand that experiencing leads to knowing, they are not able to resist suggestions from a Naïve interviewer because they do not understand that the interviewer does not have access to any information about the event. In addition, if a child cannot hold multiple representations in memory they are likely to report the most recent representation (often a suggestion). By understanding how these two aspects of theory of mind relate to suggestibility we are better able to understand children's ability to resist suggestions from an interviewer.

Source Monitoring, Theory-of-Mind Understanding, and Suggestibility

It is evident from previous research that both source monitoring and theory-of-mind understanding are related to suggestibility (Giles, et al., 2002; Poole & Lindsay, 2001; Templeton & Wilcox, 2000; Welch-Ross et al., 1997; Welch-Ross, 1999a; Welch-Ross, 1999b). But, it has been suggested that these two cognitive skills may be related to one another (Welch-Ross et al., 1997; Welch-Ross, 1999b, 2000) and that perhaps source-monitoring skills moderate the relation between theory of mind and suggestibility (Welch-Ross et al., 1997). If children are not able to hold multiple representations in their memory they will not be able to hold multiple sources in memory. Without multiple sources stored in memory children are not able to source monitor. Children who can hold multiple representations can then hold multiple sources in memory and have the information available to monitor the source of their information. It seems possible that children are not able to source monitor, and in turn resist suggestions, without being able to hold multiple representations in their thought process. Evidence for such an assertion comes from a study by Welch-Ross (1999c, as cited in Welch-Ross, 2000) who found that children who understood conflicting mental representations took longer to decide between the original and suggested items when memory for a story was tested, than did children who lacked such understanding.

Welch-Ross (2000) proposes that the Mental-State Reasoning Model assesses the relation between source monitoring and theory of mind. The Mental-State Reasoning Model proposes that several aspects of reasoning about mental states contribute to children's source-monitoring skills and in turn resistance to suggestions. First, the model proposes that having an understanding that possessing access to information leads to knowing. That is to say, children who understand that having access to information leads

to knowing can reject suggestions from someone who does not have access to information (e.g., a naïve interviewer) because children understand that this person cannot have information about the event. Children who do not understand the experiencing-knowing connection do not have this reasoning to reject suggestions from a naïve interviewer and therefore are equally likely to report suggestions from the naïve interviewer and knowledgeable interviewer (See Figure 1. path A). The second component of the model is in regards to reasoning about conflicting mental representations. Children who are able to reason about conflicting mental representations are also more resistant to suggestions from interviewers. In fact, Welch-Ross states that suggestive questions may reinstate the original memory for children who are able to hold dual representations in memory at once. On the other hand, children who are not able to hold conflicting representations in memory are likely to update their original memory with the new suggested item (See Figure 1. path B). Finally, the model suggests a relation between understanding that specific knowledge comes from specific sources (e.g. knowing that something is red comes from seeing it) and making source attributions. An explicit awareness that specific knowledge comes from specific sources (e.g., knowing that something is red comes from seeing it) also assists children in reporting the original event rather than a suggestion. Welch-Ross states that awareness of knowledge origins motivates children to retrieve source cues, which in turn, assists them in making source distinctions. If a child is able to remember he/she heard someone says something but did not see it, the child is better able to reject the suggestion (what they heard) (See Figure 1. path C). All three of these aspects of reasoning about mental states assist in decreasing children's suggestibility. As children gain the skills required to perform each of these

cognitive skills (A, B, and C) suggestibility will decrease accordingly. (see Figure 1 for diagram of Welch-Ross' model).

According to the model, there are two ways that source monitoring and theory of mind development may be related. First, children who lack mental-state understanding may not encode information about source that can later be used to infer source (and thus resist suggestions). Remembering vivid perceptual details such as colour, sound, and smell, for example, may lead one to assume that the source of a memory was an experienced event rather than an imaginary one (Johnson, et al., 1993). However, such an evaluation can only occur if this information was initially encoded. Second, even if such information was encoded, children who lack mental-state understanding may not be motivated or able to evaluate the information to infer source.

Although there seems to be support for the Mental-State Reasoning Model (see Source Monitoring, Theory of Mind and Suggestibility section above), there are some aspects of the model that have not been tested. In particular, the relation between conflicting mental representations and source monitoring has not been directly assessed even though this forms a central part of the model. Although Welch-Ross found that conflicting mental representations reduced children's suggestibility, and assumes that suggestibility decreases as a result of children monitoring their sources of information better, no explicit source-monitoring test was performed within a study that also tests children's representational abilities. Thus, the two studies in the current investigation assessed children's theory-of-mind understanding and source monitoring in relation to suggestibility in an attempt to confirm the model's validity. Our first study, designed to

assess the relation between source monitoring, theory of mind and suggestibility, was modeled after Welch-Ross' (1999b) study.

Hypotheses

The main research question of the investigation was; does source-monitoring moderate the relation between theory-of-mind and suggestibility? A three-way interaction was predicted between interviewer knowledge (Knowledgeable or Naïve), theory-of-mind performance (pass or fail) and Item (misleading or non-misleading) on children's recognition of items in the target event. It was expected that children who failed the theory-of-mind tasks would be equally suggestible regardless of which interviewer presented the misleading suggestions. However, children who passed the theory-of-mind tasks were predicted to be less resistant to suggestions from the Knowledgeable interviewer than the Naïve interviewer.

Through a regression analysis we expected that a relation between source-monitoring scores and children's resistance to suggestions would be revealed. That is to say, children who had higher source-monitoring scores would be more resistant to suggestions made by the interviewers.

It was also predicted that a 2 Interviewer (Knowledgeable or Naïve) x 2 Theory-of-mind performance (Pass or Fail) analysis of variance on correct source-monitoring scores would reveal a relation between theory-of-mind understanding and source-monitoring skills. Specifically, we expected to find that children who passed the theory-of-mind tasks would have more accurate source-monitoring scores than children who failed the theory-of-mind tasks.

Study 1

Study 1 attempts to assess the relations between Source-monitoring, Theory-of-Mind understanding and suggestibility through an exploratory-experimental research design.

Method

Participants

Participants were recruited from three local daycare centres and two junior kindergarten classes at a local Public School. All centers were of a middle socio-economic status. Fifty children between the ages of 3- to 5- years-old participated (M = 52 months, range 36 to 66 months). Informed consent was initially obtained from the school board and daycare centres. An informed consent form was then sent to all the parents of the 3- to 5-year-old children. Parents were invited to read the letter, discuss the study with their children (without mentioning that it was a memory study), and indicate whether they consented to their child's participation in the experiment by signing the consent form and returning it to school.

Materials, Procedure and Design

Assent was sought from those children whose parents had consented by asking the children if they would like to "come watch a video" with the research assistant. All children who provided assent took part individually in two sessions.

Session 1: Initial Interview

A female research assistant (RA), who later served as the Knowledgeable interviewer, read a story about Frankie the Frog getting ready for winter from a PowerPoint slide show. The 5-minute story consisted of 24 target items (e.g., a blue bird, a raccoon, Frankie catching a fly with is tongue) that the children were later asked to

recall. All items were counterbalanced between two versions of the story so that each item was sometimes present in the story and sometimes as a misleading question item. Once the story was completed the Knowledgeable interviewer invited the child to complete a puzzle. The puzzle acted as a distracter task and took approximately 2 minutes to complete.

Half of the children were interviewed by the Knowledgeable interviewer first and half the children were interviewed by the female Naïve interviewer first (the roles of Knowledgeable and Naïve interviewers were counterbalanced). Upon completion of the puzzle, children who were initially interviewed by the Knowledgeable interviewer were asked 12 yes-no recognition questions about the frog video. Six questions were non-misleading, probe items that were present in the video and thus required a "yes" answer ("Did Frankie get stuck between rocks?" when Frankie did get stuck between rocks), and 6 questions were misleading and required a "no" answer, probe items that were not present in the video (e.g., "Was there a blue bird in the video?" when in fact there was a yellow bird in the video). All questions were counterbalanced so that each item served equally often as a non-misleading or misleading question and were asked in a random order. Once the Knowledgeable interviewer asked all of her questions the Naïve interviewer entered the room. The Knowledgeable interviewer introduced the Naïve interviewer to the child and explained to the Naïve interviewer that they had just watched a video about Frankie the Frog. The Knowledgeable interviewer then told the child that she forgot something in her car and would be right back. The Naïve interviewer then worked on a second puzzle with the child that acted as a distracter between the first interview and the second. Once the child had completed the second puzzle the Naïve

interviewer said to the child, "I've never seen the Frankie the frog video, I don't know anything about it, may I ask you some questions about the video?" The Naïve interviewer then asked the child 12 additional yes-no recognition questions (these 12 questions were different from the questions the Knowledgeable interviewer asked). Twelve questions were non-misleading and required a "yes" response and 12 questions were misleading and required a "no" response. All questions were counterbalanced between interviewers in a between-subjects design. (See Appendix A for diagram of initial interview questions)

The same procedure was used for children who were interviewed by the Naïve interviewer first except that children were introduced to the Naïve interviewer immediately after the video was complete. The Knowledgeable interviewer then left while the Naïve interviewer completed the first puzzle with the child and asked her 12 yes-no recognition questions. When the Knowledgeable interviewer returned the Naïve interviewer made an excuse to leave and the Knowledgeable interviewer completed the second puzzle with the child and asked her additional 12 yes-no recognition questions. Session 1 took approximately 15 minutes to complete.

Session 2: Final Interview and Theory of Mind Tasks

After a 5 to 7 day delay a third research assistant, who presented herself as naïve, asked children 24 yes-no recognition questions about the frog video (e.g., "Did Frankie the frog see lots of red flowers in the video?"). The 24 yes-no recognition questions were the same questions asked by the Naïve and Knowledgeable interviewers in the first session. Twelve of the recognition questions were non-misleading (questions about things that did happen in the video) and twelve of the questions were misleading (questions about things that did not happen in the video, but that the naïve or knowledgeable

interviewer asked them about). All questions were asked in a random order. Prior to being asked the recognition questions children were given practice saying, I don't know to questions. (See Appendix B for diagram of final interview questions).

Following the recognition questions children completed a source-monitoring task. Children were presented with photographs of the Knowledgeable interviewer, the Naïve interviewer and a television. The photographs were to assist children in identifying the sources of information. The interviewer said, "Some of the children I've been talking to told me that [Knowledgeable interviewers name] and [Naïve interviewer's name] asked them about things that did NOT happen in the video. So if I ask you about something and you saw it in the video point to this picture of the T.V. and if I ask you about something and you didn't see it in the video but [Knowledgeable interviewer's name] or [Naïve interviewer's name] asked you about it I want you to point to their pictures. Okay?" Children were then given 8 practice questions: 2 questions where the video was the correct answer, 2 questions where the Knowledgeable interviewer was the correct answer, 2 questions where the Naïve interviewer was the correct answer and 2 questions where "no-one" was the correct answer. Children were praised for correct answers and corrected when they gave an incorrect answer. Children were then asked 24 source questions and asked to identify the source of the information. The 24 source questions were the same questions that were asked during the recognition phase of the interview and were asked in random order. For twelve of the questions the correct source was the video and for 12 of the questions the correct source was one of the interviewers (6 Knowledgeable interviewer and 6 Naïve interviewer questions).

