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J. Experimental Child Psychology 93 (2006) 25–44
Journal of Experimental Child Psychology
www.elsevier.com/locate/jecp

Developments in source monitoring: The role of thinking of others

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Received 25 February 2005; revised 15 June 2005
Available online 22 August 2005

Abstract

Adults' source judgments are more accurate when they focus on speakers' emotions than when adults focus on their own emotions. Focusing on speakers may lead to better source memory because it encourages processing of the perceptual characteristics of the source and binding of that information to the content of what is being said. The purpose of the current work was to evaluate whether young children's source memory similarly benefits from this outward encoding focus and whether this effect changes developmentally. In Experiment 1, when 4- and 5-year-olds heard an audiotape of two dissimilar speakers, only the 5-year-olds showed better source memory when asked to adopt an other-focus. In Experiment 2, when 4- and 5-year-olds watched a videotape of two similar speakers, the same pattern was found. However, in Experiment 3, when 4-year-olds watched a videotape of two dissimilar speakers (a more optimal encoding condition in which 5-year-olds showed ceiling performance), 4-year-olds benefited from taking an other-focus during encoding. Overall, the data suggest that the benefit for source memory of focusing on another person develops over the preschool years.

Keywords: Source monitoring; Binding processes; Theory of mind

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doi:10.1016/j.jecp.2005.06.006

Introduction

The process of source monitoring involves accurately attributing the origins of one's memories, knowledge, and beliefs (Johnson, Hashtroudi, & Lindsay, 1993). During childhood, especially the preschool years, there are marked improvements in children's source monitoring (e.g., Lindsay, Johnson, & Kwon, 1991; Parker, 1995; Sluzenski, Newcombe, & Ottinger, 2004). Several factors have been shown to affect children's source monitoring, including similarity of sources, elaboration, and imagery ability (for a review, see Roberts, 2000). However, although several factors affecting source monitoring have been identified, little is known about the kinds of information children encode and the underlying processes by which this encoded information is used to discriminate source.

In the adult literature, it has been suggested that binding processes, in part, underlie source monitoring (Chalfonte & Johnson, 1996). Binding processes refer to the conjoining of particular features to form a complex memory (Chalfonte & Johnson, 1996). For instance, consider the event of deciding whether a magazine or a medical journal was the source of an article regarding a new medical procedure. To make this decision, one needs to consider the source specifying features (e.g., texture of the paper, location of the article on the page, length of the article) that may have been bound with the memory for the content of the article. Based on the memorial experience of particular features belonging together, one may decide that the article was in a magazine because the paper was flimsy and glossy and also because the article was only a paragraph long and was located in a box in the bottom right-hand corner of the page. Thus, memory for individual features alone does not necessarily lead to a complex memory; rather, complex memories require reflective processes for binding these features together to yield intact coherent memories (Chalfonte & Johnson, 1996; Mitchell, Johnson, Raye, Mather, & D'Esposito, 2000).

Evidence that binding may be a mechanism for remembering source comes from evidence that the same populations that make significant errors on source monitoring tasks also make significant errors on binding tasks (Chalfonte & Johnson, 1996; Reinitz, Verfaellie, & Milberg, 1996). For example, older adults, who make significant errors on both types of tasks, show deficits in memory for bound information compared with memory for individual features (Chalfonte & Johnson, 1996; Mitchell et al., 2000). In the Chalfonte and Johnson (1996) study, old and young adults were shown an array of pictures and were told either to remember one of three features (objects, colors, or locations), to remember the objects together with their colors, or to remember the objects together with their locations. Compared with young adults, older adults performed worse in remembering locations and in both binding conditions (i.e., object–color and object–location) but not in remembering objects and colors. More important, older adults were impaired in the object–color binding condition when they were not impaired in remembering either objects or colors alone. Furthermore, compared with young adults, older adults performed worse in the object–location binding condition than in the location-only condition. Both of these findings suggest that older adults are more impaired in their memory for bound

features than in their memory for individual features, thereby contributing to their difficulty with source monitoring. As mentioned earlier, source monitoring requires the retrieval of source specifying information that has been bound together to form a coherent whole versus merely remembering individual features.

Similarly, findings from research examining children's binding processes suggest that preschool children, who show impairments on source monitoring tasks, are more impaired in memory for bound features than in memory for isolated features (Kovacs, Hansell, & Newcombe, 2005; Sluzenski, Newcombe, & Kovacs, 2005). For example, Kovacs et al. (2005), using a paradigm similar to that of Chalfonte and Johnson (1996), examined 4- and 6-year-olds' memory for individual features (objects and colors) and memory for the features bound together (object–color combination). The children were shown several pictures and were told either to remember one of two features (objects or colors) or to remember the objects together with their colors. Compared with 6-year-olds, 4-year-olds performed significantly worse in the binding condition but not in remembering objects and colors. These findings suggest a developmental shift in binding processes.

Further evidence of a developmental shift in binding processes during this period comes from research aimed at assessing children's memory for more complex stimuli (Sluzenski et al., 2005). In this study, 4- and 6-year-olds were shown pictures of animals in atypical backgrounds. The children were told either to remember one of the two features (animals or backgrounds) or to remember the combination of the animals together with their backgrounds. Similar to the findings in Kovacs and colleagues (2005) study, 4-year-olds were significantly worse than 6-year-olds in the combination condition but not in the feature condition. These results indicate significant improvements in children's binding processes and also indicate that these improvements occur during the preschool years. Furthermore, the findings from these studies suggest that developments in binding processes may contribute to improvements seen in source monitoring during the preschool years.

