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Young Children's Response Tendencies Toward Yes–No Questions Concerning Actions

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Two experiments investigated response tendencies of preschoolers toward yes–no questions about actions. Two hundred 2- to 5-year-old children were asked questions concerning actions commonly associated with particular objects (e.g., drinking from a cup) and actions not commonly associated with particular objects (e.g., kicking a toothbrush). The impact of delay and comprehension of questions were also investigated. Results revealed a consistent developmental transition: Younger children tended to display a yes bias whereas older children did not display a bias unless they faced incomprehensible questions, in which case they displayed a nay-saying bias. Delay shifted children's responses in such a way that "no" answers were given more often. These findings hold important implications regarding the use of yes–no questions with children.

Developmental research involving preschoolers is greatly dependent on the use of questions. This is obvious from an earlier analysis of the studies published in both *Child Development* and *Developmental Psychology* between the years 1995 and 1998 (see Fritzley & Lee, 2003) and also a more current analysis of the studies published in *Child Development* between the years 2000 and 2003. In the first analysis, it was found that 74% of all studies involving 2- to 6-year-olds used questioning as one of the data collection methods. A similarly high percentage was found in the second analysis (69%). Of note, in both analyses, yes–no questions were the most frequently used type of question (43.3% and 55%, respectively). However, despite the frequent use of questioning in developmental research, there are few studies available on children's inherent response biases when questioned. Considering the fact that many important developmental theories (e.g., theory of mind) are tested through the use of such questions as yes–no questions, it is imperative that studies be specifically designed to understand whether children have specific biases when responding to certain types of questions (e.g., yes–no questions). In addition, if such biases indeed exist, it is crucial to discover what factors contribute to the biases and how the biases change with increased age.

The importance of studying children's reactions to various questioning formats lies not only within developmental research but also within other contexts. For example, questions are often used as the primary method of eliciting information in medical settings (von Baeyer, Forsyth, Stanford, Watson, & Chambers, 2009), educational settings, and eyewitness and forensic settings (Krahenbuhl & Blades, 2006). For example, McGough and Warren (1994) conducted a review of questions asked to young children by child protective services professionals. It was found that 64% of all questions asked by child protective services workers were yes–no questions. Davies, Westcott, and Horan (2000) analyzed forensic interviews of 4- to 14-year-old children conducted by police investigators and found that approximately 40% of all questions posed to 4- to 7-year-olds were close-ended questions (questions with limited alternatives, such as yes–no questions). Other researchers have found similar results (e.g., Lamb et al., 1996; Sternberg et al., 1997; Walker & Hunt, 1998; Waterman, Blades, & Spencer, 2004).

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The frequent use of yes–no questions with young children is appropriate and justified. Although open-ended questions may provide more enriched and detailed responses from old children, this is typically not the case with very young children because they do not yet have the cognitive ability to answer open-ended questions (Aldridge & Wood, 1998). In contrast, yes–no questions are among the earliest types of questions understood by preschoolers (Aldridge & Wood, 1998). Children understand the conventions surrounding yes–no questions (e.g., they require a response) by about 17 months of age and are usually able to understand the semantic content of such questions around 24 months of age, provided that the interviewer uses developmentally appropriate language (Choi, 1991).

There remain many inconsistencies in the literature regarding children's response tendencies toward yes–no questions (e.g., Brady, Poole, Warren, & Jones, 1999; Fritzley & Lee, 2003; Okanda & Itakura, 2007, 2008; Peterson & Biggs, 1997; Peterson, Dowden, & Tobin, 1999). Some studies have found a yes bias, some others have failed to find any type of bias, and others have found a nay-saying bias. For example, Fritzley and Lee (2003) investigated 2- to 5-year-old children's response tendencies toward yes–no questions and found that the youngest preschoolers tended to display a yes bias, regardless of condition, whereas older preschoolers tend to show a lack of bias unless they were faced with incomprehensible questions, to which they displayed a bias toward saying no (i.e., nay-saying bias). In similar studies conducted with children from non-Western cultures (Japan and Vietnam), a yes bias has been found with 2-, 3-, 4-year-olds, but not 5-year-olds when children were interviewed by either their mothers or a stranger (Okanda & Itakura, 2007, 2008). Peterson et al. (1999) reported that children between 3 and 5 years of age were more inclined to respond yes than no in simulated forensic interviews when yes–no questions were asked. However, in a similar study, Peterson and Biggs (1997) found that 2- to 5-year-olds were biased toward saying no. Finally, Brady et al. (1999) found no clear response bias across different types of yes–no questions and conditions for children between 3 and 7 years of age.

One of the major reasons for such discrepancies may be the differences regarding the subject matter in question in addition to potential methodological or cross-cultural differences. The studies by Fritzley and Lee (2003) and Okanda and Itakura (2007, 2008) that have found a yes bias in young children, but not their older counterparts tend to use questions about the properties of objects. However, the studies by Peterson and Biggs (1997), Peterson et al. (1999), and Brady et al. (1999) asked a mixture of questions about both object properties and actions people performed without separating the effect of either subject matter. According to Jones, Swift, and Johnson (1988), preschoolers have better memories for events than they do objects. It is possible that some of the inconsistencies in the literature may be due to children having different response tendencies toward questions about object properties than they do about actions. The present study addressed this question.

Empirical research on this issue has important theoretical and applied implications. Theoretically, the answer to this question allows for assessing the generality of children's response bias toward yes–no questions and the further delineation of the factors that may or may not contribute to the emergence of such a response bias. Practically, because in applied settings (e.g., medical interviews or forensic interviews), questions about objects are not asked as often as questions concerning actions (e.g., "Did you hit your head when you fell?"), knowledge about children's response bias toward questions about actions is thus specifically critical, but currently is largely lacking.

To bridge this gap in knowledge, in the present study, we specifically focused on whether response biases toward yes–no questions regarding actions exist in young children between 2 and 5 years of age. To test whether or not children's responses differ from those of adults, we also included a comparison sample of adults in the first experiment. We showed participants actions performed with familiar objects and then asked them yes–no questions about the actions. To examine the effect of familiarity on participants' response biases, we performed either familiar and expected actions with objects (e.g., brushing teeth with a toothbrush) or actions in an unexpected fashion that children would not be familiar with (e.g., kicking the toothbrush). We aimed to examine whether or not differences in familiarity (henceforth referred to as expectedness) would engender different response biases to yes–no questions about actions as was found by Fritzley and Lee (2003), who revealed familiarity to play an important role in children's responses toward yes–no questions about object properties.