After the source-monitoring task children completed three short theory-of-mind tasks. The See-Know task, adapted from Ruffman and Olson (1989), assessed children's understanding of the relation between experiencing and knowing. Four items (a crayon, a ball, a hairbrush and a box of candy) were required. A toy was placed inside a box by the experimenter, sometimes the child looked inside the box and sometimes a puppet, Leo the Lion, looked inside the box. The child looked inside the box for two trials and the puppet looked inside the box for a different two trials. The order of who looks inside the box altered back and forth for each trial and the order of who started was counterbalanced between subjects. The child was then asked, "Do you know what is inside the box?" "Does Leo know what is inside the box?" (the order of questions was counterbalanced within subjects). Children were assigned 1 point for each trial only if the child identified both, his/her own and the puppet's knowledge correctly. Total scores for each child ranged from 0 to 4.

Children then completed two False-belief tasks to assess their ability to hold conflicting mental representations in their memory as well as their understanding that representations result from having access to information. The first False-belief task children performed was the *mistaken contents task* (Gopnik & Astington, 1988).The researcher showed the child a Smarties box and ask the child "What do you think is inside this box?" The experimenter then opened the box and showed the child that there was actually a pencil inside the box. The experimenter closed the box back up with the pencil inside they asked the child "What is inside this box?" (reality control question) followed by, "When you first looked at the box, what did you think was inside?" (former false-belief question). The experimenter then brought out the puppet, Leo the Lion, and

said, "Now it is Leo's turn to look at the box, I'm going to show Leo the closed box you first saw. What will Leo think is inside this box?" (false-belief question) Children were given a score out of three for the mistaken contents task. For each of the reality control, former false-belief and false-belief questions they correctly answered they were given one point.

The second False-belief task was the mistaken identity task (Flavell, et al., 1986). Children were shown slime that looked like a rock and asked "What is this?" The experimenter then demonstrated to the child that it was really slime and allowed the child to touch it. The experimenter then asked the child two test questions, "When you look at this with your eyes right now, does it look like a rock or does it look like slime?" "What is it really really, is it really really slime or is it really really a rock?" For the second trial children were shown a red strawberry and asked, "What colour is this?" The experimenter then placed a clear green piece of paper in front of the strawberry and asked two test questions, "When you look at this with your eyes right now does it look red or does it look green?" What colour is it really really is it really really green or is it really really red." For each of the test question the child answer correctly in the mistaken identity task the child was given 1 point. Children received a total score out of 4 for the mistaken identity task.

Results

The False-belief tasks were found to correlate with one another, $r(49) = .51, p < .001$, and were therefore combined. Since the See-Know task was measuring a different aspect of theory-of-mind (the experience-knowing connection) scores from the See-Know task were not combined with False-belief scores.

Pass-fail scores were calculated for each of the two theory-of-mind measures according to the procedure reported in the Welch-Ross (1999b) study. Children were credited as passing each task if they correctly answered all four questions. Thus, 18 children passed and 32 children failed the See-Know task, and 8 children passed and 42 children failed the False-belief task. As there were so few children in the sample who passed the False-belief task (thus reducing power in the analyses), an alternate coding system was used such that children who got 3 or 4 questions correct were credited as passing and this resulted in 21 children passing and 29 children failing the False-belief task. Although Welch-Ross (1999b) found that the different pass-fail criteria made no significant differences in her results, we did find differences with the different pass fail criteria. Thus, significant results specify the criteria used. (See Table 1 for means and standard deviations of each task).

The results section starts by assessing the relation between theory of mind and suggestibility in the initial interview (when the suggestions were first presented) as well as the final interview. A three-way analysis of variance (ANOVA) is performed to assess the relations between source-monitoring skills, theory-of-mind understanding and suggestibility. In addition the relation between source-monitoring skills and suggestibility will be assessed. As this is an exploratory study a more lenient one-tail significance test is used for some tests. Results specify if the one-tail significance test criteria was used, if not specified a two tailed significance test was used.

Initial Interview

Two 2 Interviewer (Knowledgeable, Naïve) x 2 Theory-of-mind performance (Pass, Fail) x 2 Item (misleading, non-misleading) ANOVAs were performed on the

number of questions correct. No significant three-way interactions were found for either the See-Know task or the False-belief task. It was found that children who passed the theory-of-mind task were not more suggestible to the Knowledgeable interviewer's questions than the Naïve interviewer's, this is consistent with previous research (Welch-Ross, 1999b). No significant 2-way interactions were found. A main effect of item was found, consistent with previous research, indicating that children were more accurate at answering non-misleading questions than misleading questions. $F_{see\text{-}know}(1, 48) = 43.10, p < .001$, $F_{\text{fb pass = 3 or 4}}(1, 48) = 45.85, p < .001$, $F_{\text{fb pass = 4}}(1, 48) = 21.84, p < .001$ (See Table 2). Overall, the different pass-fail criteria made no significant differences for the initial interview.

Final Interview

Recognition Scores

Two 2 Interviewer (Knowledgeable, Naïve) x 2 Theory-of-mind performance (Pass, Fail) x 2 Item (misleading, non-misleading) ANOVAs were performed on the number of questions correct on the final interview; one ANOVA used the See-Know scores and the other the False-Belief scores as the theory-of-mind measure. As predicted, for the See-Know task there was a significant three-way interaction, $F_{\text{see-know}}(1, 48) = 3.19, p < .05$ (one-tailed). This three-way interaction indicated that children who failed the See-Know task did not discriminate between the Knowledgeable and Naïve interviewer, as predicted. However, contrary to what was predicted, children who passed the See-Know task were slightly more misled by the Naïve than the Knowledgeable interviewer (see Table 3 for means). A main effect of age was marginally significant $F_{\text{see-know}}(1,48) = 3.40, p = .06$. *The* interaction remained significant when age was controlled,

$F_{\text{see-know}}(1, 48) = 2.97, p < .05$ (one-tailed). No significant two-way interactions were found. A main effect of item was found, $F_{\text{see-know}}(1, 48) = 84.20, p < .001$, again indicating that children were more accurate at non-misleading questions than misleading questions regardless of whether they passed the See-Know task ($M = 2.33$ and 5.18 for misleading and non-misleading questions respectively).

The analyses on the False-Belief tasks did not reveal a significant three-way interaction but there was a significant Item (misleading, non-misleading) x Theory-of-mind performance (pass, fail) interaction when controlling for age. This two-way interaction, when a pass score was 4 out of 4, indicated that children who passed the False-belief tasks did better on non-misleading questions than children who failed the False-belief tasks. Whereas children who failed the False-belief task did better on misleading questions than children who passed the False-belief tasks $F_{\text{fb pass = 4}}(1, 47) = 4.37, p < .05$ (see Table 4 for means). There was no significant interactions when a pass score was 3 or 4 out of 4, $F_{\text{fb pass = 3 or 4}}(1, 48) = .17, p = .68$. In addition a main effect of item was found, $F_{\text{fb pass = 3 or 4}}(1, 48) = 85.60, p < .001$ ($M = 2.37$ and 5.16 for misleading and non-misleading questions respectively) and $F_{\text{fb pass = 4}}(1, 48) = 57.76, p < .001$ ($M = 2.20$ and 5.27 for misleading and non-misleading questions respectively). Once again, children were more accurate at non-misleading questions than misleading questions regardless of whether they passed the False-belief tasks.

Source-Monitoring Scores

Two 2 Interviewer (Knowledgeable, Naïve) x 2 Theory-of-mind performance (Pass, Fail) ANOVAs on correct source scores were also performed to assess the relations between children's source-monitoring and each of the theory-of-mind tasks. An

Interviewer effect was found prior to controlling for age for both the See-Know, $F_{\text{see-know}}(1, 48) = 15.45, p < .001$, and False-belief tasks, $F_{\text{fb pass = 4}}(1, 48) = 11.55, p = .001$, and $F_{\text{fb pass = 3 or 4}}(1, 48) = 14.87, p < .001$. As shown in Table 4, the means indicate that regardless of whether children passed or failed the theory-of-mind tasks they more often correctly matched items presented by the Knowledgeable interviewer to the Knowledgeable interviewer, than they identified the Naïve interviewer as the source of items presented by the Naïve interviewer. Overall, the source-monitoring scores were very low ($M = 1.40$ and .54 out of a possible 6 for the Knowledgeable and Naïve interviewers respectively).

The Interviewer (Knowledgeable, Naïve) x Theory of mind (Pass, Fail) interaction was not significant but the means indicated that there was a trend, $F_{\text{see-know}}(1, 48) = 1.402, p = .12$ (one tail), $F_{\text{fb pass = 3 or 4}}(1, 48) = 1.09, p = .15$ (one tail), and $F_{\text{fb pass=4}}(1, 48) = .951, p = .17$ (one tail). Children who passed the theory-of-mind tasks showed a larger difference between interviewers ($M = 1.22, 1.38, 1.15$ for See-Know, and False-Belief pass equals 4 and pass equals 3 or 4 respectively) than children who failed the theory-of-mind tasks ($M = .66, .76, .65$ for See-Know, and False-Belief pass equals 4 and pass equals 3 or 4 respectively). It appears as though children were better at identifying the Knowledgeable interviewer as the source of their beliefs than the Naive when they pass the tasks compared to when they failed (see means in Table 5). The larger difference between interviewers indicates that children who passed the False-belief and See-Know tasks acknowledged a greater difference between the two interviewers than children who failed.

A suggestibility ratio was calculated following Welch-Ross' (1999b) procedure. The number of correct rejections of details suggested by the Knowledgeable interviewer was divided by the number correct rejections of details suggested by the Naïve interviewer. Therefore, a higher score indicated that children were more resistant to the Knowledgeable interviewer's suggestions. Bivariate correlations were performed between Theory-of-mind performance, the suggestibility ratio, and the source-monitoring scores, controlling for age. Separate correlations were calculated using the See-Know scores and the False-Belief scores as the theory-of-mind measure. The suggestibility ratio was found to negatively correlate with children's source-monitoring scores for both theory-of-mind measures, $r(48) = -.22$, $p < .05$ (one-tailed), and the correlation remained significant after controlling for age, $r(48) = -.23$, $p < .05$ (one-tailed). It seems possible that, as children's source-monitoring skills increased they were more likely to resist suggestions from the naïve interviewer, as predicted. No other significant correlations were found after controlling for age.