One factor that involves binding and is known to affect adults' performance when monitoring two external sources is emotional focus at the time of encoding (Johnson, Nolde, & DeLeonardis, 1996). In their study, Johnson and colleagues (1996) had adults listen to two different speakers make statements that ranged in emotional intensity (e.g., "Abused children who kill their parents should not be convicted of murder," "Da Vinci's Mona Lisa hangs in the Louvre"). As the participants listened to the two speakers, they were asked either to rate how *they felt* about what each speaker was saying (self-focus condition) or to rate how they thought the *speaker felt* about what he or she was saying (other-focus condition). After a short delay, participants were given an old–new recognition test for the statements and a source monitoring test for those items they had identified as old. Participants in the other-focus condition performed better on the source test but worse on the recognition test than did participants in the self-focus condition. The authors concluded that the participants in the other-focus condition, by focusing on how each speaker felt, were more likely to bind discriminating features of the speakers to the content of the statements and, thus, to improve their source accuracy. In contrast, participants in the self-focus condition, by focusing on their own emotions, were more likely to relate the content of the statements to their own memories,

thereby improving their recognition for content but at the expense of processing information that would provide better cues to source.

Given this evidence, it is important to consider the possible role that emotional focus at the time of encoding may play in the improvements made in children's source monitoring during the preschool years. It is possible that problems with binding processes limit the extent to which preschoolers can take advantage of focusing on other people's emotions. Focusing on others might also not benefit them due to limitations in their ability to understand others' perspectives at all. There has been extensive work in the development of theory of mind showing major developments in this area during the preschool years (e.g., O'Neill, Astington, & Flavell, 1992; Woolley & Bruell, 1996). Perner and Ruffman (1995) argued that theory of mind is what enables children to engage in mental reexperiencing of past events and suggested that developments in theory of mind contribute, in part, to corresponding improvements in source monitoring. To address the possibility that any age-related differences due to encoding focus could be due to children's inability to take the other-focus (i.e., children who lack a theory of mind could not take another's perspective), we included two measures of theory of mind.

Experiment 1

Experiment 1 examined the effect of emotional focus on either the self or the other during encoding on 4- and 5-year-olds' source accuracy for two external sources. The experimental technique for the source monitoring task was adapted from the work of Johnson and colleagues (1996), who examined the effects of emotional focus on adults' source monitoring for two external sources. A few aspects of the paradigm were changed to make the task more appropriate for children. First, the statements the children heard were age appropriate and relevant to children. Second, the source test was not in the form of a booklet; rather, the experimenter read a list of statements aloud, and the children were asked to identify the source of each statement (for a similar testing procedure, see Lindsay et al., 1991, Experiment 1).

In the current experiment, children listened to an audiotape of two individuals—a man and a woman—making statements about a range of topics relevant to children (e.g., "I hate snakes," "I really like going to the library"). Previous research indicates that children as young as 4 years of age are capable of discriminating between two dissimilar speakers (e.g., Lindsay et al., 1991). In the self-focus condition, participants were asked whether they felt the same way as the speaker (e.g., "Do you feel the same way as my friend?"). In the other-focus condition, participants were asked how the speaker felt about what he or she was saying (e.g., "How does my friend feel about that?"). Both conditions involved thinking about emotion, but they differed in whether the listeners were focused internally on themselves or externally on the speakers. Following a short delay, the experimenter read aloud various statements—both old and new—and the participants were asked to indicate whether they had heard the statements. If the participants responded that they had heard the statements, they were asked to indicate who made the statements.

Method

Participants

This experiment involved a total of 80 children: 40 4-year-olds (mean age 53.93 months, range 47–59) and 40 5-year-olds (mean age 64.85 months, range 60–71). The children were recruited from suburban preschools in the Philadelphia area, and the majority of them were White and middle class. Informed consent was obtained from the parent or guardian of each child. For this experiment and both subsequent experiments, participants were randomly assigned to either the self-focus or other-focus condition.

Procedure

All children were tested individually in a quiet room at the preschool. They were seated at a low table across from the experimenter. For this experiment and both of the subsequent experiments, the children were shown six pictures of a female face demonstrating facial expressions that represented the emotions portrayed by the speakers (e.g., happy was represented in the picture by a huge smile) before hearing the statements. The children were asked to identify the six emotions. This task was used to ensure that the children were familiar with the emotions the speakers would be portraying. The children were asked to identify the emotion being portrayed in each photograph and also to identify the emotion portrayed in one practice sentence from each speaker (each portraying a different emotion) regardless of condition. In this experiment and the subsequent experiments, none of the children had difficulty in identifying the emotions portrayed in the photographs or in labeling what emotions were being portrayed in the two practice sentences.

Each child received the source monitoring task first, followed by the two false-belief tasks and then two how-know tasks. All tasks were administered during the same testing session. The session started with the children listening to the statements, followed by the two false-belief tasks (which took approximately 1 min each), followed by the source memory test, and finally followed by the two how-know tasks.