As children age, they form schemas for the various stimuli and events they face (Davies & Pezdek, 2010). Because the objects used in the present set of

experiments are objects that children are familiar with, children should hold preexisting schemas for any actions that are normally performed with these objects and these schemas should enhance the children's memories of the interaction with the experimenter. As a result of this enhanced memory, children may demonstrate less response bias when answering questions regarding such actions. However, an alternative possibility exists. Research has also shown that events that are more salient or distinctive tend to be remembered better and for longer periods of time (Howe, 2000). Because the unexpected actions are actions that may be considered "silly" to a preschooler (e.g., kicking a toothbrush), they could be considered salient to these children. As a result of their salience, children's memories of these actions may be stronger and they may demonstrate less response bias in response to questions about these actions. Because there has not been any systematic research into this issue, it is not yet known which of the above possibilities is true. Because in research and applied settings children are often asked questions about events and actions that they observe, both expected and unexpected in nature, it is important to uncover exactly whether and how they respond to questions about such events in a biased or unbiased fashion.

In many interview settings involving children, a delay between the event and the questioning of the child is common. For example, when it comes to children providing testimony about criminal acts, delays of months or even years between testimony and the original event are not unusual (Davies & Pezdek, 2010). Adding a time delay of any length brings an additional factor to the issue of response bias—memory. In general, research has shown that young children's memory of certain events, objects, and people involved may not be as accurate as that of older children, and most likely decays more rapidly (e.g., Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993; Flin, Book, Knox, & Bull, 1992). In previous work investigating children's response tendencies toward questions regarding familiar and unfamiliar objects, delay affected children's responses under certain conditions. For example, after a 1-week delay, the youngest children's yes bias was not as strong as 1 week earlier; the older preschoolers started showing a nay-saying bias to questions that they could fully comprehend, which was not the case a week earlier (Fritzley & Lee, 2003). Thus, delay appears to be an important factor that may have a significant impact on children's response biases toward questions about actions. To test this possibility, we interviewed children twice, once immediately after they observed the actions, and then 1 week later when they had to answer questions about the actions they saw 1 week earlier.

Because existing studies (e.g., Fritzley & Lee, 2003) have shown a consistent effect of question comprehensibility on response biases to yes–no questions about object properties, here we also assessed the effect of this factor by asking children questions that were either comprehensible or incomprehensible. Understanding children's response biases to incomprehensible questions is just as important as understanding their responses to comprehensible questions. In fact, it may be argued that understanding children's response biases to incomprehensible questions is even more important, especially in forensic settings. This is because in these settings, for a variety of reasons (e.g., lack of training or purposely trying to confuse child witnesses to clear a defendant of charges) interviewers may ask questions that children have difficulty understanding (Leippe, Brigham, Cousins, & Romanczyk, 1989; Schuman, Bala, & Lee, 1999; Vieth, 2008; Watt, 2008).

We tested three specific hypotheses. First, based on the consistent findings from the existing studies, it was hypothesized that the children would provide very few "I don't know" responses, even though they were instructed that such responses were acceptable. In contrast, it was hypothesized that adults would provide "I don't know" responses when it was appropriate (i.e., to the incomprehensible questions). Second, it was hypothesized that there would be a developmental transition when it came to response tendencies toward yes–no questions. The youngest children would display a yes bias regardless of condition, with that bias being stronger in the unexpected and incomprehensible conditions. This hypothesis was based on the earlier finding that younger children tended to display a stronger bias in the unfamiliar and incomprehensible conditions (Fritzley & Lee, 2003). Then with increased age, the children's response biases would differ depending on conditions. Specifically, consistent with the previous findings, the older children would not demonstrate any bias in response to the comprehensible yes–no questions, but would switch to a nay-saying bias in response to the incomprehensible questions. When faced with questions regarding unexpected actions, their nay-saying bias would be stronger. It was hypothesized that adults would respond accurately (i.e., without bias) to all comprehensible questions and would admit their ignorance (i.e., say "I don't know") to the incomprehensible questions. Third, and finally, based on the previous findings regarding delay (Fritzley & Lee, 2003), it was hypothesized that

after a 1-week delay, the younger children's yes bias would become less pronounced whereas the older children would display a tendency toward a nay-saying bias even when the questions were comprehensible.

Experiment 1

This experiment investigated the response tendencies of preschool children toward yes–no questions about actions. Specifically, we asked children between the ages of 2 and 5 years questions concerning actions commonly associated with particular objects (e.g., drinking from a cup) and actions not commonly associated with particular objects (e.g., kicking a toothbrush). We also investigated whether or not children's comprehension of the question itself would have any impact on children's answers.

Method

Participants. Participants consisted of a group of children and a group of adults. The group of children included thirty 2-year-olds (12 male children and 18 female children, M_{age} = 2, 9; age range = 2, 1–2, 11), thirty 3-year-olds (16 male children and 14 female children, M_{age} = 3, 7; age range = 3, 1–3, 11), thirty 4-year-olds (16 male children and 14 female children, M_{age} = 4, 5; age range = 4, 1–4, 11), and thirty 5-year-olds (14 male children and 16 female children, M_{age} = 5, 4; age range = 5, 1–5, 11). The children were largely Caucasians from middle-class families enrolled in day care programs in two Canadian cities. The group of adults included thirty 18- to 39-year-olds (16 men and 14 women, M_{age} = 22, 6) who were all full-time students enrolled at an Ontario college.

Materials. Materials consisted of six objects, all of which are familiar to young children. The objects consisted of a red plastic cup, a green plastic apple, a big purple ball, a metal spoon, a coloring book, and a purple toothbrush.

Procedure. For the children, after parents completed consent forms, each child was interviewed individually in their day care. The adult participants completed their consent forms and participated in a classroom at their college. Each participant went through a pretest session to determine that they were able to identify the name and function of the pertinent objects.

The participants were then shown either an expected action (e.g., the experimenter rolled a ball) or unexpected action (e.g., the experimenter kicked a toothbrush) and then asked a set of three questions. The set of three questions contained a "yes" question (for which the correct answer was "yes"), a "no" question (for which the correct answer was "no"), and an "incomprehensible" question (for which there was no correct answer). For example, the experimenter rolled the ball in front of the participant and then asked a "yes" question (Did I roll the ball?), a "no" question (Did I bounce the ball?), and an "incomprehensible" question (Did I twireno the ball?). After the participant answered the three questions concerning the first action, they were then shown the next action and asked a similar set of three questions. This continued until all actions were demonstrated and all questions were asked. The order of expected and unexpected actions and the order of the questions ("yes," "no," and incomprehensible questions) were randomized using a random numbers table. For each participant, there were three expected actions and three unexpected actions. To ensure generalization, there were two expected actions for each object, with half of the participants experiencing one action and the other half experiencing the other. The same was done for the unexpected actions. The participants were instructed three times that they could say "yes," "no," or "I don't know" to any of the questions asked—once before the questions started, another time after the first 6 questions were asked (after questions were asked for two objects), and the final time after the first 12 questions were asked (after questions were asked for four objects). After all actions were performed and all questions were asked, the participants were asked to replicate all of the actions performed by the experimenter, one at a time. The questions asked in the present study can be found in Appendix.

