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Preschoolers Mistrust Ignorant and Inaccurate Speakers

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Being able to evaluate the accuracy of an informant is essential to communication. Three experiments explored preschoolers' ($N = 119$) understanding that, in cases of conflict, information from reliable informants is preferable to information from unreliable informants. In Experiment 1, children were presented with previously accurate and inaccurate informants who presented conflicting names for novel objects. 4-year-olds—but not 3-year-olds—predicted whether an informant would be accurate in the future, sought, and endorsed information from the accurate over the inaccurate informant. In Experiment 2, both age groups displayed trust in knowledgeable over ignorant speakers. In Experiment 3, children extended selective trust when learning both verbal and nonverbal information. These experiments demonstrate that preschoolers have a key strategy for assessing the reliability of information.

Much of what we know, both as children and as adults, comes from other people (Bruner, 1990; Vygotsky, 1962). To learn new words, scientific facts, moral norms, and cultural and religious beliefs, children depend on information from others. However, people know different things and, thus, have different information to offer. For example, adults tend to know more words than children, science teachers typically know more science than mathematics teachers, parents know more about recent family events than strangers, and Spanish speakers know Spanish and English speakers do not. Do children encode the identity of individuals when deciding what to believe and whom to trust for new information? In particular, do children consider a person's past reliability as predictive of their future reliability and, if so, how general is this attribution? The studies reported here examine young children's ability to distinguish reliable from unreliable informants in the light of their past history.

In asking whether young children distinguish among informants in this way, it is helpful to differentiate between transient and stable variation among individuals in their reliability (Miller, 2000). Much theory-of-mind research has focused on how children come to understand that individual differences in perceptual access result in temporary differences in knowledge. A familiar example is one in which a child watches as John, but not Mary, looks inside a closed container and the child has to determine which adult knows the container's contents (Pratt & Bryant, 1990). This dominant conception treats knowledge as person independent. If the above situation were reversed, and Mary but not John were given access, then the difference in knowledge would also be reversed. Although conceptually sound, the focus of this research program has important limits. It ignores the fact that there are stable, preexisting and naturally occurring differences among individuals in the scope and accuracy of their knowledge and beliefs. Such differences cannot be discovered by assessing the availability of information in the current environment. In the current experiments, we focus on children's attribution of knowledge as a stable, person-dependent trait.

We already have evidence that young children are sensitive to certain, group-based differences in knowledge. For example, young children appreciate that adults know more than themselves, and that younger children know less (Taylor, Cartwright, & Bowden, 1991). They appreciate that different individuals have different kinds of expert knowledge (Lutz & Keil, 2002; Taylor, Esbensen, & Bennett, 1994). As communicators, young children also show marked sensitivity to the age of a listener by producing simpler, shorter speech to children younger than themselves (Dunn & Kendrick, 1982; Shatz & Gelman, 1973).

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Here, however, we focus on children's sensitivity not to a person's group membership but to his or her individual record of reliability in the past. If children are sensitive to whether or not an individual has made true versus false assertions in the past, they could use that information both in judging the truth value of a present statement and in deciding whether or not the person is a reliable source of new information in the future. This type of selective trust calls for the coordination of several abilities. First and foremost, it calls for the ability to distinguish true from false assertions. In addition, however, it calls for an ability to note which individual has made which type of assertion in the past; to anticipate—on the basis of an individual's past record—what type of assertion he or she will make in the future; and to direct questions and trust toward those informants who are likely to be more accurate. Next, we review recent findings pertinent to these various abilities.