Source monitoring task

Three separate lists of 5 statements (15 total) were prepared, each expressing opinions on topics relevant to children (e.g., preferences for foods or drinks, dislikes and likes of activities, dislikes and likes of movies and television shows). Of these, 10 statements were assigned to the speakers (5 each) so as to equate the different topics, likes and dislikes, and emotional intensity for each speaker. The remaining 5 statements were used as new statements for the subsequent source test (Appendix A). The list from which the children heard from each speaker was randomized. During the test phase, each child heard 15 sentences read (10 old and 5 new). The order in which the sentences were read was randomized, with the exception that there were no more than two consecutive statements from either speaker.

An audiotape was made where a male and a female read the statements for each of the three lists. The order of the statements was random, with the restriction that one speaker did not say more than two statements consecutively. Two dolls (male and female) were placed on top of the recorders to represent the speakers and to make it easier for the children to identify the speakers during the test phase. The experimenter introduced the children to the dolls and explained the procedure. The experimenter explained that the dolls sitting on each recorder represented the voice the children were going to hear and that the dolls were going to say a few things about themselves. After introducing the dolls to the children, the experimenter ensured that the children understood that the dolls represented the voice in the speaker. The children received two practice statements—one from each doll. The practice statements also served to ensure that the children knew what was expected of them with regard to emotional focus.

Immediately after the introduction and training, the experimenter proceeded with the acquisition phase. In the self-focus condition ($n = 40$), the experimenter told the children, "These are my two friends, Billy and Ashley. We are going to listen to them tell us a few things about themselves. After we listen to what my friend tells us, I want you to tell me if you feel the same way as my friend." If the children failed to respond, the experimenter prompted them to shake their heads yes or no if they felt the same way. In the other-focus condition ($n = 40$), the directions were the same as in the self-focus condition except that the children were told, "I want you to tell me how my friend feels about what he or she is saying." If the children failed to respond, the experimenter asked, "How does my friend feel about that? Does my friend feel happy, scared, mad, yucky, sad, or surprised?" After each sentence was heard, the experimenter paused the audiotape and asked the emotion question (i.e., "Do you feel the same way as my friend?" or "How does my friend feel about that?"). The acquisition phase, including the instructions, took approximately 8 min. At the end of the task, all of the materials were removed and placed out of the children's view.

Following the source monitoring acquisition phase, the children were given the false-belief tasks. After the false-belief tasks, which took approximately 2 min, the children were given the memory tests. The dolls were placed on the table in the same locations as during acquisition.

The experimenter told the children, "Remember we listened to my friends Billy and Ashley tell us some things about themselves? Well, now what we are going to do is see if you can remember the sentences that they said. I am going to read you sentences and I want you to tell me if you heard the sentence [recognition], and if you did hear it, I want you to tell me if Billy or Ashley said the sentence [source]. But guess what? I am going to read some sentences that no one said, and I want you to shake your head and say no to those sentences. So, if Billy said the sentence, what would you say? If Ashley said the sentence, what would you say? What if no one said the sentence, what would you say?" Pointing to the respective doll and shaking the head no were acceptable forms of response. For each statement, the children were first asked the recognition question, for example, "Did you hear 'My favorite restaurant is McDonald's'?" followed by the source question, for example, "Did Billy or Ashley say that?"

Theory of mind tasks

Separate tasks were used to assess children's understanding of another person's theory of mind (false-belief tasks) and understanding of their own theory of mind (how-know tasks). To assess children's understanding of another person's theory of mind, children received the "smarties" task (Perner, Leekman, & Wimmer, 1987) and the "rock" task (Flavell, Flavell, & Green, 1983). To assess children's understanding of their own theory of mind, we used variants of the how-know tasks employed by Perner and Ruffman (1995). These tasks assessed whether the children (a) implicitly knew where the ball was located and (b) could explicitly justify how they knew the location of the ball (i.e., by seeing it being hidden or by being told). Each of the tasks involved a blue box and a red box and a plastic ball that was put inside the boxes.

False-belief tasks

The two objects used were a sponge painted to look like a rock and a crayon box that contained M & Ms. The order in which children saw a particular object was randomized. In both of the tasks, the object was placed on the other side of the table from the children and the children were asked, "What is this?" After the children responded, they were shown the reality of the object (e.g., they squeezed the sponge). Once the true nature of the object was revealed, the children handed the object back to the experimenter and the experimenter placed the object on the other side of the table. The children were then asked what another person would think about the object (e.g., "Your mommy hasn't seen this yet. She didn't squeeze it like you did. If your mommy comes in and sees this sitting here, what will she think this is? Will she think this is a rock or a sponge?") Following each of the tasks, the object was taken out of the children's view.

How-know tasks

In the see-know task, both the blue and red boxes were placed in front of the children as they watched the experimenter put the ball inside one of the boxes. In the told-know task, the boxes were hidden behind a screen that blocked the children's view and the experimenter told the children where she was going to hide the ball. In both tasks, the children were asked "Where is the ball?" (implicit knowledge) and "How did you know it was in that box?" (explicit knowledge).

Results

An alpha level of .05 was used for all statistical analyses. When appropriate, Student's Newman–Keuls post hoc tests were used. For all t tests, the p values reported are two-tailed.

Memory tests

Corrected recognition and source monitoring scores were calculated for all children. Corrected recognition scores were the proportions of test items that were

correctly identified as "old" (hits), regardless of source accuracy, minus the proportion of incorrect old responses to new items (false alarms). Source monitoring scores were the proportions of statements correctly identified as old that were also attributed to the correct source. These proportions are shown in Table 1.