Results and Discussion

First, it was determined that all participants were indeed familiar with the objects used and that they could replicate the experimenter's actions after all of the actions were demonstrated and all of the questions asked. The participants' ability to replicate the action is important because if they are not able to demonstrate the action that they were shown, it may indicate that they did not remember it, which would be problematic. Almost all of the children could replicate the actions that were performed (M = .95, SE = .01) and all of the adults could replicate the actions that were performed.

To determine whether or not there was a significant difference between participants' ability to replicate actions that were expected and their ability to

replicate those that were unexpected, a 4 (age: 2-, 3-, 4-, 5-year-olds) × 2 (expectedness: expected, unexpected) repeated measures analysis of variance (ANOVA) was conducted with expectedness of the performed actions as the repeated measure. The scores for the 5-year-olds and for the adults were excluded because they were able to replicate all actions. There was no significant difference in children's replication scores for expected actions versus unexpected actions, $F(1, 87) = .46$, $p = .499$, $\eta_p^2 = .01$. The age effect was not significant, $F(2, 87) = 1.00$, $p = .372$, $\eta_p^2 = .02$. In addition, there was no significant interaction between age and replication, $F(2, 87) = .38$, $p = .689$, $\eta_p^2 = .01$.

It was hypothesized that the children would provide very few "I don't know" responses, even though they were told that such responses were acceptable. This hypothesis was supported, as "I don't know" responses represented only 1.6% of all responses from children in the present study. However, it should be noted that children increased their use of the "I don't know" response with age, $\chi^2(3, N = 120) = 10.00$, $p = .019$. No 2-year-olds (0.0%), one 3-year-old (3.3%), some 4-year-olds (13.3%), and one third of the 5-year-olds (33.3%) responded "I don't know" at least once. McNemar's tests indicate that expected actions (10) and unexpected actions (12) led to nearly identical numbers of children using the "I don't know" response, $\chi^2(1, N = 120) = .20$, $p = .655$ and that many more children used the "I don't know" response following incomprehensible questions (15) than comprehensible questions (1), $\chi^2(1, N = 120) = 13.13$, $p < .001$. Even then, "I don't know" answers were only given by approximately 12.5% of the entire sample of children. This finding is in line with the findings from numerous recent studies using yes–no questions (Brady et al., 1999; Peterson & Biggs, 1997; Peterson et al., 1999; Peterson & Grant, 2001).

In contrast, it was hypothesized that when appropriate, adults would admit that they did not understand what the experimenter was asking (i.e., that they would provide "I don't know" responses to the incomprehensible questions). Adult participants used the "I don't know" response more than the child participants, but not as frequently as was hypothesized. In response to the 180 incomprehensible questions asked (one incomprehensible question for all six objects for all 30 adult participants), 78 (43%) of such appropriate responses were given. As expected, all of the "I don't know" responses provided by adults were to the incomprehensible questions. Expected actions (19 [63%]) and unexpected actions (19 [63%]) led to identical numbers of adults using the "I don't know" response.

To examine whether or not participants had a response bias, a response bias score was calculated for each participant for both the expected and unexpected conditions. To do so, a yes score and a no score were first obtained in each condition. The yes score was obtained by assigning a score of 1 to any yes response to a yes question and a score of 0 to any no response to a yes question. The maximum yes score for both the expected and unexpected conditions was 3 (three objects in each condition with one yes question each) and the minimum was 0. The no score was obtained by assigning a score of 1 to any no response to a no question and a score of 0 to any yes response to a no question. The maximum no score for both conditions was 3 and the minimum was 0. The no score was then subtracted from the yes score, resulting in a response bias score for each condition with a maximum score of 3 and a minimum score of −3.

For each incomprehensible question, participants received a score of 1 for any yes response and a score of −1 for any no response. Because there was only one incomprehensible question per object and there were three objects, the maximum and minimum response bias scores for the incomprehensible word condition were therefore 3 and −3 as well. The response bias score for a participant failing to demonstrate any bias would be 0. Participants with a positive response bias score would be demonstrating a yes bias, whereas participants with a negative response bias score would be demonstrating a nay-saying bias.

In all conditions, the response bias score for a participant with no response bias should be 0. A positive response bias score suggests a yes bias, whereas a negative response bias score suggests a nay-saying bias. To examine whether or not participants had a response bias, one sample t tests were conducted to compare the mean response bias scores of each age group to a score of 0 (see Figure 1). Two-year-olds displayed a significant yes bias in all four conditions, ts > 2.98, ps < .01. Three-year-olds displayed a lack of bias in the expected comprehensible and unexpected comprehensible conditions, $1.17 > t > -.41$, ps > .254, and a nay-saying bias in the expected incomprehensible and unexpected incomprehensible conditions, ts < −4.75, ps < .001. Four-year-olds displayed a lack of bias in the expected comprehensible and unexpected comprehensible conditions, $1.86 > t > -1.54$, ps > .072, and a nay-saying bias in the expected incomprehensible and unexpected incomprehensible

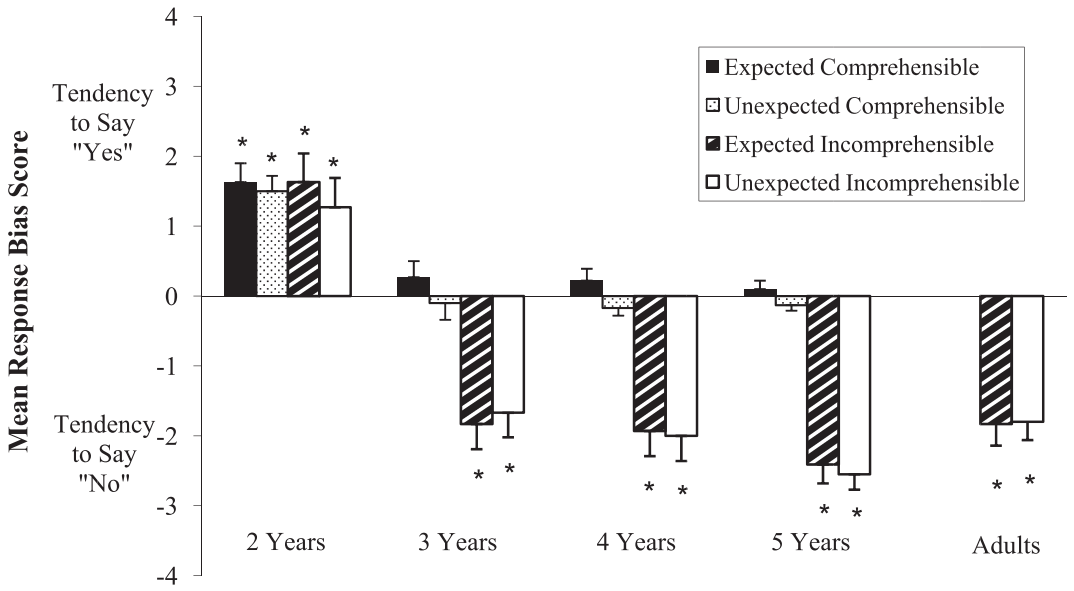

Figure 1. Mean response bias scores for each age group for all four conditions in Experiment 1.
*Significant response bias.

conditions, ts < −5.30, ps < .001. Five-year-olds displayed a lack of bias in the expected comprehensible and unexpected comprehensible conditions, 0.83 > t > −1.68, ps > .102, and a nay-saying bias in the expected incomprehensible and unexpected incomprehensible conditions, ts < −8.94, ps < .001. Finally, the adults showed a significant nay-saying bias in both the expected incomprehensible and unexpected incomprehensible conditions, ts < −5.96, ps < .001. Their results for the comprehensible questions were not included as they were able to answer all of the comprehensible questions accurately.