Discussion

Children, who passed the See-Know task, therefore understanding the experiencing-knowing connection, were slightly more misled by the Naïve than the Knowledgeable interviewer. However, children who did not pass the See-Know task did not discriminate between the Knowledgeable and Naïve interviewers. These results were not replicated with the False-belief task, although it was found that children who passed the False-belief task did better on misleading and non-misleading questions than children who failed the False-belief tasks. Although children who passed the False-belief task demonstrated better memories overall (as their performance on the non-misleading

questions was superior to children who failed the False-belief task), it appears as though False-belief understanding assists in resistance to misleading suggestions.

The results from Study 1 are not consistent with Welch-Ross' (1999b) findings. Welch-Ross did not find a significant three-way interaction based on children's See-Know scores, but did find a significant three-way interaction based on children's False-Belief scores. These results may be related to the number of children passing the False-belief task or perhaps the age difference between Welch-Ross' sample and the current one (see below for more specific details).

In addition, Welch-Ross (1999b) found that children who passed the False-belief tasks reported more suggestions from the Knowledgeable interviewer rather than the Naïve interviewer. Welch-Ross' findings appear to be the opposite of what was found in Study 1. Welch-Ross suggested that children reported suggestions more often from the Knowledgeable interviewer because they believed the Knowledgeable interviewer to have access to information about the event, while the Naïve interviewer did not have access to relevant information. One possibility for our results is that children who passed the False-belief tasks understood that the Knowledgeable interviewer knew what happened in the video so the children tried harder to answer correctly because they knew the Knowledgeable interviewer would know if they made a mistake. Since children tried harder during the suggestive interview with the Knowledgeable interviewer they may have encoded the original event for these items more accurately.

Source monitoring

Children who passed the theory-of-mind tasks were found to be more accurate at matching items presented by the Knowledgeable interviewer with the Knowledgeable

interviewer than items presented by the Naïve interviewer with the Naïve interviewer. This result does not reflect an interviewer bias because the interviewers were counterbalanced (i.e., each RA served as the Knowledgeable and Naïve interviewer across the experiment). Thus, it appears that children may have just been guessing and were possibly biased towards choosing the Knowledgeable interviewer because they spent more time with her.

Another possibility for the weak results in Study 1 is that the interviewers were not distinct enough and children were not able to differentiate between the two interviewers. Both interviewers had relatively similar appearances (short dark brown hair, fair skin, similar height) as well as a similar friendly demeanour. So when children attempted to retrieve the source of their information both interviewers appeared the same in their memory. This similar appearance may have led them to guess. The means in Table 6 demonstrate that children were much more accurate at identifying the video as the source of their knowledge than either of the interviewers. It appears as though children were able to identify the video as the source of their knowledge but were unable to differentiate between the two interviewers, resulting in poor source scores for the interviewers. Perhaps if the differences between interviewers were more salient (e.g., different clothing, different hair colour etc.) children's source monitoring scores for the interviewers would improve.

It is also possible that the aspects of theory of mind that are being tested (experiencing- knowing and False-belief tasks) are not the aspects that are related to source monitoring. Perhaps other aspects of theory of mind such as awareness of knowledge origins are more strongly related to source monitoring. Awareness of

knowledge origins assesses children's understanding that knowledge originates with specific experiences (e.g., knowing that something feels heavy comes from feeling the object). Once a child understands that you know something feels heavy because you felt it, s/he is better able to monitor the sources of information. If the child knows the object feels heavy, s/he can then conclude s/he must have felt the object. Perhaps if children do not possess awareness of knowledge origins, False-belief understanding and the experiencing- knowing concept are not enough to assist children in source monitoring in this task.

Children's source-monitoring skills were found to be negatively related to a suggestibility measure that reflected differential resistance to the Knowledgeable and Naïve interviewers. As children's source-monitoring skills increased they were more likely to resist suggestions from the Naïve interviewer. This correlation supports previous findings that source-monitoring is related to children's resistance to suggestions.

Another difference that should be noted between Welch-Ross' (1999b) study and Study 1 is the age range. Although the mean age for study 1 (M = 4.37) is quite close to the mean age in Welch-Ross' study (M = 4.71) the youngest child in Welch-Ross' study is 6 months older (42 months) than our youngest child (36 months). Perhaps the younger children in Study 1 are part of the reason why we did not replicate Welch-Ross' results. Both source-monitoring skills and theory-of-mind understanding are highly related to age; therefore small differences in age may result in different findings.

Study 2

Study 2 addresses the issues from Study 1 and further attempts to confirm the validity of the Mental-State Reasoning Model. First, Study 2 included interviewers who

were more physically distinct (they wore more distinct clothing and had more physical features) in attempt to provide these young children with adequate opportunity to identify the source of suggestions. A study conducted by Campbell and Tuck (1995) found that younger children relied more on external parts (e.g., hair colour) rather than internal facial structure (e.g., distance between eyes and nose). By increasing the differences of more external aspects of our interviewers, such as hair colour and using more distinct clothing cues, children would hopefully be better able to distinguish between the interviewers. Second, unlike Study 1 where children were asked about each of the 24 target items twice (once during the 24 recognition questions and once during the 24 source questions), Study 2 used 24 recognition questions and 24 source questions but each question probed a different item. Therefore, children were asked about 48 items in total rather than being asked twice about the same 24 items, as in Study 1. This modification decreased the monotony of questions and ensured that the source responses are not skewed due to the questions being asked a second time. It also ensured that there was no overlap in recognition and source-monitoring measures. Third, forced choice recognition questions, were used, rather than the yes/no questions used in Study 1, in order to replicate Welch-Ross' (1999b) study more closely. Consistent with our results from Study 1, Welch-Ross (1999b) also found that children did not distinguish between interviewers during the first interview. Welch-Ross suggests that the format of the questions ("yes-no" recognition questions) may have functioned as a statement rather than a question resulting in children feeling a social pressure to comply regardless of the interviewer's knowledge. The "yes-no" question type was also used in our second interview which may have resulted in children feeling the pressure to comply with the

statements. Changing the question format to forced-choice may help replicate Welch-Ross' (1999b) results. Fourth, another theory-of-mind task was included to assess a more complex aspect of theory-of-mind than either the See-Know or False-belief tasks measured. The Tunnel task, assesses children's theory-of-mind skills based on their ability to understand the link between specific kinds of information access and knowledge (Whitcombe & Robinson, 2000). Including the Tunnel task assesses whether another aspect of theory of mind may be influential. The Tunnel task was added in hopes of clarifying whether children require the understanding of knowledge origins rather than or in addition to the other two aspects of theory of mind previously tested. Finally, the age range of our sample was closely monitored to replicate Welch-Ross' results. Since the Tunnel task required a fairly advanced understanding of theory of mind young children have difficulty passing this test, thus the age range for Study 2 consisted of children between the ages of 3.5 and 5.5 years old.

Method

The method for Study 2 was the same as Study 1 except for the following changes.

Participants

Participants were recruited from four local daycare centres, two junior and two senior kindergarten classes at a local Public School. All centers were of a middle socio-economic status. Seventy-two children between the ages of three and a half to 5- years-old participated (M = 52 months, range 42 months to 70 months).

Materials, Procedure and Design

Session 1: Initial Interview

Session 1 followed the same procedure as Study 1 with a few exceptions. The Frankie the Frog story contained 48 target items instead of 24 target items. Upon completion of the story children were asked 24 yes/no recognition questions by each interviewer. The assignment to items as non-misleading or misleading and the counterbalancing was identical to Study 1. (See Appendix C for diagram of initial interview questions). In addition the Naïve and Knowledgeable interviewer's appearance was made more distinct: One interviewer had brown hair, wore a blue shirt and had a darker skin tone while the other interviewer had blond hair, wore a red shirt and had a more fair skin tone.

Session 2: Final Interview and Theory-of-Mind Tasks

After a 5 to 7 day delay a third research assistant, who presented herself as naïve, asked children forced-choice recognition questions about 24 of the target items in the frog story (e.g., Did Frankie the Frog see a *blue bird* in the video or did Frankie the Frog see a *yellow bird* in the video?). Twelve of the questions were misleading where the child chose between the original item from the story and the suggested item from the first interview. For the 12 non-misleading questions, the child chose between the item that appeared in the story and a novel item (e.g., a *green bird*). For both types of questions half of the questions presented the correct item first. All questions were shuffled and asked in a random order. Prior to being asked the recognition questions children were given practice saying, I don't know to questions.

Following the recognition questions children completed the same source-monitoring task from Study 1 except that the 24 source-monitoring questions probed different items to those probed in the 24 recognition questions. All 48 questions were

counterbalanced between the recognition questions and source questions. (See Appendix D for diagram of final interview questions)

After the source-monitoring task children completed the three previous theory-of-mind tasks (See-Know, mistaken contents and appearance reality) as well as the Tunnel task. The Tunnel task is based on Whitcombe's and Robinson's (2000) procedure. The Tunnel task assesses children's source-monitoring skills based on their ability to understand the link between information access and knowledge. The Tunnel task required a tunnel (which is a box with dimensions approximately 45 x 15 x 15 cm) with a window covered with a clear plastic sheet on one side so that children could see but not feel inside the box and an opening on the other side with a sock attached. Children could put their hands in the sock and feel but not look at the objects inside the box. Children were given the opportunity to explore the tunnel and see that on one side they could look inside the box but not feel, and on the other side they could feel inside the box through a sock but not look. Six pairs of toys (plus 4 practice pairs), which either differ in how they looked or how they felt were used. Three pairs looked different and felt the same (e.g., a red car and a blue car) and three pairs felt different and looked the same (e.g., two bubble bottles one filled with bubbles and one empty – heavy and light). The experimenter explained to the child that all the pairs of toys would either feel different (weight) or look different (colour). All items were be hidden behind a screen until each trial began.