Recognition

A 2 (Age) × 2 (Focus) analysis of variance (ANOVA) on corrected recognition scores produced a significant main effect of age, $F(1,76) = 23.36$, $p < .01$, and a significant main effect of focus, $F(1,76), = 7.67$, $p < .01$. No other effects were significant. As shown in Table 1, 5-year-olds had better recognition ($M = .78$) than did 4-year-olds ($M = .56$), and participants' scores in the self-focus condition ($M = .73$) were better than those in the other-focus condition ($M = .61$), as is true for adults (Johnson et al., 1996).

Source monitoring

A 2 (Age) × 2 (Focus) ANOVA produced a significant main effect of focus, $F(1,76) = 4.14$, $p < .05$, and a significant interaction effect of Age × Focus, $F(1,76) = 8.69$, $p < .01$. None of the other effects was significant. Children in the other-focus condition ($M = .85$) had better source scores than did children in the self-focus condition ($M = .78$). However, this was true only for the 5-year-olds, for whom children in the other-focus condition had better source monitoring scores than those in the self-focus condition, $t(38) = 5.68$, $p < .01$. In addition, as seen in Table 1, 5-year-olds in the other-focus condition had better source monitoring scores than did 4-year-olds in the other-focus condition, $t(38) = 3.51$, $p < .01$. No other effects were significant.

Theory of mind tasks

We first present children's responses on the false-belief tasks and how-know tasks and then examine the relation between these tasks and the memory tests. Means and standard deviations are shown in Table 2.

Table 1
Mean proportions and standard deviations for corrected recognition and source identification (Experiment 1)

	Corrected recognition	Source identification	Hits	False positives
4-year-olds				
Self	.64 (.24)	.80 (.19)	.97 (.08)	.32 (.25)
Other	.48 (.25)	.77 (.18)	.94 (.10)	.46 (.31)
5-year-olds				
Self	.83 (.14)	.76 (.11)	.94 (.08)	.11 (.12)
Other	.73 (.18)	.92 (.07)	.94 (.11)	.21 (.18)

Note. Standard deviations are in parentheses.

Table 2
Mean scores and standard deviations for theory of mind tasks as function of age (Experiment 1)

	False belief[a]	How-know		Total[b]
		See[a]	Told[a]	
4-year-olds	.60 (.50)	.46 (.51)	.51 (.51)	.86 (.89)
5-year-olds	.73 (.45)	.65 (.48)	.88 (.36)	1.35 (.69)

[a] Maximum score = 1.
[b] Maximum score = 2.

To pass the false-belief tasks, the children had to pass both the smarties task and the rock task. Thus, the children received a score of 0 or 1. There were no age differences in performance on the false-belief tasks. In fact, there were equal numbers of children in both age groups who passed on both tasks.

On the how-know tasks, children's justification in response to the critical question "How do you know that?" was scored as correct if the children made a reference to "seeing" or "hearing." Examples of deficient answers included "because you put it there," "because I know everything," and "I don't know." Children were given a cumulative score of 0 to 2. Nine children (six 5-year-olds and three 4-year-olds) chose the wrong box when asked where the object was located. The majority of these children mentioned that they thought the experimenter was trying to trick them. These children were subsequently removed from the analyses. A repeated-measures ANOVA was performed with the children's scores on the source questions as the dependent measure, age as the between-subjects variable, and type of source (see or tell) as the within-subjects variable. There was a significant effect of age, $F(1,69) = 8.33$, $p < .01$. As shown in Table 2, 5-year-olds answered more questions correctly than did 4-year-olds. In addition, children answered the "told" question correctly more often than they did the "see" question, $F(1,69) = 7.31$, $p < .01$. The interaction effect was not significant.

Theory of mind and memory tests

There were no significant correlations between the theory of mind tasks and memory tests, nor were there any main effects or interaction effects of theory of mind on the memory tests.[1] The lack of relations between these measures and source memory was quite surprising, so further analyses were conducted. First, to examine the possibility that there might be a significant relation between one focus group, namely the other-focus group, and the theory of mind measures, separate correlations for each focus group were conducted. However, this analysis also resulted in no significant correlations. Second, given the binary nature of the scor-

[1] It could be argued that if the children failed the theory of mind tasks, they should not be included in this particular source monitoring task because it requires them to take the perspectives of other persons. However, when the children who failed the theory of mind tasks are removed from the analyses, the results remain the same. So, to increase power of detection, all children were included in the analyses.

ing scheme on the theory of mind measures (0 or 1), we performed a chi-square analysis by separating the "good performers" from the "poor performers" on the source monitoring task via a median split for each focus group. One would predict that good performers would be more likely to succeed on the theory of mind measures than would poor performers. However, this analysis also resulted in no significant differences.

Discussion

The current experiment assessed the impact of emotional focus on children's source monitoring. Recognition was affected by both age and direction of focus. As expected, 5-year-olds correctly recognized statements better than did 4-year-olds, and children's recognition scores were better in the self-focus condition than in the other-focus condition. Perhaps children in the self-focus condition, like adults, related the content of the statements to some personal event in memory, thereby leading to better recognition (Johnson et al., 1996).