A 4 (age: 2-year-olds, 3-year-olds, 4-year-olds, 5-year-olds) × 2 (expectedness: expected, unexpected) × 2 (question type: comprehensible, incomprehensible) repeated measures ANOVA was conducted, with the expectedness and question type factors as the repeated measures (adult data were excluded from the analyses due to the lack of variability in some conditions). The age effect was significant, $F(3, 113) = 31.16$, $p < .001$, $\eta_p^2 = .45$. As age increased, response bias scores decreased. Post hoc tests were conducted to determine the differences among the four age groups. A Tukey's honestly significant difference (HSD) test showed that the 3-year-olds ($M = -.83$, $SE = .23$), 4-year-olds ($M = -.96$, $SE = .24$), and 5-year-olds ($M = -1.25$, $SE = .23$) were not significantly different in their response tendencies from one another, but were all significantly different from the 2-year-olds ($M = 1.51$, $SE = .23$). Response bias scores were marginally closer to zero for expected ($M = -.30$, $SE = .13$) than unexpected ($M = -.47$, $SE = .12$) actions, $F(1, 113) = 3.66$, $p = .058$, $\eta_p^2 = .03$. Response bias scores were closer to zero for comprehensible questions ($M = .41$, $SE = .08$) than those for incomprehensible questions ($M = -1.18$, $SE = .16$), $F(1, 113) = 171.24$, $p < .001$, $\eta_p^2 = .60$. The only significant interaction was Age Group × Question Type, $F(3, 113) = 17.89$, $p < .001$, $\eta_p^2 = .32$. The youngest children displayed clear yes biases when responding to questions regarding both comprehensible and incomprehensible questions, with no significant difference between the two types of questions, $F(1, 113) = .24$, $p = .628$, $\eta_p^2 = .01$ For the 3-, 4-, and 5-year-olds, there were significant differences between their responses to the comprehensible and incomprehensible questions, Fs > 58.3, ps < .001, η_p^2s > .33. The older children displayed a lack of bias toward questions that were comprehensible and a nay-saying bias toward questions that were incomprehensible.

The hypothesis about the developmental transition in children's tendencies toward yes–no questions was supported. As expected, 2-year-olds were the only children that displayed a tendency to respond affirmatively in all conditions, replicating the findings of the previous studies. Although it was hypothesized that 3-year-olds would display a yes bias as well, there was no bias present in their responses to comprehensible questions and they displayed a significant nay-saying bias in response to the incomprehensible questions.

As expected, 4- and 5-year-olds did not display a response bias while answering comprehensible

questions and displayed a significant nay-saying bias in response to the incomprehensible questions. Thus, the 3-year-olds had the same pattern of responses as did the older children. Indeed, the children were strongly influenced by the comprehensibility manipulation such that all ages had significant response biases for incomprehensible questions (affirmation for 2-year-olds and nay-saying for older children), but none revealed significant response biases for comprehensible questions (although the 2-year-olds showed a tendency toward yes biases to all questions). However, for all ages, children's responses were only marginally significantly different for the expected versus unexpected actions. Overall, when a lack of bias was found, the data show that children were responding accurately, not randomly.

Experiment 2

Experiment 2 was designed to build upon Experiment 1 by adding a delay condition. As discussed in the Introduction, the implementation of a delay is of great importance in the applied (e.g., forensic) setting as there are often delays between the time an event occurs and the time of the interview (Davies & Pezdek, 2010). If a delay affects children's response tendencies in situations such as that set up in the present experiment (where the experimenter is nonthreatening, the children are being interviewed in a familiar setting, and the topic of the interview is not stress inducing for the child), then it is likely that a delay will also affect children's response tendencies in forensic interviews. Because of this, discovering whether or not a delay does in fact elicit more biased responses from young children becomes a vital task for developmental and forensic researchers.

Method

Participants. Participants consisted of twenty 2-year-olds (7 male children and 13 female children, M_{age} = 2, 6; age range = 2, 1–2, 11), twenty 3-year-olds (8 male children and 12 female children, M_{age} = 3, 6; age range = 3, 1–3, 11), twenty 4-year-olds (12 male children and 8 female children, M_{age} = 4, 4; age range = 4, 1–4, 11), and twenty 5-year-olds (9 male children and 11 female children, M_{age} = 5, 5; age range = 5, 1–5, 11). Participants were enrolled in day care programs in two Canadian cities and had not previously participated in the first experiment.

Materials and procedure. The materials and procedure for the present experiment were identical to those of Experiment 1 with one modification. Instead of being interviewed only once, the children were interviewed twice—they were asked the same questions 1 week after their initial interview, without being able to see the object or the action performed again. This was done to determine how they would respond when they were forced to rely on their memory of their previous interaction with the experimenter. The questions can be found in Appendix.

Results and Discussion

As was the case in Experiment 1, results demonstrated that all of the children were familiar with the objects. A "replication score" was calculated in the same manner as in Experiment 1. The majority of the children could replicate the actions that were performed (M = .80, SE = .02). In general, the younger children were worse at replicating the actions than were the older children.

To determine whether or not there was a significant difference between children's ability to replicate actions that were expected and their ability to replicate those that were unexpected and also to determine whether or not there was a difference between the two interviews, a 4 (age: 2-year-olds, 3-year-olds, 4-year-olds, 5-year-olds) × 2 (expectedness: expected, unexpected) × 2 (delay: no delay, delay) repeated measures ANOVA was conducted with expectedness of the performed actions and delay as the repeated measures. The children were better able to replicate the actions that were expected (M = 2.51, SE = .07) than those that were unexpected (M = 2.29, SE = .08), $F(1, 76) = 10.93$, $p = .001$, $\eta_p^2 = .13$. The children were less able to replicate the actions in the second interview (M = 2.10, SE = .09) than in the first (M = 2.70, SE = .06), $F(1, 76) = 57.04$, $p < .001$, $\eta_p^2 = .429$. (i.e., they did not remember the actions as well after a 1-week delay). There was also a significant interaction between the expectedness factor and the delay factor, $F(1, 76) = 4.33$, $p = .041$, $\eta_p^2 = .05$, demonstrating that the difference between children's replication scores for the expected and unexpected actions differed more in the second interview (M = 2.26, SE = .09 vs. M = 1.94, SE = .12) than they did in the first (M = 2.75, SE = .06 vs. M = 2.65, SE = .07). In both the expected and unexpected conditions, there was a difference in ability to replicate the experimenter's actions between the first interview and the second interview, Fs > 36.90,

ps < .011, η_p^2s > .32. In the first interview, there was no significant difference in the children's ability to replicate expected and unexpected actions, $F(1, 76) = 2.48$, $p = .119$, $\eta_p^2 = .03$, whereas in the second interview, there was a significant difference, $F(1, 76) = 10.48$, $p = .002$, $\eta_p^2 = .12$. The age effect was also significant, indicating that older children were better able to replicate the experimenter's actions, $F(3, 76) = 7.23$, $p < .001$, $\eta_p^2 = .22$. There were no significant interactions involving age.