The ability to distinguish true from false assertions emerges early in development. Pea (1982) found that 24- to 30-month-old children say ''no'' to speakers who misname visible objects—a retort they rarely offer to speakers who name objects correctly. Furthermore, 16-month-old infants notice, correct, and deny simple claims that they know to be incorrect. Koenig and Echols (2003) found that 16-month-olds looked in a prolonged fashion at speakers who misnamed a series of common objects. Interestingly, infants were not simply surprised by false labels in all circumstances. Instead, when false labels derived uniquely from a human speaker looking at objects, infants demonstrated increased looking to the source and attempted to correct the speaker. False labels produced by a person who was looking away from the objects did not elicit increased looking, pointing, or corrections from infants. Thus, infants' responses to false labels depended on the speaker's direction of attention.

These findings indicate that infants distinguish between true and false assertions. When people provide information that conflicts with their knowledge, infants recognize, correct, and deny assertions that they know to be false. Given this early sensitivity to the distinction between true and false assertions, we may ask whether children encode the identity of speakers when evaluating the truth value of their claims. In two recent studies, we have explored this issue. Three- and 4-year-olds were presented with two informants: one who named familiar objects accurately and one who named them inaccurately (Clément, Koenig, & Harris, 2004; Koenig, Clément, & Harris, 2004). Children in both age groups proved competent at subsequently identifying the hitherto accurate versus inaccurate informant (Koenig et al., 2004). On the other hand, there was a marked age change in predicting how the informants would refer to a further object. Whereas most 4-year-olds anticipated that only the hitherto accurate informant would be accurate, 3-year-olds often erred by predicting that both informants would be accurate (Clément et al., 2004). In each study, children were also tested to assess whether they could use a speaker's prior accuracy to decide whom to trust regarding new information. During the test session, children were presented with a series of unfamiliar objects, which received conflicting descriptions from the two speakers. For example, in reference to a given unfamiliar object, the hitherto accurate speaker called it a ''mido'' and the hitherto inaccurate speaker called it a ''blicket.'' Having listened to both informants, children were asked what they thought the object was called (e.g., ''a mido or a blicket?''). In both studies, 4-year-olds systematically accepted new information from the accurate over the inaccurate informant.

Three-year-olds' performance, on the other hand, was mixed. Clément et al. (2004) found that 3-year-olds accepted information indiscriminately from either informant. However, in Koenig et al. (2004), those 3-year-olds who systematically kept track of the informants' prior accuracy, by answering both explicit questions correctly, were more likely to choose the name supplied by the previously accurate informant. No age effects were found using this measure, but a possible developmental change was suggested because 70% of 4-year-olds responded correctly on both explicit questions whereas only 50% of 3-year-olds did so.

Experiment 1 was designed to clarify and extend these results. We had two main goals. Our primary goal was to compare systematically the capacity of 3- and 4-year-olds for selective trust. Children were presented with an accurate informant who consistently labeled familiar objects (i.e., a ball, a cup, a book) correctly and an inaccurate informant who consistently labeled these same objects incorrectly. We then administered four different assessments of children's differentiation between the two informants: (i) on two *explicit judgment* trials, we asked them to identify the person who had said something ''wrong''; (ii) on *prediction* trials, children were shown a familiar object (a banana) and asked to predict what the accurate and inaccurate informants would say about it; (iii) on three *ask* trials, children were shown novel objects and were asked if they knew the objects' names; when children demurred, they were prompted, ''I bet one of these people can

help—which one would you like to ask?''; (iv) on three *endorsement* trials (regardless of whom children had asked), each informant responded with a different name for the novel objects (e.g., ''danu'' vs. ''toma'') and children were invited to endorse one of the names: ''What do you think it's called?''

We anticipated that 4-year-olds would display a consistent differentiation between the reliable and unreliable informant. Thus, in line with prior findings (Clément et al., 2004; Koenig et al., 2004), we expected that 4-year-olds would pick out the inaccurate speaker on explicit judgment trials, predict the differential responses of the two informants on prediction trials, and accept information from the reliable informant on endorse trials. In addition, we anticipated that 4-year-olds would seek out information from the reliable informant on ask trials. Such a coherent pattern of selectivity would indicate that 4-year-olds do not just endorse information received from a hitherto accurate informant but also actively seek information from such an informant.