The key finding of the experiment, however, was that only 5-year-olds' source performance benefited from taking the other-focus. That is, 5-year-olds in the other-focus condition made more accurate source judgments than did 4-year-olds in the other-focus condition as well as 5-year-olds in the self-focus condition. There are several possible reasons why other-focus did not improve source monitoring scores for 4-year-olds. First, 4-year-olds may have had difficulty in taking the speakers' perspectives at all. The lack of significant relations between the theory of mind tasks and the memory tests suggests, however, that such a limitation might not be the most important reason why the younger children did not show better source identification when asked to take other persons' perspectives. Second, 4-year-olds may have had more difficulty than 5-year-olds in identifying the speakers' emotions via audiotape. During encoding, they may have been confused as to what emotion label to give the speakers for particular statements and, therefore, failed to bind particular features of the speakers with the content of the statements. Research indicates that adults benefit from multiple cues to source such as perceptual cues for later source identification (Ferguson, Hashtroudi, & Johnson, 1992). Thus, it is possible that if the speakers were both seen and heard, 4-year-olds would have an easier time in labeling the speakers' emotions and, therefore, would benefit from the other-focus. Third, it is possible that 4-year-olds had more difficulty in understanding the source task in general. To address the latter two issues, in Experiment 2 we examined the impact of emotional focus on children's source monitoring using videotape presentation where the speakers' emotions are both seen and heard and with improved instructions for making source judgments.

Surprisingly, there were no relations between the theory of mind measures and the memory tests. It is possible that there was not enough variability in the scores obtained on the theory of mind measures to detect a difference. Age differences between 4- and 5-year-olds were not very apparent, and it might be that crucial change on these variables occurs earlier in development. Consequently, no theory of mind data were collected in subsequent experiments.

Experiment 2

The purpose of this experiment was to examine the effect of emotional focus on children's ability to monitor two external sources when the speakers' emotional reactions are both seen and heard during acquisition as well as when source judgments are better explained. Children watched a videotape of two female speakers who were very similar (e.g., same complexion, same hair color and length). We chose to employ similar speakers because pilot data with dissimilar speakers showed that 5-year-olds' performance showed ceiling effects. Preschool children have difficulty in discriminating between similar sources (Lindsay et al., 1991), but it seemed possible that manipulating children's focus at the time of encoding would lead to improved source accuracy and would avoid floor effects.

Method

Participants

This experiment involved a total of 80 children: 40 4-year-olds (mean age 52.68 months, range 48–59) and 40 5-year-olds (mean age 65.95 months, range 60–71) recruited from a suburban area. The majority of the children were White and middle class. Informed consent was obtained from the parent or guardian of each child. The children were randomly assigned to the focus conditions.

Materials

A total of 15 statements expressing opinions about a range of child-centered topics were prepared (e.g., preferences for different foods or television shows). The statements were designed so that they varied in degree of positive or negative emotion (e.g., "I love playing with my friends," "I am afraid of lions"). This was confirmed by having 20 undergraduates (11 females and 9 males) rate the 30 portrayals of emotion (15 from each speaker). The raters were asked to rate how well each actor portrayed the emotion label for each statement. This norming study indicated that each speaker portrayed the emotion accurately.

From these 15 statements, three different lists of 5 statements were compiled and these lists were equated for emotional level and topic (Appendix B). The children were randomly assigned to hear two of the three lists (List A and List B) during the acquisition phase. The remaining list (List C) was used as new items during the source test. Therefore, the children heard 10 statements during the acquisition phase and 15 statements (10 old and 5 new) during the test phase.

Both of the speakers were videotaped reading each of the lists. The speakers were two similar females. They had similar hair colors, eye colors, and complexions, and they wore the same clothing. The order of the statements the children heard was random, with the restriction that one speaker did not say more than two consecutive statements.

Procedure

The children were tested individually in a quiet room. The children were seated approximately 10 feet from two television sets. The videotapes of each of the speakers were assigned to one of the televisions. The experimenter ensured that the children knew the names of both speakers. In addition, each speaker was prerecorded reading a practice sentence to ensure that the children understood the nature of the task and what was expected of them regarding emotional focus.

As in Experiment 1, after each statement, children in the self-focus condition ($n = 40$) were asked, "Do you feel the same way as my friend?" The children were asked to say yes or no. If the children failed to respond, the experimenter prompted the children by asking them to shake their heads yes or no if they felt the same way as the speaker.

In the other-condition ($n = 40$), after each statement, the children were asked, "How does my friend feel about what she said?" If the children did not respond, the experimenter asked a forced-choice recognition question: "Does my friend seem happy, sad, scared, surprised, angry, or yucky?"

At the end of the videos, the participants were given a coloring book and crayons during the retention interval, which lasted approximately 2 min.

For the test phase, the experimenter showed the children three pictures (4×6 inches) that corresponded to the three response options: Speaker A, Speaker B, and no one. The third picture was used to depict the new statements that neither of the speakers had said on the video. This picture was essentially a snapshot of white light, which represented the idea of "nothing" (for a similar procedure, see Thierry, Spence, & Memon, 2001). The children were given practice questions for each picture (e.g., "If Speaker A said the statement, where would you point?") to ensure that they understood where they should point for each speaker. All of the children understood that the pictures represented the speakers and the idea of no one.