The hypothesis that children would rarely provide "I don't know" responses was supported by the findings in the present study. "I don't know" responses represented only 2.8% of all responses. One 2-year-old (5.0%), one 3-year-old (5.0%), one 4-year-old (5.0%), and more than half of the 5-year-olds (55.0%) responded "I don't know" at least once. Because children younger than 5 years of age rarely replied, "I don't know," their data were collapsed and compared with those of the 5-year-olds. There was a significant difference in terms of "I don't know" responding between the children under 5 years and the children who were 5 years, $\chi^2(1, N = 80) = 25.97$, $p < .001$. A McNemar's test was conducted to compare the number of children using the "I don't know" response in each within-subjects condition. Results showed that expected actions (10) and unexpected actions (12) led to nearly identical numbers of children using the "I don't know" response, $\chi^2(1, N = 80) = .21$, $p = .647$. However, significantly more children used the "I don't know" response following incomprehensible questions (13) than comprehensible questions (4), $\chi^2(1, N = 80) = 5.33$, $p = .021$. Fewer children (7) chose to use the "I don't know" response in the second interview than in the first (12), but the effect was not significant, $\chi^2(1, N = 80) = 1.49$, $p = .222$. This finding that children seldom use the "I don't know" response is consistent with the findings from numerous recent studies using yes–no questions (Brady et al., 1999; Peterson & Biggs, 1997; Peterson et al., 1999; Peterson & Grant, 2001). Children are very reluctant to admit their ignorance when they are answering yes–no questions.

To investigate the existence of response biases in the present experiment, response bias scores were obtained for each child, using the same procedure as that in Experiment 1. Similar to Experiment 1, the response bias score for a child failing to demonstrate bias would be 0. One-sample t tests were conducted to compare the mean response bias scores of each age group to a score of 0 (see Figures 2 and 3). For the first interview, 2-year-olds displayed a significant yes bias in all four conditions, ts > 3.10, ps < .01. Three-year-olds displayed a lack of bias in the unexpected comprehensible, expected incomprehensible, and unexpected incomprehensible conditions, $.43 > t > -1.05$, ps > .307, and a yes bias in the expected comprehensible condition, $t(19) = 3.29$, $p = .004$. Four-year-olds displayed a lack of bias in the expected comprehensible and unexpected comprehensible conditions, $1.44 > t > -2.03$, ps > .055, and a nay-saying bias in the expected incomprehen-

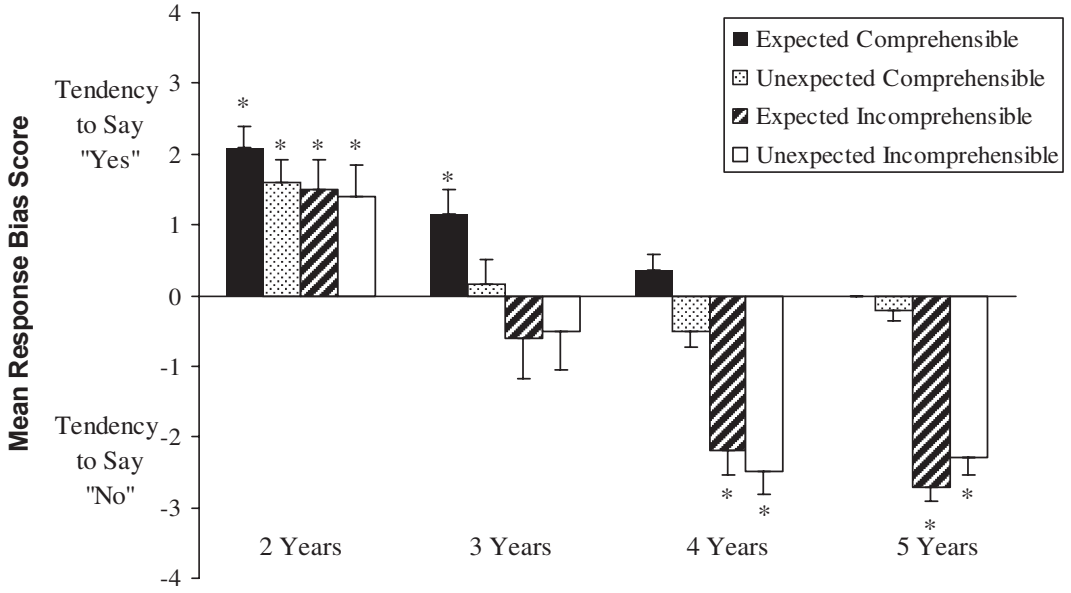

Figure 2. Mean response bias scores for all age groups in the first interview in Experiment 2.
*Significant response bias.

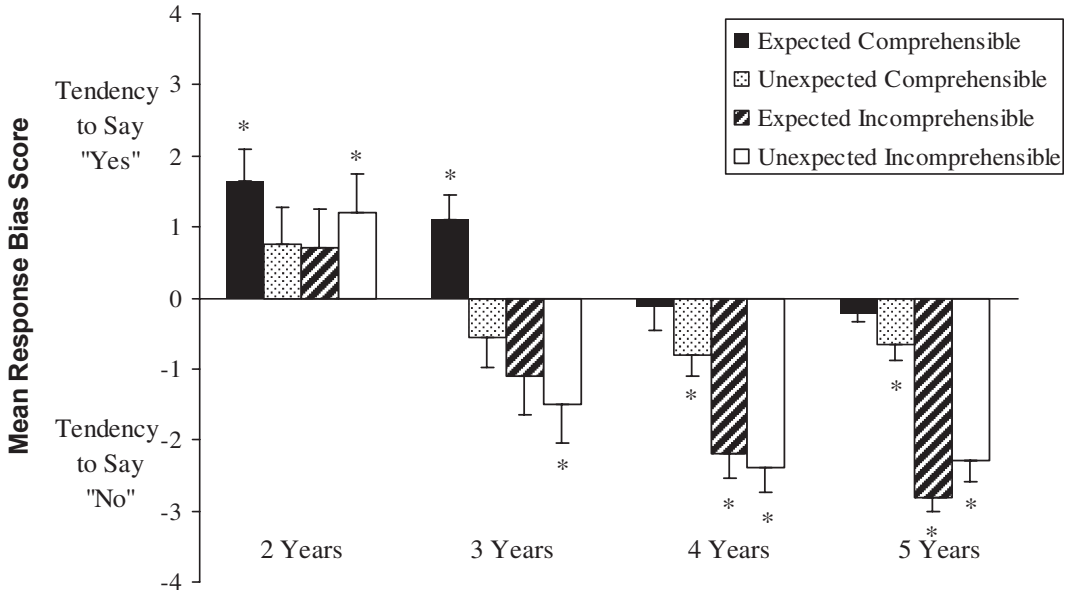

Figure 3. Mean response bias scores for all age groups in the second interview in Experiment 2.
*Significant response bias.