Children were then given 4 practice trials, two where the experimenter had more information than the child (e.g., the experimenter looked inside the box when the items presented at the start were different colours and the child felt) and 2 where the child had more information than the experimenter (e.g., the experimenter felt inside the box when

the items presented at the start were different colours and the child looked). The order was counterbalanced between subjects. To start each trial, children were shown two toys and asked to identify the difference between the toys, for example, "What's the difference between these two cars?" Once the child identified the difference the experimenter confirmed the difference, "That's right; one is red and one is blue." Children were then asked to pass each item to the experimenter, "Can you pass me the red one? Can you pass me the blue one?" to check the naming of items. Once the difference (colour or weight) had been identified, the two toys were placed behind a screen. Leo the puppet covered one of the toys (e.g. the blue car) with a cloth and moved it into the box so that neither the experimenter nor the child knew which toy was inside the box. One person looked inside the box and the other person felt inside the box based on the trial. The child was then asked by Leo, "Which car do you think is inside the box, is it the red one or the blue one?" Once the child stated his/her answer, Leo asked the experimenter, "Which car do you think is inside the box?" (the experimenter either agreed or disagreed with the child based on the condition of the trial). The puppet then asked the child once more as if confused, "Which car do you think is inside the box?" Here the child could either change his/her answer to what the experimenter had stated or repeat his/her original answer. Finally, the puppet asked the child, "How do you know "X" is in the box?" If the child did not give a source on his/her own they were given three options from Leo, "Is it because you saw it, because you felt it or because [experimenter's name] told you?" (order of options were counterbalanced within subjects). Children were given feedback during the practice trials on whether or not they were correct as well as why they were correct or incorrect. Once children completed all 4 practice trials the 6 experimental trials

began. Two trials the child was *less informed* (e.g., the child looked inside the box when there was a weight difference, such as bubbles that were either empty or full, and the experimenter felt) and the experimenter *disagreed* (one see and one feel trial). This was termed the *less informed/disagree* condition. Two trials the child was *less informed* and the experimenter *agreed* (one see and one feel trial). This was termed the *less informed/agree* condition. Finally, two trials the child was *more informed* (e.g., the child felt inside the box when the item feels different, such as a treasure chest that is heavy or light, and the experimenter looked) and the experimenter *disagreed* (one see and one feel trial). This was termed the *more informed/disagree* condition. The order of trials was counterbalanced between children. If the child correctly identified the item in the tunnel (either by seeing/feeling the item or adjusted his/her answer to what the experimenter said) he/she received one point. Scores for identifying the object were calculated per condition (less informed/disagree, less informed/agree, more informed/disagree) thus scores ranged from zero to two per condition. Children were then given one point for correctly identifying how they knew what was inside the box (the source). Scores were calculated per condition (less informed/disagree, less informed/agree, more informed/disagree) thus scores range from zero to two per condition.

Results

The False-belief tasks (mistaken contents and appearance reality) were combined for a total score out of 4. Since the See-Know and Tunnel tasks measured different aspects of theory-of-mind (the experience-knowing connection and an awareness of knowledge origins) scores for the two tasks were not combined with the False-belief scores.

Pass-fail scores were calculated for each of the theory-of-mind measures. Scores for the See-Know task and the False-belief tasks were again calculated according to Welch-Ross' (1999b) study. Children were considered to have passed if they correctly answered all four questions. Thirty-six children passed and 36 children failed the See-Know task, and 24 children passed and 48 children failed the False-belief task. The Tunnel task pass-fail scores were calculated based on children's scores in the *less informed/disagree* condition. In this condition children were required to update their knowledge to what the experimenter stated for both a feel and see trial. Children were credited as passing if they correctly updated their knowledge and the source of their knowledge on both trials (a score of four out of four). Children who answered one or more of these questions incorrectly were categorized as failing the Tunnel task. On the basis of this criterion 17 children passed and 55 children failed the Tunnel task (See Table 7 for means and standard deviations for each task).

The results section begins by assessing the relation between theory of mind and suggestibility in the initial interview (where the suggestions are first presented) followed by the final interview. Analyses are then run to assess the relations between source-monitoring skills, theory-of-mind understanding and suggestibility. Once again, we used a more lenient one-tail significance test for some analyses in this exploratory study. Results specify if the one-tail significance test criteria was used.

Initial Interview

Three 2 Interviewer (Knowledgeable, Naïve) x 2 Theory-of-mind performance (Pass, Fail) x 2 Item (misleading, non-misleading) ANOVAs were performed on the

number of questions correct. See-Know, False-belief and Tunnel task performances each served as the "Theory-of-mind" between-subject factors respectively in each ANOVA.

A main effect of item was found in all three ANOVAs: $F_{\text{see-know}}(1,69) = 7.87$, $p < .05$, $F_{\text{false-belief}}(1,69) = 6.55$, $p < .05$ and $F_{\text{tunnel task}}(1,69) = 4.81$, $p < .05$. Children were more accurate at non-misleading questions than misleading questions regardless of whether they passed the theory-of-mind tasks. Thus, children were indeed suggestible (See Table 8 for means).

Contrary to our predictions, no significant three-way interactions were found for any of the tasks. Inconsistent with Welch-Ross' (1999b) findings, a significant 2-way interaction was found between Interviewer and See-Know performance. Children who passed the See-Know task were more accurate at answering the Knowledgeable interviewer's questions than children who failed the See-Know task, irrespective of item type (misleading/non-misleading). Children were equally accurate at answering the Naïve interviewer's questions. As age was marginally significant, $F_{see\text{-know}}(1,69) = 3.26$, $p = .07$, age was controlled for and the interaction remained significant, $F_{\text{see-know}}(1, 69) = 4.97$, $p < .05$ (see Table 9 for means).

Regarding the False-Belief task, although there was a main effect of the False-belief task, $F_{\text{false-belief}}(1, 70) = 8.64$, $p < .025$, that remained significant when age was controlled, $F_{\text{false-belief}}(1, 69) = 5.27$, $p < .025$, this (like the See-Know task) was qualified by a significant interaction between Interviewer and False-belief performance after controlling for age, $F_{\text{false-belief}}(1, 69) = 4.11$, $p < .05$ (Age was not significant $F_{\text{false-belief}}(1, 69) = 1.02$, $p = 0.32$). Once again children who passed the False-belief task were significantly more accurate at answering the Knowledgeable interviewer's questions than

children who failed the False-belief task. In addition, children who passed were better at answering questions from the Naïve interviewer in comparison to children who failed (see Table 10 for means).

No significant interactions were found for the Tunnel task but there was a main effect of interviewer, $F_{\text{tunnel task}}(1, 69) = 3.75$, $p < .05$ (one-tailed), demonstrating that children were slightly more accurate when answering the Naïve interviewer's questions than the Knowledgeable interviewer's questions (M= 7.74 and 7.34 for Naïve and Knowledgeable respectively).

Final Interview

Recognition Scores

Three 2 Interviewer (Knowledgeable, Naïve) x 2 Theory-of-mind performance (Pass, Fail) x 2 Item (misleading, non-misleading) ANOVAs were performed on the number of questions correct on the final interview; the first ANOVA used the See-Know scores, the second used the False-Belief scores and the third used the Tunnel scores as the measure of theory-of-mind.

A main effect of Item was found for all three analyses $F_{\text{see-know}}(1, 70) = 28.97$, $p < .001$ (M = 3.95 and 3.10 for non-misleading and misleading respectively), $F_{\text{false-belief}}(1, 70) = 33.06$, $p < .001$ (M = 4.03 and 3.07 for non-misleading and misleading respectively) and $F_{\text{tunnel task}}(1, 70) = 25.15$, $p < .05$ (M = 3.93 and 2.98 for non-misleading and misleading respectively). Children were consistently more accurate at answering non-misleading questions than misleading questions.

The results of the ANOVA in which See-Know was used to measure theory-of-mind understanding demonstrated that the predicted three-way interaction was non-

significant. No two-way interactions were found. These results were consistent with Welch-Ross' (1999b) findings.

Our next variable of interest was the False-belief task. Once again, contrary to our predictions, no significant three-way interaction was found. However, a Item by False-belief performance interaction was found, $F_{\text{false-belief}}(1, 70) = 3.52$, $p < .05$ (one-tailed), indicating that children who passed the False-belief task showed a larger suggestibility effect (i.e., answered more non-misleading questions accurately than misleading questions) in comparison to children who failed the False-belief task (see Table 11 for means). No other significant interactions or main effects were found.

Finally focussing on the analyses for the Tunnel task, the predicted three-way interaction was indeed significant $F_{\text{tunnel task}}(1, 70) = 5.50$, $p<.05$ and remains significant when controlling for age $F_{\text{tunnel task}}(1, 69) = 4.84$, $p<.05$ (See Table 12), although, age was not a significant factor $F_{\text{tunnel task}}(1, 69) = 1.09$, $p = .30$. Demonstrating a larger suggestibility effect for children who pass the Tunnel task when interviewed by the Knowledgeable interviewer. For children who fail the Tunnel task, there is a slightly larger suggestibility effect when they are interviewed by the Naïve Interviewer although the difference between interviewers for children who failed seems to be minimal.

Source-Monitoring Scores

In general, children's source-monitoring scores were quite low. It appears as though the task was quite difficult for children as their scores were below chance levels, (.25), $p < .05$. Even if children were just guessing at the source of information they were doing so quite poorly.

Three 2 Interviewer (Knowledgeable, Naive) x 2 Theory-of-mind performance (Pass, Fail) x 2 Item (misleading interviewer source questions, non-misleading video source questions) ANOVAs on correct source scores were performed to assess the relations between children's source-monitoring and each of the theory-of-mind-tasks.

Analyses for the See-Know task revealed no three-way interactions. An Interviewer by Item interaction was found when controlling for age, $F_{\text{see-know}}(1, 69) = 5.95$, $p < .05$, demonstrating that children are more accurate at identifying misleading questions the Knowledgeable interviewer asked than the Naïve interviewer ($M = 1.11$ and .76 for the Knowledgeable and Naïve interviewers respectively). Children were equally accurate at identifying the video as the source of non-misleading questions from both the Naïve and Knowledgeable interviewers. No other interactions were found. Contrary to our prediction, a main effect of See-Know performance indicated that children who failed the See-Know task had a slightly higher source monitoring score ($M = 2.38$) than children who passed ($M = 1.93$), $F_{\text{see-know}}(1, 69) = 3.20$, $p < .05$ (one-tailed). In addition, an Interviewer effect revealed that children were slightly more accurate at identifying the Knowledgeable interviewer as the source of information than the Naïve interviewer.

Analyses involving the False-belief task revealed no three-way interactions. A two-way interaction was found between Interviewer and False-belief performance, $F_{\text{false-belief}}(1,70) = 5.26$, $p < .05$. Children who passed the False-belief task were better at identifying the Naïve interviewer as the source of information than children who failed the False-belief task. Conversely, children who failed the False-belief task were better at identifying the Knowledgeable interviewer as the source of information than children who passed the False-belief task (see Table 13 for means). An interaction between Item

and False-belief task was also found, $F_{\text{false-belief}}(1, 70) = 3.38, p < .05$ (one tailed), indicating that children who failed the False-belief task were better at identifying the interviewers as the sources of information (misleading questions) than children who passed the False-belief task . On the other hand, children who passed the False-belief task were slightly more accurate at identifying the video as the source of information (non-misleading questions) than children who failed the False-belief task (See Table 14 for means). When controlling for age, a two-way interaction was found between Interviewer and Item, $F_{\text{false-belief}}(1, 70) = 5.37, p < .05$, suggesting that overall children are better at identifying the Knowledgeable interviewer as the source of misleading questions from the first session than the Naïve interviewer (M =1.05 an .78 for Knowledgeable and Naïve respectively). Children are equally accurate at responding to non-misleading source questions (video questions) from either the Knowledgeable interviewer or Naïve interviewer (M = 3.35 and 3.47 for the Knowledgeable and Naïve interviewers respectively). However, age was not significant $Ff_{\text{alse-belief}}(1, 69) = .094, p = .76$. No other significant interactions were found.