During the test phase, the children were asked who said a particular statement and were told to point to the picture identifying who said the statement (e.g., "Did Speaker A, Speaker B, or no one say [the statement]?"). The test phase involved 15 statements (10 old and 5 new). The statements were read in a random order, with the restriction that no more than two statements from any one source (i.e., Speaker A, Speaker B, or new) were presented consecutively. Second, the test lists were compiled so that one of the first two sentences was a new statement. If the children failed to use the "nothing" picture after hearing the first three statements, the experimenter reminded them that some of the sentences were new, that no one had said them, and that their job was to point to the "no one" picture.

Results

Recognition

A 2 (Age) $\times$ 2 (Focus) ANOVA resulted in a significant main effect of age, $F(1, 76) = 19.19$, $p < .01$, and a significant main effect of focus, $F(1, 76) = 13.84$, $p < .01$. The interaction effect was not significant. As shown in Table 3, 5-year-olds

Table 3
Mean proportions and standard deviations for corrected recognition and source identification (Experiment 2)

	Corrected recognition	Source identification	Hits	False positives
4-year-olds				
Self	.77 (.17)	.75 (.05)	.94 (.07)	.17 (.19)
Other	.63 (.17)	.78 (.06)	.90 (.09)	.27 (.19)
5-year-olds				
Self	.88 (.08)	.76 (.06)	.95 (.07)	.07 (.10)
Other	.79 (.11)	.90 (.05)	.92 (.08)	.13 (.13)

Note. Standard deviations are in parentheses.

had better recognition ($M = .83$) than did 4-year-olds ($M = .70$), and children in the self-focus condition ($M = .82$) had better recognition scores than did children in the other-focus condition ($M = .71$). These patterns replicate those found in Experiment 1.

Source monitoring

A 2 (Age) × 2 (Focus) ANOVA produced a significant main effect of age, $F(1,76) = 26.78$, $p < .01$, a significant main effect of focus, $F(1,76) = 47.98$, $p < .01$, and a significant interaction effect of Age × Focus, $F(1,76) = 19.73$, $p < .01$. As seen in Table 3, 5-year-olds had better source scores than did 4-year-olds, and children in the other-focus condition had better source scores than did children in the self-focus condition. However, the beneficial effect of taking the other-focus appeared only for the older children. As in Experiment 1, 5-year-olds in the other-focus condition had better source monitoring scores than did 5-year-olds in the self-focus condition, $t(38) = 7.62$, $p < .01$, and 5-year-olds in the other-focus condition had better source monitoring scores than did 4-year-olds in the other-focus condition, $t(38) = 6.89$, $p < .01$. No other effects were significant.

Discussion

The aim of this experiment was to determine whether other-focus would improve both 4- and 5-year-olds' source monitoring scores when multiple cues to source were available (i.e., speakers were both seen and heard) and when improvements were made to the clarity of the source task. However, the results mirrored those of Experiment 1. Again, 5-year-olds in the other-focus condition outperformed 5-year-olds in the self-focus condition and 4-year-olds in the other-focus condition, with 4-year-olds showing no significant differences as a result of other-focus.

Why do the younger children not benefit from other-focus? One possibility is that because the speakers were similar, the perceptual features that the 4-year-olds bound with specific statements were not helpful in discriminating the speakers. For example, if the children bound the sex of the speaker with a particular statement, this combina-

tion would not be helpful for later source discriminations because the speakers were of the same sex. Perhaps 5-year-olds focused on more than one type of perceptual feature or made use of more discriminating perceptual features (e.g., sound of voice) or other characteristics of the speakers (e.g., spatial location).

Research with adults indicates that encoding multiple characteristics of each source (e.g., perceptual and spatial) helps with later source discriminations (Ferguson et al., 1992). In this case, 4-year-olds might benefit from taking an other-focus when the speakers are dissimilar and multiple cues to source are available. We examined this possibility in Experiment 3.

Experiment 3

The purpose of this experiment was to examine whether 4-year-olds would show improved source monitoring as a result of other-focus when speakers were dissimilar as well as when encoding conditions were optimal due to the use of video and source judgments being clearly explained. We did not study 5-year-olds because pilot work showed that they performed at ceiling under these conditions.

Method

Participants

This experiment involved a total of 30 4-year-olds (mean age 53.63 months, range 48–58) recruited from preschools as in the previous experiments. The majority of the children were White and middle class. Informed consent was obtained from the parent or guardian of each child.

Materials and procedure

The materials and procedure were identical to those in Experiment 2, with the exception that the speakers were a male and a female.

Results

An alpha level of .05 was used for all statistical analyses. Corrected recognition and source monitoring scores were calculated for all participants. The scores are shown in Table 4.

Recognition

A one-way ANOVA resulted in a significant effect of focus, $F(1,28) = 6.14$, $p < .05$. Children in the self-focus condition had better recognition scores ($M = .81$) than did children in the other-focus condition ($M = .70$), as in Experiments 1 and 2.

Table 4
Mean proportions and standard deviations for corrected recognition and source identification (Experiment 3)

	Corrected recognition	Source identification	Hits	False positives
4-year-olds				
Self	.81 (.11)	.74 (.13)	.95 (.05)	.15 (.12)
Other	.70 (.12)	.84 (.11)	.93 (.10)	.21 (.16)

Note. Standard deviations are in parentheses.

Source monitoring

A one-way ANOVA resulted in a significant effect of focus, $F(1,28) = 5.24$, $p < .05$. Children in the other-focus condition had better source scores ($M = .84$) than did children in the self-focus condition ($M = .74$).