sible and unexpected incomprehensible conditions, ts < −6.52, ps < .001. Five-year-olds displayed a lack of bias in the expected comprehensible (because all questions were answered correctly, a t score is not possible) and unexpected comprehensible conditions, $t(19) = -1.29$, $p = .214$, and a nay-saying bias in the expected incomprehensible and unexpected incomprehensible conditions, ts < −9.10, ps < .001.

For the second interview, 2-year-olds displayed a significant yes bias in the expected comprehensible and unexpected incomprehensible conditions, ts > 2.21, ps < .05, and a lack of bias in the unexpected comprehensible and expected incomprehensible conditions, ts < 1.43, ps > .17. Three-year-olds displayed a lack of bias in the unexpected comprehensible and expected incomprehensible conditions, ts > −2.00, ps > .06; a yes bias in the expected comprehensible condition, $t(19) = 3.17$, $p = .005$; and a nay-saying bias in the unexpected incomprehensible condition, $t(19) = -2.78$, $p = .012$. Four-year-olds displayed a lack of bias in the expected comprehensible condition, $t(19) = -.27$, $p = .789$, and a nay-saying bias in the unexpected comprehensible, expected incomprehensible, and unexpected incomprehensible conditions, ts < −2.55, ps < .05. Five-year-olds displayed a lack of bias in the expected comprehensible condition, $t(19) = -1.45$, $p = .163$, and a nay-saying bias in the unexpected comprehensible, expected incomprehensible, and unexpected incomprehensible condition, ts < −2.66, ps < .05.

A 4 (age: 2-year-olds, 3-year-olds, 4-year-olds, 5-year-olds) × 2 (expectedness: expected, unexpected) × 2 (question type: comprehensible, incomprehensible) × 2 (delay: no delay, delay) repeated measures ANOVA was conducted with the expectedness, question type and delay factors as the repeated measures. As age increased, bias scores decreased, $F(3, 76) = 20.53$, $p < .001$, $\eta_p^2 = .45$. A Tukey's HSD test showed that the 2-year-olds ($M = 1.36$, $SE = .28$) were significantly different in their response tendencies from all of the other age groups. Also, the 3-year-olds ($M = -.23$, $SE = .28$) were significantly different in their response tendencies from all of the other age groups. The 4- ($M = -1.29$, $SE = .28$) and 5-year-olds ($M = -1.39$, $SE = .28$) were significantly different in their response tendencies from the 2- and 3-year-olds, but were not significantly different from one another.

The hypothesis that there would be a developmental transition, when it came to response tendencies toward yes–no questions was once again supported. Two-year-olds displayed a tendency to respond affirmatively in almost all conditions (with the exception of the comprehensible-word unexpected-action condition and the incomprehensible-word expected-action condition in the second interview), replicating the findings of Experiment 1. Three-year-olds displayed a yes bias in their responses to comprehensible questions regarding expected actions (in both the first and second interview) and displayed a significant nay-saying bias in response to the incomprehensible questions regarding unexpected actions. As expected, in the first interview, 4- and 5-year-olds did not display a response bias while answering comprehensible

questions and did display a significant nay-saying bias in response to the incomprehensible questions. As hypothesized, the 4- and 5-year-olds said "no" more often in the second interview, displaying a nay-saying bias to comprehensible questions regarding unexpected actions and incomprehensible questions regarding both expected and unexpected actions.

The expectedness effect was significant. Response bias scores were closer to zero for expected ($M = -.21$, $SE = .14$) than unexpected ($M = -.57$, $SE = .16$) actions, $F(1, 76) = 13.46$, $p < .001$, $\eta_p^2 = .15$. Also, whether the questions were comprehensible or incomprehensible had a significant effect on children's responses. Overall, children showed response bias scores closer to zero for the comprehensible questions ($M = .37$, $SE = .13$) than for the incomprehensible questions ($M = -1.14$, $SE = .18$), $F(1, 76) = 161.55$, $p < .001$, $\eta_p^2 = .68$.

A main purpose of the present experiment was to investigate whether or not children's response tendencies toward yes–no questions regarding expected and unexpected actions would change if they were asked the same set of questions 1 week later, without being able to see the actions produced again. Implementing a delay had a significant effect on children's response biases, with response bias scores being significantly closer to zero in the first interview ($M = -.20$, $SE = .13$) than in the second interview ($M = -.58$, $SE = .17$), $F(1, 76) = 10.36$, $p = .002$, $\eta_p^2 = .12$. Overall, in the second interview, a nay-saying bias was more pronounced. This finding may be attributed to the fact that the children had experienced the actions a week before and the objects were no longer present. As a result, the children may have experienced problems remembering their previous interaction with the experimenter. This point is supported by the fact that children had a harder time replicating the actions in the second interview than they did in the first. It is quite possible that the shift toward nay-saying tendencies may be attributed to this deterioration of memory.

A significant interaction between age and expectedness, $F(3, 76) = 3.09$, $p = .032$, $\eta_p^2 = .11$, was found, reflecting the fact that similarities in response bias between the expected and unexpected condition depended on age. Two-year-olds displayed a yes bias in both the expected and unexpected conditions, with no significant difference between the two conditions, $F(1, 76) = 1.63$, $p = .206$, $\eta_p^2 = .02$. Three-year-olds displayed a lack of bias in both conditions, but their responses in the two conditions were significantly different, $F(1, 76) = 14.17$, $p < .001$, $\eta_p^2 = .16$. Four- and five-year-olds displayed a significant nay-saying bias, with only the 4-year-olds displaying significant differences between the two conditions, $F(1, 76) = 6.84$, $p = .011$, $\eta_p^2 = 08$. The differences in responses to the two conditions for the 5-year-olds were not significant, $F(1, 76) = .10$, $p = .751$, $\eta_p^2 = .01$.

There also existed a significant interaction between age and question type, $F(3, 76) = 13.54$, $p < .001$, $\eta_p^2 = .35$. Two-year-olds displayed a yes bias in both question type conditions, with no significant differences between the two, $F(1, 76) = 1.87$, $p = .175$, $\eta_p^2 = .02$. Three-year-olds displayed a lack of bias in both conditions, but there was a significant difference between their responses in the two, $F(1, 76) = 34.13$, $p < .001$, $\eta_p^2 = .31$. Four- and 5-year-olds displayed a lack of bias when questions were comprehensible and a nay-saying bias when questions were incomprehensible, Fs > 75.40, ps $< .001$, $\eta_p^2 > .49$.