Examining the analyses involving the Tunnel task revealed no significant three-way interaction. However, a two-way interaction was found between Item and Tunnel task performance $F_{\text{tunnel task}}(1, 70) = 7.07, p < .05$. Contrary to our hypotheses, children who failed the Tunnel task were better at identifying the interviewers as the source of information (misleading questions) than children who passed the Tunnel task (M = 1.01 and .70 for fail and pass respectively). Children who passed the Tunnel task were better at identifying the video as the source of information (non-misleading questions) than children who failed the Tunnel task (M = 3.20 and 3.95 for fail and pass respectively). An

interaction between Interviewer and Item was found when controlling for age, $F_{\text{tunnel task}}(1, 69) = 6.69, p < .05$. Once again children were found to be better at identifying the Knowledgeable interviewer as the source of information than the Naïve interviewer (misleading questions). Yet, children were equally accurate at identifying the video as the source of information when they had been asked the questions by the Knowledgeable or Naïve interviewers in session 1 (see Table 15 for means). No other interactions were found.

Overall, an item effect was found for all three theory-of-mind tasks indicating that children were more accurate with non-misleading (video) source questions than misleading (interviewer) source questions, $F_{\text{see-know}}(1, 70) = 98.28, p < .001$ ($M = 3.38$ and .94 for non-misleading and misleading questions respectively), $F_{\text{false-belief}}(1, 70) = 103.61, p < .001$ ($M = 3.46$ and .87 for non-misleading and misleading questions respectively) and $F_{\text{tunnel task}}(1, 70) = 104.76, p < .001$ ($M = 3.63$ and .81 for non-misleading and misleading questions respectively). In sum, children overall were more accurate at identifying the video as the source of information than either of the interviewers. However, it is possible that perhaps the children who failed may be driving these results. Especially considering that more children failed the Theory-of-mind tasks than passed.

Discussion

Study 2 was conducted to further test the validity of Welch-Ross' Mental-State Reasoning Model by expanding on the methodologies used in Study 1. First, Study 2 increased the distinctiveness between interviewers to provide children with an adequate opportunity to identify the source of suggestions. Second, 48 target items were used in

the video instead of 24 allowing the 24 recognition questions and 24 source question to probe different items and ensured that there was no overlap in measures. Third, in the recognition interview children were asked forced-choice questions rather than yes/no questions. Since Welch-Ross (1999b) also used forced-choice questions during recognition this should increase the likelihood of replication. Fourth, the Tunnel task was added as an additional measure of theory-of-mind in order to assess a more complex aspect of theory-of-mind, the understanding of knowledge origins. Finally, our age range was increased to 42 to 66 months in order to closely replicate Welch-Ross' sample.

Initial Interview summary

Results indicated that children, who passed the See-Know task, thus demonstrating their understanding of the experience-knowing connection, were slightly more accurate at answering the Knowledgeable interviewer's questions than the children who failed in the initial suggestive interview. These results were replicated for children who passed the False-belief task, demonstrating that children's ability to reason about conflicting mental representations is also related to their ability to accurately answer questions from a Knowledgeable interviewer during the initial interview. As these results combine the misleading and non-misleading questions together, children who passed may have acquiesced more to the misleading questions asked by the Knowledgeable interviewer, yet still have been more accurate overall because they also agreed more with the non-misleading questions. Thus, overall accuracy when answering the Knowledgeable interviewer's questions was increased for the children who passed the theory-of-mind tasks. These findings are consistent with Welch-Ross' predictions (that children who passed would differentiate between interviewers while children who failed

would not); however, Welch-Ross did not find that children differentiated between the interviewers in the initial interview. She suggests that children who passed the theory of mind tasks acquiesced to the yes/no questions of both interviewers in the initial interview because these questions were more suggestive in nature than forced-choice questions. However, our results indicate that children who passed the theory-of-mind tasks were more accurate with the Knowledgeable interviewer. Although our results demonstrate that children who pass theory-of-mind tasks differentiate between the two interviewers, contrary to our prediction, children who pass the theory-of-mind tasks were slightly more accurate at answering the Knowledgeable interviewer's questions than the Naïve interviewer's questions.

Recognition summary

Consistent with Welch-Ross' findings (1999b), children's performance on the See-Know task was not related to their recognition test performance. Welch-Ross did, however, find a significant three-way interaction between the False-belief task performance, Interviewer and Item. Our results did not reveal a three-way interaction with False-belief performance but a three-way interaction was found with children's performance on the Tunnel Task. Contrary to Welch-Ross' (1999b) findings, when the interviewer was Naïve children who failed the False-belief task seemed to do better than children who passed the False-belief task. passing the Tunnel task was not associated with resisting suggestions from the Naïve interviewer. However, consistent with Welch-Ross' findings, when interviewed by the Knowledgeable interviewer children who passed the Tunnel task were less accurate with the Knowledgeable interviewer than children who failed the Tunnel task. It appears as though children who passed the Tunnel task were

quite sensitive to the Knowledgeable interviewer. The children who passed were not only the most accurate when asked *non-misleading* questions by the Knowledgeable interviewer, but they were the least accurate when asked *misleading* questions by the Knowledgeable interviewer. It appears as though children who possess an Awareness of Knowledge Origins understood that the Knowledgeable interviewer had access to information about the event and therefore the children more often acquiesced to the Knowledgeable Interviewer's questions.

In the current study, children's False-belief performance was also related to their performance on the recognition task but the relation was not irrespective of item type (i.e., Misleading/non-misleading). Children who passed the False-belief task had a much larger suggestibility effect than children who failed the False-belief task, indicating that children who passed the False-belief task were better at non-misleading questions than children who failed the False-belief task. Consistent with the initial interview, children overall seemed to be more accurate at answering questions asked by the Knowledgeable interviewer than the Naïve interviewer. Although the results (for the misleading questions) are the opposite of our predictions and Welch-Ross' (1999b) findings, they are consistent with Study 1 results. Once again, the order of the interviewers was counterbalanced therefore there should be no bias towards one interviewer or the other. The superior performance when answering questions from the Knowledgeable interviewer, compared to those from the Naïve interviewer will be discussed in the General Discussion

It could be argued that the results did not differ depending on item type because the children were not suggestible in the current paradigm. The results suggest, however,

that this was not the case. Overall, children were consistently more accurate when answering non-misleading questions than misleading questions in both the initial interview and final interview.

Source monitoring summary

Overall, children were most accurate at identifying the video as the source of information, regardless of whether the non-misleading questions about the items in the video had come from the Naïve or Knowledgeable interviewer. Possible explanations for children being more accurate at identifying the video than the interviewers will be addressed below in the General Discussion. However, children were once again more accurate at identifying the Knowledgeable interviewer as the source of misleading questions than the Naïve interviewer. It is important to note that this was an overall score and did not hold consistently true for children who passed the False-belief or Tunnel tasks. This will be discussed in further detail below.

In addition, children's performance on the See-Know task was related to their ability to identify the sources of information. Contrary to our hypothesis children who failed the See-Know task had more accurate source-monitoring scores than children who passed the See-Know task. These results were also reflected in the False-belief and Tunnel tasks where children who failed were better at identifying the interviewers as the sources of information than children who passed. One possible explanation of these results, which should be treated with caution, is that those children who passed the theory-of-mind tasks did worse because they were considering multiple sources and doing so badly, whereas children who failed the theory-of-mind tasks were just guessing and were at chance levels (Welch-Ross, 2000). Perhaps the task was too difficult for the

children, resulting in children who attempted to monitor source doing extremely poorly on the task. This hypothesis is not supported by the data, however, because both groups were significantly below chance (.25) $p < .05$, suggesting that both groups were doing something other than guessing, albeit rather poorly. Conceivably, children who passed the theory-of-mind assessments, and were therefore more likely to reason about others' knowledge states, were more likely to claim that the items suggested by the Knowledgeable interviewer actually happened in the video, therefore they would be less accurate at identifying the interviewers but more accurate at identifying the video. On the other hand, children who failed, and were not able to hold multiple sources in memory, were more likely to report their last suggestion or source resulting in them choosing the interviewers slightly more often. An additional explanation is offered in the General Discussion applying the strategy use literature to understand how children may be utilizing their cognitive resources.

General Discussion

Previous research demonstrates that source monitoring and theory-of-mind understanding are each related to suggestibility (Giles, et al., 2002; Poole & Lindsay, 2001; Templeton & Wilcox, 2000; Welch-Ross, 1999a; Welch-Ross, 1999b Welch-Ross et al., 1997). However, Welch-Ross' (2000) Mental-State Reasoning Model suggests there is a relation between source monitoring and theory of mind that operates in the suggestibility process. The Mental-State reasoning model suggests that aspects of reasoning about mental states (e.g. theory-of-mind understanding) contribute to children's ability to source monitor and in turn resist suggestions (See Figure 1). Although there has been some support for the model, the relation between conflicting mental representations

and source monitoring had not been directly tested. Therefore, the current investigation assessed the relation between children's theory-of-mind understanding, source-monitoring skills and suggestibility. A three-way interaction was predicted between interviewer knowledge (Knowledgeable or Naïve), theory-of-mind performance (pass or fail), and item (misleading or non-misleading) on children's recognition scores. It was predicted that children who failed the theory-of-mind tasks would be equally suggestible by each of the interviewers. Conversely, children who passed the theory of mind tasks were predicted to be less resistant to suggestions from the Knowledgeable interviewer than the Naïve interviewer. It was also predicted that we would find a relation between source-monitoring and suggestibility through a regression analysis. As children's source monitoring scores increased they would be come more resistant to suggestions made by the interviewers. Finally, it was predicted that children who passed theory-of-mind tasks would have more accurate source-monitoring scores than children who failed the theory of mind tasks.

In both studies it was found that children's theory-of-mind skills were indeed related to their ability to accurately answer questions about items originating in different sources. Children were overall more accurate at answering questions asked by the Knowledgeable interviewer than the Naive interviewer. While this pattern is not surprising for non-misleading questions, we had expected the opposite (based on Welch-Ross, 1999b) pattern to emerge for misleading questions. Since children appear to be equally accurate at misleading questions regardless of interviewer, children's performance on non-misleading questions may be driving these results. Since the Knowledgeable interviewer has access to information about the video, children are more likely to agree with the non-

misleading questions asked by the Knowledgeable interviewer. With an increased accuracy to non-misleading questions children's overall accuracy score for the Knowledgeable interviewer may be increased, presenting children as more accurate when answering questions asked by the Knowledgeable interviewer than the Naïve interviewer. Another explanation for these findings is that the results were driven by children who failed the theory-of-mind task. Since more children failed the tasks than passed it is possible that they are driving the results. When assessing the means based on pass and fail results it appears as though children who pass the theory-of-mind tasks are least resistant to suggestions from the Knowledgeable interviewer. When assessing the three-way interaction found with children's Tunnel Task performance it is clear that children who pass the Tunnel task, displaying an understanding of Awareness of Knowledge origins, have a larger suggestibility effect when interviewed by the Knowledgeable interviewer than the Naïve interviewer. However, this awareness of knowledge origins did not seem to assist children in accurately identifying the source of their knowledge. With such a low number of children passing (17 out of 72) it is possible that with a larger sample of children who pass (thus, increasing power) the results would be different. Also with a decreased delay between the original event and the source-monitoring task it is possible that children's memory of the original event would improve and in turn improve their performance on the difficult source-monitoring task.