Discussion

The purpose of this experiment was to examine whether 4-year-olds' source monitoring would benefit from taking an other-focus in conditions that maximized the likelihood of seeing this effect. In fact, 4-year-olds in the other-focus condition had significantly better source scores than did 4-year-olds in the self-focus condition. These results suggest that 4-year-olds do not lack the basic ability to take a speaker's perspective or to bind important featural information together with a statement. However, they might be able to make use of these skills only in the most supportive situations.

Comparison of effect sizes in Experiments 2 and 3

In Experiment 3, unlike Experiment 2, encoding focus produced significant differences in 4-year-olds' source performance. However, although no significant differences were found in source performance in Experiment 2, encoding focus produced a moderate effect size ($r = .29$), suggesting that in different situations taking the perspective of another person may benefit source performance. To examine whether the source monitoring results (in terms of the estimated effect size) from both studies are part of the same story, we compared the focus effect sizes in Experiments 2 and 3.

For each of the two studies, we computed the effect size r and found the associated Fisher z score for each of these r values. By transforming r values to Fisher z scores, we are able to compare effect sizes and determine whether they are consistent with one another or whether they are statistically heterogeneous (Rosenthal & Rosnow, 1991). When the effect sizes from Experiments 2 and 3 were compared ($r = .29$ and $r = .40$, respectively), it was found that these effects were consistent with one another. This result lends support to the notion that in Experiment 2, any benefit the 4-year-olds may have received in the other-focus may have been masked because the

speakers were similar and the perceptual features the 4-year-olds may have bound with specific statements were not helpful in discriminating the speakers.

General discussion

Preschool children often have difficulty with source memory for spoken statements ("who said what"), and there are marked improvements across the age range from 4 to 6 years in the ability to make accurate source decisions (Drummey & Newcombe, 2002; Foley, Johnson, & Raye, 1983; Lindsay et al., 1991). The results of the current three experiments suggest that one reason for the early difficulty with source judgments is that the source memory of younger children often does not improve when they take the perspectives of speakers, and this encourages binding together in memory important characteristics that are useful in judging source. Although Experiment 3 showed that children as young as 4 years can show the benefit of other-focus, they do so only in the most supportive circumstances. Comparing Experiments 1 and 2 with Experiment 3 is instructive. Experiments 1 and 3 both used dissimilar speakers, but 4-year-olds showed a benefit of other-focus only in Experiment 3, where the use of videotape rather than audiotape allowed the two speakers to be both seen and heard. Experiments 2 and 3 involved a different contrast. Although both used video presentation, 4-year-olds showed a benefit of other-focus only in Experiment 3, where speakers were dissimilar. Thus, it appears that younger children need both a rich array of perceptual and emotional information and sharp contrasts between speakers to benefit from other-focus.

One may ask which of the conditions in these three experiments best generalizes to the real world. Video presentation certainly comes closer than audio presentation to mimicking real-world experience (although we do sometimes hear people without seeing them, e.g., when speaking over the telephone or listening to the radio), so it might be that Experiment 1 underestimates what 4-year-old children can do in everyday life. In addition, even video certainly does not capture the full richness of live interaction, and further work evaluating source memory for statements made by live actors might show better ability to benefit from other-focus. However, the contrast in results between Experiments 2 and 3, involving a change from similar to dissimilar speakers, suggests that 4- and 5-year-olds do not have equivalent abilities to encode source in their daily lives. After all, people's daily lives often involve interacting with speakers of the same sex or with speakers who are similar to each other in other salient characteristics. Hence, the limitation that the younger children showed in Experiment 2 might well have important implications for everyday memory.

Why do 4-year-olds have a somewhat limited ability to benefit from another person's perspective? Their success in Experiment 3, along with the fact that there were no relations between source memory and theory of mind ability in Experiment 1, suggests that a basic inability to take another person's perspective is not the reason. Instead, several other factors might be at work. First, younger pre-

schoolers might find it difficult to notice distinctive characteristics of speakers that are not immediately salient, characteristics that would allow them to be distinguished from alternative sources. The contrast between Experiments 2 and 3 suggests the importance of encoding distinctive characteristics of superficially similar speakers. Second, younger children might have a basic limitation in the ability to bind together the speaker characteristics with the contents of the statements. The importance of binding ability is suggested by research using a wide variety of stimuli not involving people who are supplying information (Kovacs et al., 2005; Sluzenski et al., 2005). Third, younger children might not be as able as older children to use memory characteristics to make source judgments, even when they have encoded the characteristics and bound them together. Sluzenski et al. (2004) found that 4-year-olds recalled more perceptual details than spatial/temporal or semantic details for real events than for imagined events, just as older children do, but still had greater difficulty in distinguishing the two types of events. This finding implicated the role of strategic abilities to exploit memory characteristics in the developing competence to make source judgments.

Given that 4-year-olds benefited from other-focus in Experiment 3, one may ask whether even younger children would show this effect in suitably enriched and supportive contexts. Further research should address this issue by studying 3-year-olds because difficulty in adopting others' perspectives may come into play in this age range. After all, it is 3-year-olds who often show distinctively low performance on theory of mind tasks (e.g., Wimmer & Perner, 1983). However, we have found in pilot work that children of this age do not clearly understand the basic structure of the source memory task. Nonetheless, developmentally appropriate research techniques might be devised for 3-year-olds to help understand the earliest roots of source memory and the fundamental competencies that enable it to be shown in its simplest form.