A third significant interaction was found between expectedness and question type, $F(1, 76) = 24.60$, $p < .001$, $\eta_p^2 = .25$. There was a significant difference in response bias between the expected and unexpected conditions for the comprehensible questions, $F(1, 76) = 30.74$, $p < .001$, $\eta_p^2 = .29$, but not for the incomprehensible questions, $F(1, 76) = .28$, $p = .596$, $\eta_p^2 = .01$. There was also a significant difference in response bias to the comprehensible and incomprehensible questions for the expected condition, $F(1, 76) = 194.38$, $p < .001$, $\eta_p^2 = .72$, and for the unexpected condition, $F(1, 76) = 50.36$, $p < .001$, $\eta_p^2 = .40$. For the comprehensible questions regarding expected actions, a significant yes bias was found; for the comprehensible questions regarding unexpected actions, a lack of bias was found; and for incomprehensible questions regarding both expected and unexpected actions, a significant nay-saying bias was found.

General Discussion

The present study examined children's response biases toward yes–no questions about actions. With two experiments, we investigated whether or not children between the ages of 2 and 5 years can answer comprehensible and incomprehensible yes–no questions regarding expected and unexpected actions in an unbiased manner. In Experiment 1, children answered yes–no questions about actions that they just observed, whereas in Experiment 2 children were interviewed twice, with a 1-week delay in between the two interviews, to assess the children's response tendencies when they were forced to rely on their memory to answer questions.

The two experiments were conducted partly to address the many inconsistencies that remain in the literature regarding children's response tendencies toward yes–no questions (e.g., Brady et al., 1999; Fritzley & Lee, 2003; Okanda & Itakura, 2007, 2008; Peterson & Biggs, 1997; Peterson et al., 1999). As mentioned earlier, some studies have found a yes bias, some others have failed to find any type of bias, and still some others have found a nay-saying bias.

Although some differences were found between the two experiments, the majority of the findings from the second experiment replicated those from the first. For the most part, the three specific hypotheses were confirmed. First, when it comes to "I don't know" responses, there were consistencies found between the two experiments. In both experiments, the children produced very few "I don't know" responses, even though it was repeatedly suggested that "I don't know" was an acceptable response. In both experiments, it was the older children who tended to give the most "I don't know" responses, regardless of condition. In contrast to children, adults were more willing to give the "I don't know" response and this response occurred, as expected, all in the context when they faced incomprehensible questions.

The hypothesis that there would be a developmental transition, when it came to response tendencies toward yes–no questions was also supported. The youngest children displayed a tendency toward saying "yes," whereas the older children were able to answer the questions correctly, providing the questions were comprehensible and they were not forced to rely on their memory. Both experiments also produced a consistent pattern of results when children were faced with incomprehensible yes–no questions: Two-year-olds displayed a consistent yes bias in all but two conditions (both of which were in the second interview, after the 1-week delay); 3-year-olds were the most inconsistent, wavering between a yes bias, a lack of bias, and a nay-saying bias; and finally, 4- and 5-year-olds displayed a significant nay-saying bias in all conditions involving incomprehensible questions. There appears to be a developmental transition in terms of response tendencies toward yes–no questions that are incomprehensible: The youngest children display a yes bias and as age increases, this bias transitions into a nay-saying bias.

The consistent findings with respect to age-related changes are consistent with the literature regarding the use of yes–no questions in interviews with young children. As previously mentioned, a steadily increasing amount of research has investigated children's response tendencies toward yes–no questions. This research has found that younger children have more difficulty answering this type of question than do older children (e.g., Ceci & Bruck, 1993; Dent & Stephenson, 1979; Goodman & Reed, 1986; Lamb et al., 2003; Rocha, 2003; Yuille, Hunter, Joffe, & Zaparniuk, 1993). It also appears as though a similar pattern of response biases to yes–no questions may exist regardless of the subject matter in question. The developmental transition in response tendencies found in previous studies (e.g., Fritzley & Lee, 2003) utilizing yes–no questions about objects was found in the present study, which involved yes–no questions about actions.

These age differences may be attributed to many different factors. First, younger children have not yet reached cognitive and verbal maturity. As stated in Hardy and Leeuwen (2004), "age-related differences in language, memory, suggestibility, experience, and emotional maturity as these relate to interview performance have been well documented (e.g., see Ceci & Bruck, 1993)" (p. 156). The youngest children have lesser developed cognitive and linguistic skills and have also had less experience with interviews. It is quite possible that the youngest children's response tendencies in the present research were different from those of the older children as a direct result of this immaturity and inexperience.

It is also possible that younger children may be more sensitive to the social characteristics of the situation. They are being interviewed by adults, who are bigger and who they perceive to be more knowledgeable about the situation than they are (Hardy & Leeuwen, 2004). Reyna, Holliday, and Marche (2002) point out that younger children may be more likely to comply with (i.e., say "yes" to) adults, for example, to try to please adults. In the case of yes–no questions, a "yes" answer may be considered to be more agreeable than a "no" answer (Reyna et al., 2002). As children age, they gain more experience with the demands of asking and answering questions. Although older children will also try to please adults, they may be more cognizant of the implicit demands of the interview situation (i.e., that the interviewer is asking questions to gain accurate information from them) than are younger children. As a result, they may be more likely to try their best to accurately answer the questions asked. This may serve as an explanation for the finding that the youngest preschoolers showed a tendency toward a yes bias whereas the older preschoolers did not.

The inconsistencies found in the response tendencies of 3-year-olds must be addressed. In some

conditions, they responded in a similar manner as the 2-year-olds (i.e., they displayed a yes bias), whereas in other conditions they responded as the older children did (i.e., they displayed a lack of bias or a nay-saying bias). A very likely explanation for these inconsistencies is that these particular children are experiencing a transition in their question-answering tendencies. Specifically, a subset of the 3-year-olds are similar to the 2-year-olds in that they still have yet to gain experience with the protocols involved in questioning, and they also have to further develop cognitively. Other 3-year-olds might be similar to the 4- and 5-year-olds in that they have gained the experience and cognitive maturity necessary to answer questions in an unbiased manner (when the questions are comprehensible). In addition, they may start to display the nay-saying bias that the older children also tend to display when facing incomprehensible questions because the knowledge they have accumulated tells them that they have never heard the incomprehensible word associated with the action in question. Proportions of these children may vary from experiment to experiment, producing inconsistent findings. These findings need to be further examined so that the inconsistencies can be clarified.