Why might children's recognition and source-monitoring performance be more accurate for the knowledgeable than the naïve interviewer?

These results do not reflect a simple bias towards one of the interviewers. As mentioned earlier, the interviewers were counterbalanced as the Naïve and

Knowledgeable interviewer between participants. In addition, the order children were interviewed in was counterbalanced as well (e.g. Knowledgeable interviewer asked questions first half of the time and Naïve interviewer asked questions first half of the time; counterbalanced between participants). Study 2 also attempted to increase the distinctness between the two interviewers. By increasing the distinctness of the two interviewers it was hoped that children would be better able to source monitor between the two interviewers. Since the children were more accurate at identifying the video as the source of information it was assumed by making the interviewers more distinct from one another they would be better able to monitor the two interviewers. However, children's source-monitoring scores for the two interviewers remained quite low. Perhaps even more distinct interviewers (e.g. a male interviewer and a female interviewer) are needed for children to be able to monitor the difference between interviewers. It appears as though there is something that causes the children to be better able to monitor the video as the source of their belief than the interviewers. It is possible that children were better able to monitor the video as the source of information because of the visual information they encoded while watching the video. Perhaps the verbal suggestions from the interviewers did not have strong enough source cues that children were not able to monitor these sources. The questions from the interviewers were not only asked at a faster pace than the video but there was no visual details only verbal details to encode and retrieve. This may make it more difficult for children to make source judgements for the interviewers. It is also possible that children were not actually monitoring all three sources. Perhaps children were making more simple see (therefore it must have been in the video), not see (therefore it must be one of the interviewers) judgements. When

making their "not see" source judgements (e.g., not in the video) children may have just guessed between interviewers resulting in low source scores.

In Study 1, Children who passed may have been more accurate at answering the Knowledgeable interviewer's questions because they understood that the Knowledgeable interviewer knew what happened in the video and therefore tried harder to answer their questions during the suggestive interview. Therefore, children may have encoded the original event for these items more accurately than for the Naïve interviewer. Since children's source-monitoring scores were so low (below chance) it appears as though they may have just been guessing, although biased towards choosing the Knowledgeable interviewer since they spent more time with them. It is possible that children may have been more inclined to select the Knowledgeable interviewer as the source more often because they spent more time with her. This would explain why children, overall, were slightly more accurate with identifying the Knowledgeable interviewer while still being below chance.

An Awareness of Knowledge Origins Summary

Children's performance on the Tunnel task, signifying an awareness of knowledge origins (e.g. knowing that something feels heavy comes from feeling the object), did not demonstrate a clear connection between theory-of-mind understanding and performance on the source-monitoring task. Although it was hypothesised that children who passed the Tunnel task would possess a more complex understanding of theory of mind and would therefore have a greater ability to source monitor, such results were not confirmed. In fact, results indicated that children who failed the Tunnel task were better at identifying the interviewers as the source of information than children who passed the Tunnel task.

Children who passed the Tunnel task were, however, better at identifying the video as the source of information than children who failed the Tunnel task. It appears as though children who passed the theory-of-mind tasks were more likely to say items happened in the video rather than from one of the interviewers. Children who possess a theory-of-mind may be more likely to report suggested items from the Knowledgeable interviewer as occurring in the video because they believed the Knowledgeable interviewer had access to information about the video and were therefore more likely to believe the Knowledgeable interviewer's suggestions actually occurred. This would explain why the source-monitoring scores of children who passed the theory-of-mind tasks were worse than those of children who failed, yet the pass-children were better at identifying the video as the source than the fail-children. Children who failed the theory-of-mind tasks, and were therefore unable to hold multiple sources in memory, were more likely to report items from the last source they remembered (the interviewers), resulting in higher accuracy scores with the interviewers than children who passed. Perhaps children who failed the Tunnel task were just guessing between interviewers (although still biased towards the Knowledgeable since they did spend more time with them) while children who passed the Tunnel task attempted to source monitor but distinguishing between two female interviewers, although fairly distinct, proved to still be too difficult. According to Welch-Ross (2000) children who possess the ability to reason about conflicting mental representations may in fact do worse on the source-monitoring task because they have two sources to reason about while children who do not have the ability to reason about conflicting mental representations only need to recall the most recent source and therefore have an easier task at hand. Given that the interviewers were generally similar

this may have increased the difficulty of the task for children who could reason about the different sources. This may result in the pass children having lower source monitoring scores than the fail children.

Another possible explanation for these results comes from the strategy use literature. Perhaps children, who passed the Tunnel task, yet were worse at identifying the interviewers as the source of information than children who failed, were demonstrating a utilization deficiency. As defined by Miller (2000) utilization deficiencies occur when children use a strategy spontaneously but experience little to no gain in task performance. Children in the present investigation who passed the Tunnel task demonstrated the ability to use complex theory-of-mind strategies but were unable to consistently apply this strategy to the source-monitoring task. Consistent with the strategy use research, children who demonstrated an awareness of knowledge origins did worse than children who did not demonstrate an awareness of knowledge origins (Bry, Hersh & Turner, 1985; DeMarie-Dreblow & Miller, 1988). Bjorklund (1997) explains these results as an outcome of children's information processing resources being taxed. When children are utilizing a newly developed strategy their cognitive resources are directed towards executing the strategy and few resources are left for children to retrieve individual items (e.g. source). If this is the case it may be necessary to assess the relationship between theory-of-mind understanding and source monitoring with children who have a more developed awareness of knowledge origins. Perhaps once children are not exhausting all their cognitive resources towards their awareness of knowledge origins strategy they will be better able to apply the strategy towards accurate source monitoring. The number of children who passed the Tunnel task was quite low so the results of the Tunnel task are

not completely conclusive at this point. A future study needs to be performed with an increased number of children passing the Tunnel task in order to completely understand the connection between children's performance on the Tunnel task and their ability to source monitor.

Implications for the Mental-State Reasoning Model

Welch-Ross' (2000) Mental-State Reasoning Model states that as aspects of theory-of-mind develop suggestibility will decrease incrementally. As theory-of-mind understanding develops children are able to make source attributions and in turn resist suggestions. However, our results suggest that the connection between theory of mind and source monitoring may not be quite as direct. Perhaps different aspects of theory of mind contribute to different source monitoring judgements. Currently the model depicts each aspect of source monitoring as contributing to the ability to make source attributions. It seems reasonable to assume that each development in theory-of-mind understanding leads to different abilities to make source attributions. For example, children who pass the See-Know task and demonstrate an understanding that seeing leads to knowing may be able to understand that someone who was not present does not have information about the event but they may not be able to hold the conflicting mental representations and monitor between them or even encode source information in order to make such complex source judgements. If this is the case, that more complex understandings of theory-of-mind lead to an increased ability to source monitor or make more complex source attributions, it is possible that the source monitoring task used in this study was too complex for the theory-of-mind skills 3- to 5- year-olds possess. As very few children passed the complex Tunnel task it is evident that many of these

children did not possess an awareness of knowledge origins. Without this awareness of knowledge origins children may not have encoded the vital source information required to perform the source monitoring task (e.g. seeing something in the video leads to know it happened and that hearing something about the video does not necessarily mean it happened in the video).

Welch-Ross presents three pathways which each uniquely contribute to decreased suggestibility. The current project does not find support for any of these pathways. The first path (path a) which states that an understanding of information access and knowing (e.g. passing the See-Know task) leads to the ability to reject suggestions from the Naïve Interviewer. In fact, the predicted three-way interaction for the See-Know task was also not found in Welch-Ross' (1999b) study. Perhaps without the other aspect of mental state understanding children are not able to encode and retrieve all the information necessary to correctly reject the naïve interviewer.

The second path (path b) states that the ability to reason about conflicting mental representations (e.g. passing the False-belief tasks) allows children to consider two options, the suggestion and the original event, and often the suggestion will reinstate the original memory for a child who is able to consider multiple representations. Once again support was not found for this path. Children who passed the False-belief tasks were no better at resisting suggestions than children who failed the False-belief tasks.

The final path (path c) suggests that children's awareness of knowledge origins motivates children to retrieve source information and allows children to make accurate source attributions. Although our results did not support this aspect of the model the number of children who passed the Tunnel task was quite low and results should be

cautiously interpreted. Welch-Ross' previous studies have not assessed all three aspects of the model in one experiment. It is possible that Children who passed the See-Know task and False-belief tasks in Welch-Ross' (1999b) study also possessed and Awareness of Knowledge Origins and were therefore able to better monitor their sources of information and resist suggestions. Without a complete measure of all three paths we cannot conclude what aspects of theory-of-mind understanding assist children in making source attributions and in turn resisting suggestions.

To conclude, there is still not a clear connection between source monitoring and theory-of-mind understanding. With such low recognition and source-monitoring scores it appears as though children were just not remembering the event. Without a clear memory of the event our understanding of the connection between the two cognitive skills is also foggy. It is necessary to continue the investigation in order to gain a clear picture of these two cognitive skills and their relations to suggestibility. Although this connection has yet to be verified, understanding the relations between theory of mind and source monitoring in relation to suggestibility may help clarify developmental differences in children's resistance to suggestions.