During the preschool years, children begin to create autobiographical memories (e.g., Nelson, 2000; Welch-Ross, 1995) and are able to talk about past events (e.g., Fivush, 1997). There are many factors associated with these changes, including the growth of language, appreciation of narrative structure, and understanding that conversational partners value the ability to reminisce. One aspect of remembering the personal past, however, is knowing who said what—as well as when, where, and why they said it. With respect to this aspect of early memory, the work in this study suggests that the somewhat sketchy quality of memory for the preschool years may derive in part from difficulty in encoding such information by taking the perspectives of other speakers.

Acknowledgments

The authors are thankful to the children, parents, teachers, and preschool directors for their cooperation in this research. We also thank Meredith Meyer, Jennifer

Rosentrater, and Natalie Hansell for their assistance in data collection and thank Karen Mitchell, Julia Sluzenski, Anthony Dick, and an anonymous reviewer for their helpful comments on this research. Portions of these data were presented at the October 2003 meeting of the Cognitive Development Society in Park City, Utah.

Appendix A. Statements used in Experiment 1

List A
I hate the color yellow.
I like going to the circus to see the clowns.
I hate snakes.
My favorite restaurant is McDonalds.
I really don't like to eat pizza.
List B
Peanut butter and jelly is my favorite sandwich.
I don't like to watch "Barney" videos.
I am afraid of the dark.
I really like going to the library.
My favorite color is purple.
List C
I love eating at "Chucky Cheese's."
Chocolate milk tastes so good.
I hate broccoli.
"Pokemon" is my favorite movie.
I really like playing soccer.

Appendix B. Statements used in Experiments 2 and 3

Speaker A
I really like to draw pictures.
Playing sports is so much fun.
Ice cream is so good.
I really don't like to eat spinach.
I hate watching TV.
Speaker B
I don't like to play in the snow.
I love playing with my friends.
I love going to the movies.
I really like Bob the Builder.
I really don't like getting my hair cut.

New items
Barney is for babies.
I am afraid of lions.
I really like playing at the beach.
I love listening to bedtime stories.
Hot dogs are so gross.

References

Chalfonte, B. L., & Johnson, M. K. (1996). Feature memory and binding in young and older adults. *Memory & Cognition, 24*, 403–416.

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

Ferguson, S. A., Hashtroudi, S., & Johnson, M. K. (1992). Age differences in using source-relevant cues. *Psychology and Aging, 7*, 443–452.

Fivush, R. (1997). Event memory in early childhood. In N. Cowan (Ed.), *The development of memory in childhood* (pp. 139–161). Hove, UK: Psychology Press.

Flavell, J. H., Flavell, E. R., & Green, F. L. (1983). Development of the appearance–reality distinction. *Cognitive Psychology, 15*, 95–120.

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

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

Johnson, M. K., Nolde, S. F., & DeLeonardis, D. M. (1996). Emotional focus and source monitoring. *Journal of Memory and Language, 35*, 135–156.

Kovacs, S. L., Hansell, N., & Newcombe, N. S. (2005, April). *Preschoolers' feature memory and binding processes.* Poster presented at the biennial meeting of the Society for Research in Child Development, Atlanta, GA.

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

Mitchell, K. J., Johnson, M. K., Raye, C. L., Mather, M., & D'Esposito, M. (2000). Aging and reflective processes of working memory: Binding and test load deficits. *Psychology and Aging, 15*, 527–541.

Nelson, K. (2000). Memory and belief in development. In D. L. Schacter & E. Scarry (Eds.), *Memory, brain, and belief* (pp. 259–289). Cambridge, MA: Harvard University Press.

O'Neill, D. K., Astington, J. W., & Flavell, J. H. (1992). Young children's understanding of the role that sensory experiences play in knowledge acquisition. *Child Development, 63*, 474–490.

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

Perner, J., Leekman, S., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5*, 125–137.

Perner, J., & Ruffman, T. (1995). Episodic memory and autonoetic consciousness: Developmental evidence and a theory of childhood amnesia. *Journal of Experimental Child Psychology, 59*, 516–548.

Reinitz, M. T., Verfaellie, M., & Milberg, W. P. (1996). Memory conjunction errors in normal and amnesic subjects. *Journal of Memory and Language, 35*, 286–299.

Roberts, K. P. (2000). An overview of theory and research on children's source monitoring. In K. Roberts & M. Blades (Eds.), *Children's Source Monitoring* (pp. 11–57). Mahwah, NJ: Lawrence Erlbaum Associates.

Rosenthal, R., & Rosnow, R. (1991). *Essentials of behavioral research: Methods and data analysis* (2nd ed.). New York: McGraw–Hill.

Sluzenski, J., Newcombe, N. S., Kovacs, S. (2005). *Developments in episodic memory and memory binding*. Unpublished manuscript, Temple University.

Sluzenski, J., Newcombe, N. S., & Ottinger, W. (2004). Changes in reality monitoring and episodic memory in early childhood. *Developmental Science, 7*, 225–245.

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

Welch-Ross, M. K. (1995). An integrative model of the development of autobiographical memory. *Developmental Review, 15*, 338–365.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition, 13*, 103–128.

Woolley, J. D., & Bruell, M. J. (1996). Young children's awareness of the origin of their mental representations. *Developmental Psychology, 32*, 335–343.