Older children may have responded with a nay-saying bias toward the incomprehensible questions for reasons both social and cognitive in nature (Fritzley & Lee, 2003). First, because children, like adults, do not like to admit when they do not understand or know the answer to a question (Goody, 1978; Krosnick & Fabrigar, in press; Siegal, 1997), they provide an answer. Second, it is also possible that the children may not even realize that they do not comprehend the question asked (Saywitz, Snyder, & Nathanson, 1999). Third, because they have learned to follow the implicit demand of conversational turn-taking (Saywitz et al., 1999) and therefore should give a response, they opt for the "no" response because they have never heard the words before or have never heard adults using the words to describe the corresponding objects or actions. Finally, it may be possible that their tendency toward a nay-saying bias is not necessarily a bias in the true sense of the word. They may realize that the incomprehensible words are not in fact real words. Therefore, they reject the question by providing a "no" response. The finding that the adults also displayed a nay-saying bias in the incomprehensible condition supports this latter possibility.

The finding that there exists a developmental transition when children are answering incomprehensible questions is consistent with the current literature regarding questions that children do not understand or that provide no correct alternative for the children to select. Many studies have found that when children are faced with questions that they do not understand, they will often try to answer the questions anyway (Hughes & Grieve, 1980; Poole & White, 1993; Pratt, 1990; Saywitz & Snyder, 2003; Waterman, Blades, & Spencer, 2000, 2001, 2004). The nay-saying bias found in the older children's responses to incomprehensible yes–no questions parallels the results of two studies conducted by Waterman et al. (2000, 2001). Waterman and her colleagues found that when they asked 5- to 9-year-olds nonsensical yes–no questions, the children said "no" more often than they said "yes."

These findings regarding incomprehensible questions have important implications. In particular, children are likely to be asked questions in a multitude of situations, which due to their developmental level, they are not yet able to understand. Such situations include, but are not limited to, the developmental research setting (e.g., researchers studying theory of mind), medical settings (e.g., doctors asking children questions about injuries), educational settings (e.g., teachers and administrators attempting to determine at what educational level to place a particular child), and forensic interview settings (e.g., investigators asking questions regarding a crime or lawyers asking a child questions during a trial). In this latter situation, the consequences of such a misunderstanding can be particularly disastrous. Researchers have observed various courtroom interactions and have found that many lawyers do tend to ask questions that are semantically and syntactically complex and as such, the children often misunderstand (Saywitz et al., 1999). In fact, there is evidence to suggest that in certain cases, this may be part of the defense's repertoire of strategies to free the defendant of all charges (Evans, Lee, & Lyon, 2009; Leippe et al., 1989; Vieth, 2008; Watt, 2008). Although it must be noted that generalizability of this set of studies to the courtroom setting may be limited (due to procedural differences between the present studies and those involving traumatic events), the potential dangers of using developmentally inappropriate and confusing language are still clearly illustrated by the present results.

The inconsistent findings regarding the expectedness of the actions are worth noting. These inconsistencies might be the result of various factors combined. For example, it has been suggested by Howe (2000) that in the case where events are

unique and distinctive, children's memories are more accurate. It is likely that a subset of the children were more surprised by or interested in the unexpected actions, which would make the actions more unique and distinctive. As a result of this distinctiveness, children would remember their interaction with the experimenter better and therefore produce less biased reports. On the other hand, as mentioned in the Introduction, children form schemata as they age, and perhaps the unexpected actions may not be part of the script repertoire that children are familiar with, and as a result, their interaction with the experimenter was not as memorable. The finding that after a week's delay, children were worse at replicating the unexpected actions than they were the expected actions supports this possibility. Because children were not able to remember the unexpected actions as well as they did the expected actions after a week had passed, these children may produce more biased reports.

Our second experiment provided some insight regarding whether or not a delay has any effect on children's response tendencies toward yes–no questions. With respect to the comprehensible word condition, the 2- and 3-year-olds showed little change in terms of response bias from the first interview to the second (with the exception of the 2-year-olds not displaying their usual yes bias in the unexpected condition), while the 4- and 5-year-olds tended to say "no" more often in the second interview. A nay-saying bias was found for both age groups when they answered comprehensible questions concerning unexpected actions. With respect to the incomprehensible questions, the delay seemed to have little effect on the responses of the children as a whole—the only age groups that the delay seemed to affect were the 2-year-olds, who failed to display their usual yes bias in the expected condition, and the 3-year-olds, who started to display a nay-saying bias in the unexpected condition in Experiment 2.

In summary, the present set of experiments provides insight into how children's response biases toward yes–no questions regarding actions change as they age. Consistent with our previous experiments using questions regarding objects (Fritzley & Lee, 2003), the youngest children tended to display a yes bias and this bias transitioned into a nay-saying bias as age increased. In addition, the experiments showed that delay has an impact on children's response biases—when forced to rely on their memory to answer questions about actions they had seen a week previously, the children tended to say "no" more often.

These findings have important methodological and practical implications. Yes–no questions have been used extensively with young children in many different settings, including developmental research, medical, educational, and forensic ones. As such, uncovering any biases that young children may hold toward such questions becomes of fundamental importance. The present set of studies suggests that the yes–no question should be avoided (whenever possible) if the children are younger than 4 years of age. If it is not possible to avoid the use of such questions (i.e., the children are not providing enough information in response to other types of questions), then it is recommended that interviewers do their best to adhere to the guidelines for developmentally appropriate interviews, such as the Stepwise Interview (Yuille et al., 1993). Adhering to these guidelines would involve modifications such as limiting the environmental distractions around the child, spending time building rapport with the child, and explaining, in detail, the interview process.

It is clear from both previous work and the present set of experiments that researchers must not only investigate questions of theoretical interest (e.g., children's theory of mind) but must also study the way we study children. Without fully understanding the biases that enter into research with young children, we will never fully understand either their capabilities or the biases to which they may fall victim. This is just the beginning of many questions we have about research involving young children. There are numerous other issues related to the questioning of children (e.g., how they respond to multiple-choice questions and tag questions) that require more research attention. In addition, research methods other than interviews (e.g., questionnaires) must be investigated.

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Appendix

Objects Used and Test Questions Asked in Both Experiments

Object	Expected actions	Question
1. Cup	1. Drink from the cup	1. Did I drink from the cup?
	2. Clean the cup	2. Did I clean the cup?
		3. Did I dloh the cup?
2. Ball	1. Bounce the ball	1. Did I bounce the ball?
	2. Roll the ball	2. Did I roll the ball?
		3. Did I twireno the ball?
3. Coloring book	1. Open the book	1. Did I open the book?
	2. Color in the book	2. Did I color in the book?
		3. Did I nepo the book?
Object	Unexpected actions	Question
1. Apple	1. Put clothes on the apple	1. Did I dress the apple?
	2. Sit on the apple	2. Did I sit on the apple?
		3. Did I onsti the apple?
2. Spoon	1. Put it through earring	1. Did I put the spoon in my earring?
	2. Step on the spoon	2. Did I step on the spoon?
		3. Did I ponest the spoon?
3. Toothbrush	1. Kick the toothbrush	1. Did I kick the toothbrush?
	2. Cut bristles of the toothbrush	2. Did I cut the toothbrush?
		3. Did I citthek the toothbrush?