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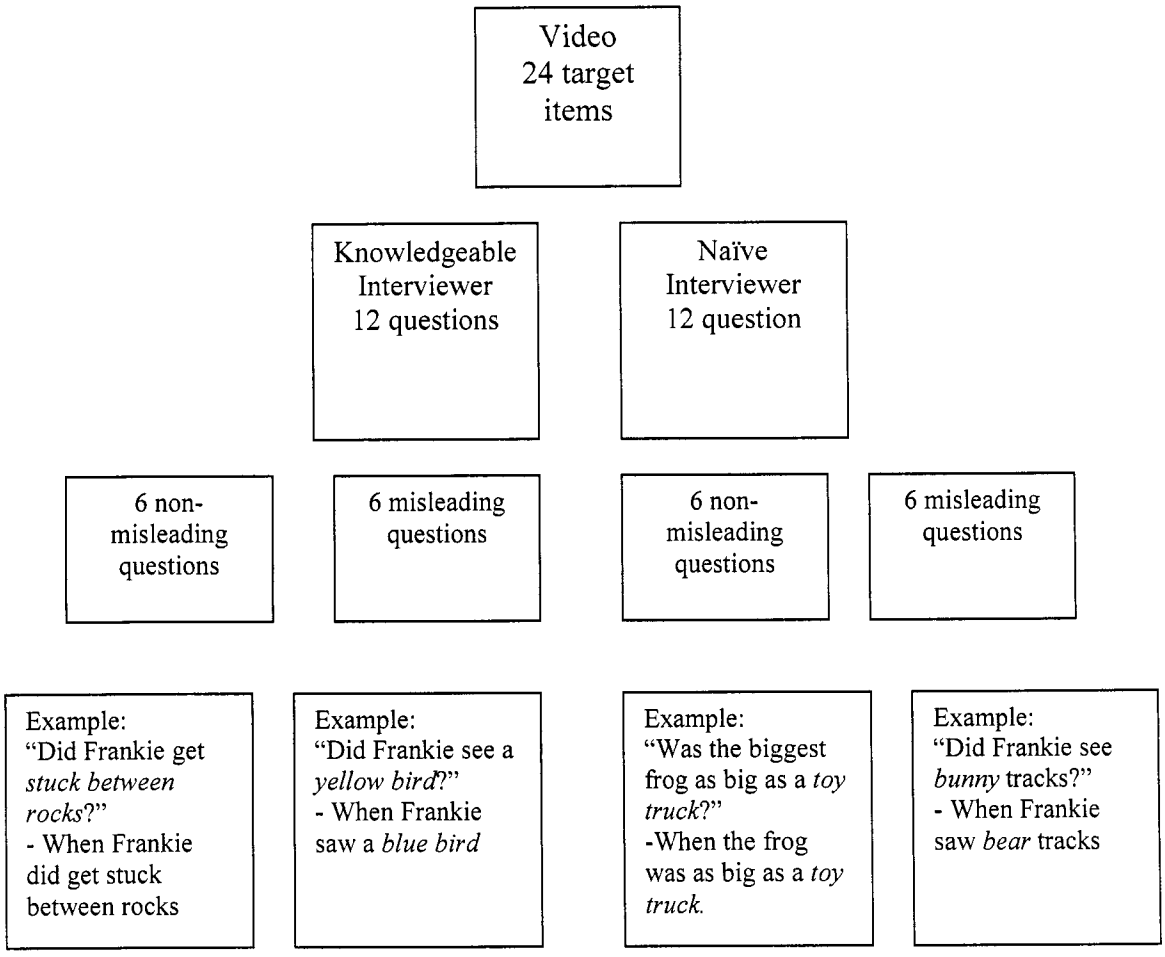
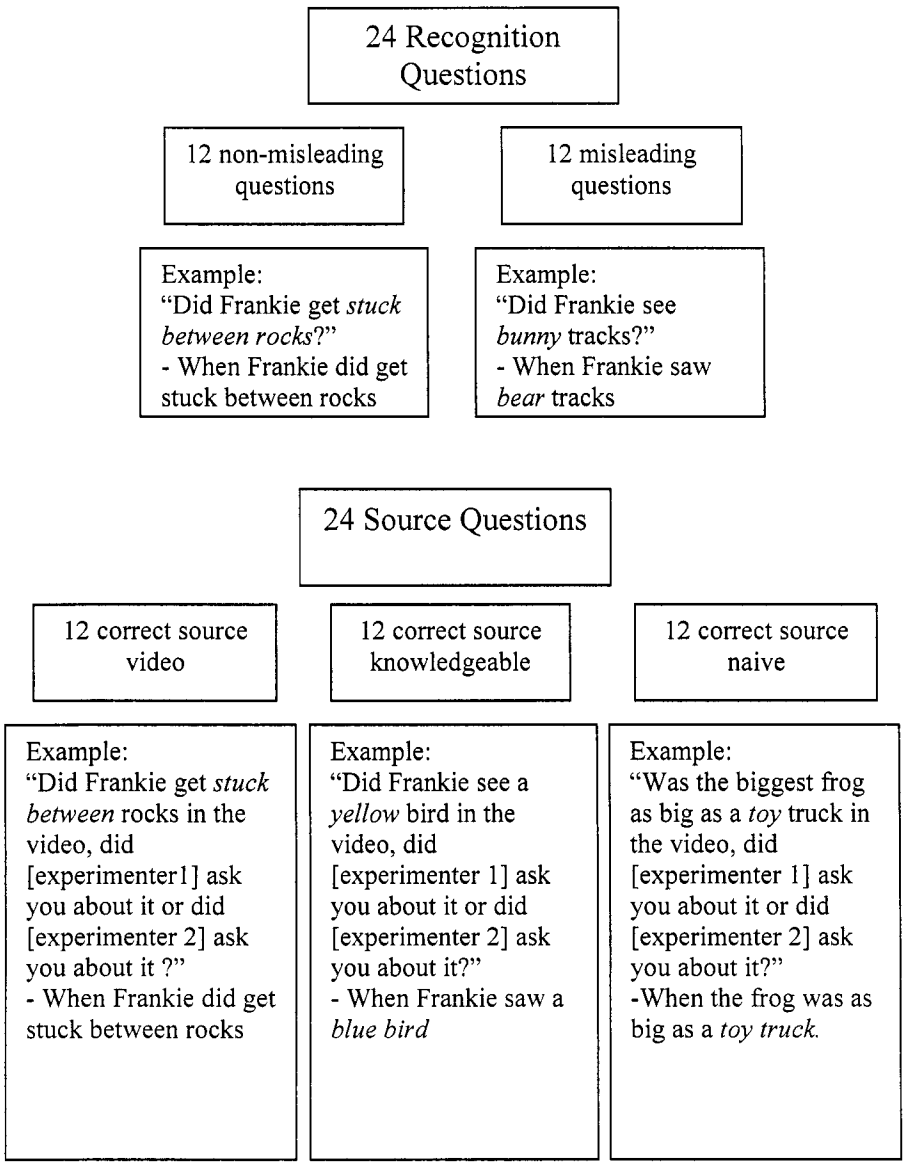
Appendix A

Diagram of Initial Interview Questions Study 1



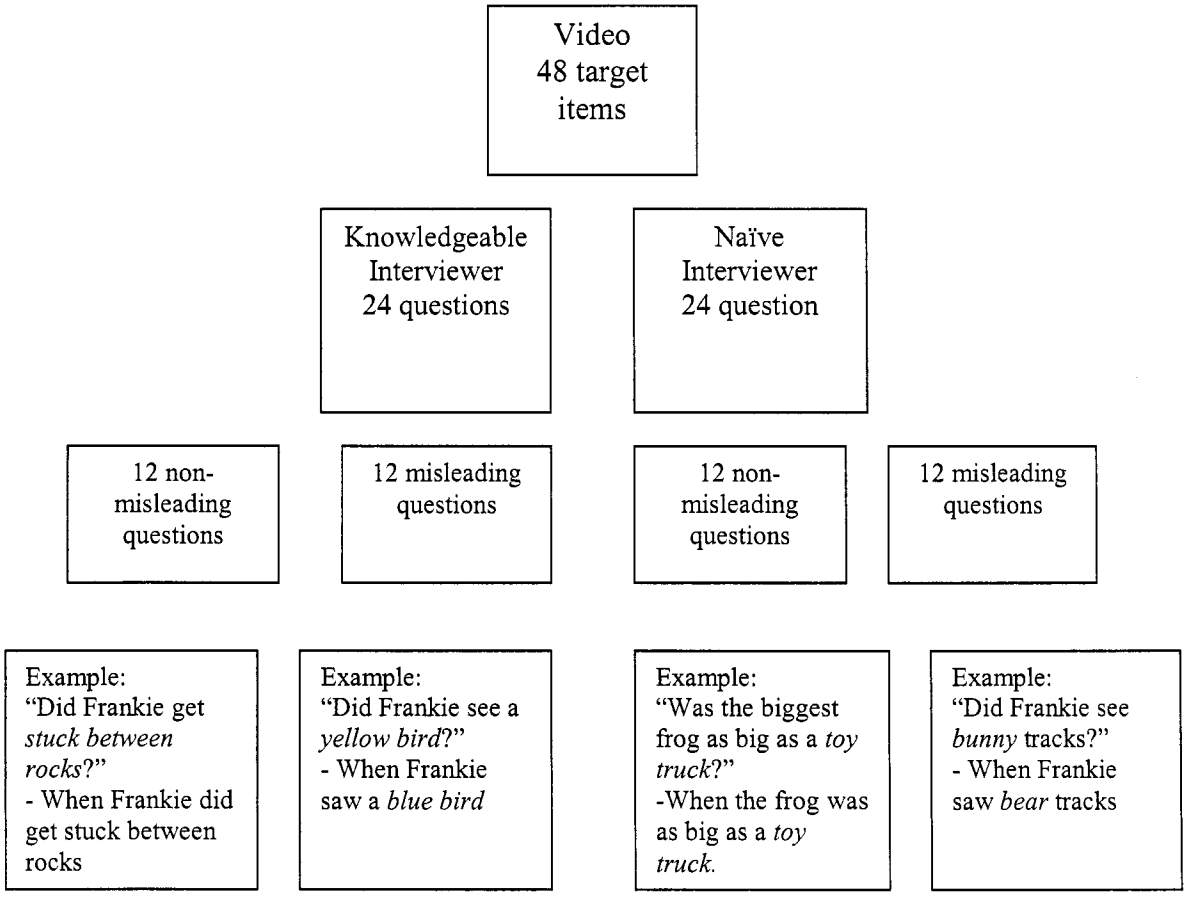
Appendix B

Diagram of Final Interview Questions for Study 1



Appendix C

Diagram of Initial Interview from Study 2



Appendix D

Diagram of Final Interview Questions from Study 2

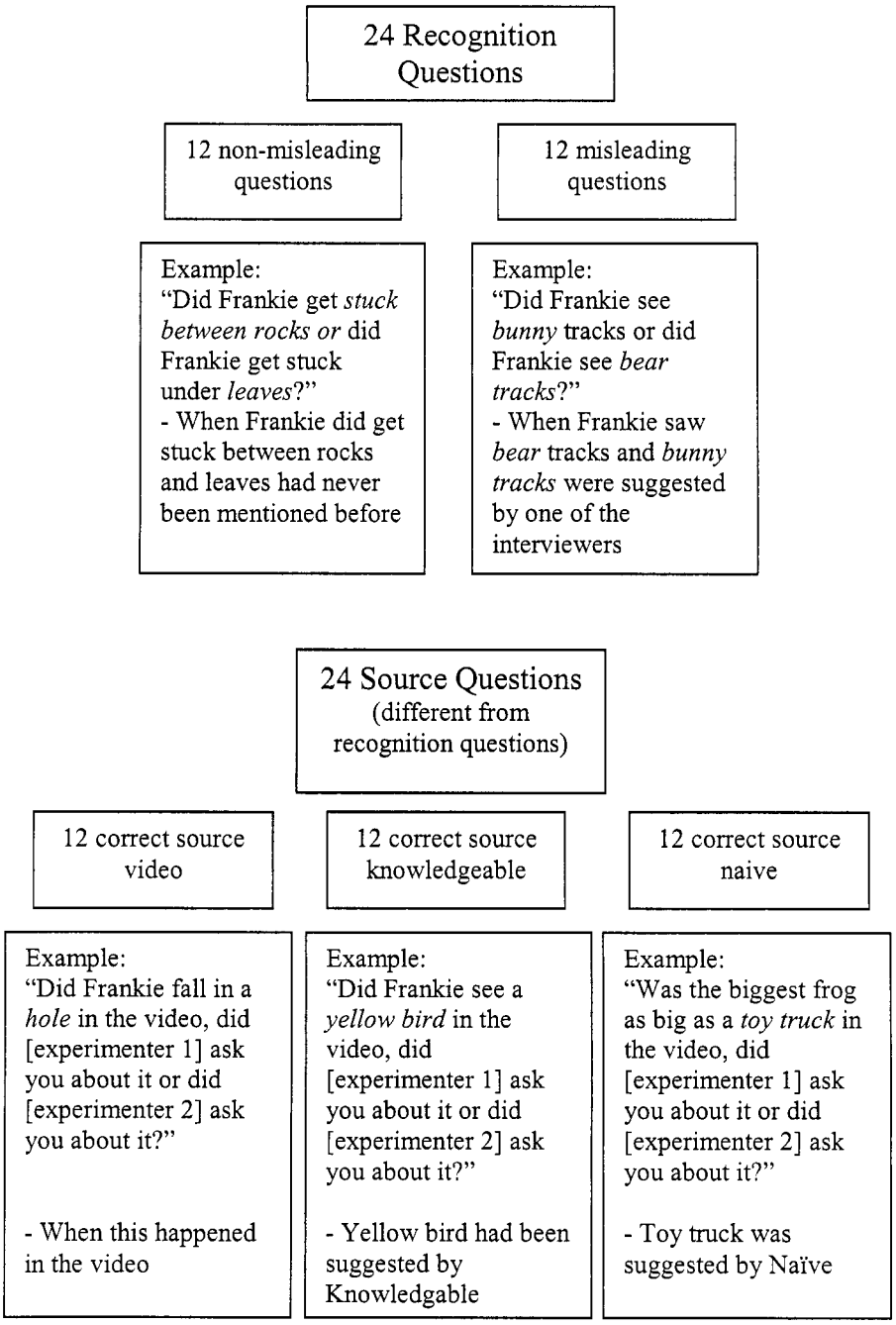


Table 1

Means and Standard Deviations for See-Know and False-belief Tasks

Task	M	(SD)
See-Know	2.18	(1.66)
False-belief	1.98	(1.43)

Note [a] All means out of 4.

Table 2

Mean Number of Correct Misleading and Non-misleading Initial Interview Test Questions Correct by Interviewer

Interviewer	Question type	M	(SD)
See-Know (pass = 4)			
Knowledgeable			
	Misleading	3.10	(2.01)
	Non-misleading	5.20	(1.18)
Naïve			
	Misleading	2.94	(2.06)
	Non-misleading	5.14	(1.33)
False-belief (pass = 3 or 4)			
Knowledgeable			
	Misleading	3.18	(1.99)
	Non-misleading	5.21	(1.20)
Naïve			
	Misleading	3.03	(2.04)
	Non-misleading	5.19	(1.32)
False-belief (pass = 4)			
Knowledgeable			
	Misleading	3.26	(2.76)
	Non-misleading	5.32	(1.61)

Naïve			
	Misleading	3.47	(2.73)
	Non-misleading	5.34	(1.80)

Note. [a] All means out of 6.

Table 3

Mean Number of Correct Recognition Test Questions Correct as a Function of Performance on the See-Know Task (pass = 4).

	Pass (n = 18)		Fail (n = 32)	
Interviewer question type[a]	M	(SD)	M	(SD)
Knowledgeable				
Misleading	2.30	(1.78)	2.58	(1.66)
Non-misleading	5.34	(0.90)	4.97	(1.03)
Naïve				
Misleading	1.94	(1.47)	2.64	(2.06)
Non-misleading	5.44	(0.86)	4.98	(1.05)

Note. [a] All means out of 6.

Table 4

Mean Number of Correct Recognition Test Questions as a Function of Performance on the False-Belief Task (pass = 4) When Age is Covaried.

False-Belief Performance (pass = 4)	Pass (n=8)		Fail (n=42)	
Item	M	(SD)	M	(SD)
Misleading[a]	1.43	(3.96)	2.51	(1.56)
Non-misleading[a]	5.66	(2.26)	5.05	(.91)

Note [a] All means out of 6.

Table 5

Mean Number of Correct Interviewer Source-Monitoring Test Questions at the Final Interview as a Function of Performance on See-Know and False-Belief Tasks

Task	Interviewer[a]	M	(SD)	M	(SD)
See-Know Performance (pass=4)		Pass (n = 18)		Fail (n = 32)	
	Knowledgeable	1.44	(1.50)	1.38	(1.54)
	Naïve	0.22	(0.43)	0.72	(0.96)
False-Belief Performance (pass = 4)		Pass (n = 8)		Fail (n = 42)	
	Knowledgeable	1.88	(2.17)	1.31	(1.37)
	Naïve	0.50	(0.76)	0.55	(0.86)
False-Belief Performance (pass = 3 or 4)		Pass (n = 21)		Fail (n = 29)	
	Knowledgeable	1.48	(1.78)	1.34	(1.31)
	Naïve	0.33	(0.58)	0.69	(0.97)

Note. [a] All means out of 6.

Table 6

Mean Number of Correct Source-Monitoring Test Questions at the Final Interview as a Function of Performance on the See-Know and False Belief Tasks

Source[a]	M	(SD)	M	(SD)
See-Know Performance (pass = 4)	Pass (n = 18)		Fail (n=32)	
Video	8.33	(3.46)	5.88	(3.27)
Knowledgeable	1.44	(1.50)	1.38	(1.54)
Naïve	0.22	(0.42)	0.72	(0.96)
False-Belief Performance (pass = 4)	Pass (n = 8)		Fail (n = 42)	
Video	8.63	(2.83)	6.40	(3.55)
Knowledgeable	1.88	(2.17)	1.31	(1.37)
Naïve	0.50	(0.76)	0.55	(0.86)
False-Belief Performance (pass = 3 or 4)	Pass (n = 21)		Fail (n = 29)	
Video	8.24	(1.32)	5.69	(3.33)
Knowledgeable	1.48	(1.78)	1.34	(1.32)
Naïve	0.33	(0.58)	0.69	(0.97)

Note. [a] All means for the video are out of 12 and all means for the interviewers are out of 6.

Table 7

Means and Standard Deviations for See-Know, False-belief and Tunnel tasks

Tasks	M	SD
See-Know	2.82	(1.46)
False-Belief	2.49	(1.35)
Tunnel Task	.62	(.85)

Note [a] All means out of 4 except Tunnel task, means out of 2.

Table 8

Mean Number of Correct Misleading and Non-misleading Initial Interview Test Questions Correct by Theory-of-mind Task

Theory-of-mind task	Question type[a]	M	(SD)
See-Know			
	Misleading	6.40	(3.29)
	Non-misleading	8.35	(3.99)
False-Belief			
	Misleading	6.68	(3.48)
	Non-misleading	8.58	(4.16)
Tunnel Task			
	Misleading	6.64	(3.05)
	Non-misleading	8.44	(4.67)

Note. [a] All means out of 12.

Table 9

Mean Number of Correct Initial Interview Test Questions Correct as a Function of Performance on the See-Know Task.

	Pass (n = 36)		Fail (n = 36)	
Interviewer type[a]	M	(SD)	M	(SD)
Knowledgeable	7.76	(3.40)	6.69	(3.40)
Naive	7.72	(3.14)	7.32	(3.14)

Note. [a] All means out of 12.

Table 10

Mean Number of Correct Initial Interview Test Questions as a Function of Performance on the False-Belief Task.

	Pass (n = 24)		Fail (n = 48)	
Interviewer type[a]	M	(SD)	M	(SD)
Knowledgeable	8.42	(3.99)	6.64	(2.80)
Naive	8.38	(3.74)	7.09	(2.63)

Note. [a] All means out of 12.

Table 11

Mean Number of Correct Misleading and Non-misleading Recognition Test Questions Correct as a Function of Performance on the False-belief Task.

	Pass (n = 24)		Fail (n = 48)	
Question type[a]	M	(SD)	M	(SD)
Misleading	2.98	(1.87)	3.16	(1.36)
Non-misleading	4.25	(1.78)	3.80	(1.27)

Note. [a] All means out of 6.

Table 12

Mean Number of Recognition Test Questions Correct as a Function of Performance on the Tunnel Task Covarying Age

		Pass (n = 17)		Fail (n = 55)	
Interviewer	Question type[a]	M	(SD)	M	(SD)
Knowledgeable					
	Non-misleading	4.25	0.33	3.17	0.17
	Misleading	2.61	0.31	3.80	0.18
Naïve					
	Non-misleading	3.35	0.32	3.24	0.20
	Misleading	2.88	0.36	4.20	0.17

Note. [a] All means out of 6.

Table 13

Mean Number of Correct Source Test Questions as a Function of Performance on the False-Belief Task.

	Pass (n = 24)		Fail (n = 48)	
Interviewer[a]	M	(SD)	M	(SD)
Knowledgeable	2.08	(2.04)	2.31	(1.44)
Naive	2.31	(2.09)	1.96	(1.48)

Note. [a] All means out of 6.

Table 14

Mean Number of Correct Source Test Questions as a Function of Performance on the False-Belief Task.

	Pass (n = 24)		Fail (n = 48)	
Item[a]	M	(SD)	M	(SD)
Misleading (interviewer)	.67	(1.78)	1.07	(1.27)
Non-Misleading (video)	3.73	(3.14)	3.20	(2.21)

Note. [a] All means out of 6.

Table 15

Mean Number of Correct Misleading and Non-misleading Source Test Questions Correct by Interviewer

Interviewer	Question type[a]	M	(SD)
Knowledgeable			
	Misleading (suggested by interviewer)	1.02	(1.61)
	Non-misleading (occurred in video)	3.50	(2.12)
Naïve			
	Misleading (suggested by interviewer)	.69	(1.36)
	Non-misleading (occurred in video)	3.65	(2.29)

Note. [a] All means out of 6.