With respect to 3-year-olds, we envisaged two different outcomes. In marked contrast to 4-year-olds, 3-year-olds might display a pervasive failure to distinguish between the two informants. Thus, they might respond indiscriminately on all four types of test trial. Alternatively, 3-year-olds might show some limited sensitivity to the past history of the two informants but fail to use that past history to infer any stable differences in reliability. On that interpretation, 3-year-olds should be accurate on explicit judgment trials insofar as they call for an appreciation of past differences between the informants, but respond indiscriminately on subsequent test trials insofar as they call for an inference about future reliability.

A second goal of Experiment 1 was to examine children's interpretation of the inaccurate informant. Following the series of test trials, children were given an explanation probe. They were asked to explain why the speaker continually said the wrong thing. If children failed to offer a reason, they received the following forced-choice prompt, ''Was it because she didn't know or was it because she was pretending?'' This explanation probe allowed us to examine the nature of children's intentional explanations for the speaker's mistakes. Mistakes made by the inaccurate informant might be interpreted as errors attributable to the speaker's lack of knowledge or as deliberate acts of silliness or pretense. We anticipated that 4-year-olds would focus on the ignorance of the inaccurate informant, in keeping with the selective trust they had shown in earlier studies. Three-year-olds, by contrast, might regard the inaccurate informant's errors as playful rather than as an indication of ignorance. This would help to explain why their display of selective trust was less systematic in earlier studies.

Experiments 2 and 3 were designed to investigate whether children display selective trust when informants differ in their knowledge as opposed to their accuracy. In the experiments described above, children were presented with a dramatic difference between two informants. On three consecutive occasions, one informant proved to be consistently correct in naming objects whereas the other proved to be consistently incorrect. In the absence of a joking or pretend context, this particular type of consistent variation in accuracy between attentive and serious-minded speakers is quite rare. However, consistent differences between speakers in their knowledge are commonplace. Certain interlocutors will frequently appear knowledgeable whereas others will often acknowledge or reveal ignorance. In Experiment 2, the methods used in Experiment 1 were modified in order to examine whether children's selective trust extends to comparisons of knowledgeable versus ignorant informants. In Experiment 3, we asked whether children take the validity of speaker claims to reflect a general trait of trustworthiness. Children were presented with knowledgeable and ignorant speakers who subsequently provided both verbal and nonverbal information about novel objects. If children attribute knowledge and ignorance to speakers as consistent, general traits, they ought to generalize trust across different types of information.

Experiment 1

Method

Participants. Thirty-nine children participated in the study: twenty-one 3-year-olds, $M = 3$ years 6 months and range = 2 years 9 months to 4 years 0 months, and eighteen 4-year-olds, $M = 4$ years 6 months and range = 4 years 1 month to 5 years 1 month. Approximately half of the children were female. All children were recruited from local Head Start and private child-care centers in Cambridge, MA and were tested there by a single experimenter. Approximately 60% of the participants were White, 20% were African American, and 20% were Asian American and most were from primarily middle-class backgrounds.

Materials. The visual stimuli were a series of six video clips, corresponding to three familiarization trials and three test trials. Each clip presented children with the same three college-age actors and a

different object. On each video clip, a female actor wearing a red shirt and a female actor wearing a blue shirt sat at a table, and appeared at the left and right sides of the screen. All trials began when the third female actor placed an object on the table. On *familiarization* trials, the objects were familiar: a ball, a cup, and a book. On *test* trials, the objects were unfamiliar: (1) a colorful, woven object, (2) a white, rubber object, and (3) a red, paper object. The order of trials within familiarization (ball, cup, book) and test periods (woven, rubber, paper object) was maintained across participants.

Design and procedure. To introduce the task, the experimenter indicated a picture of the actors and said, ''I've got these two friends. See? One has a blue shirt and one has a red shirt. They're going to show you some things and tell you what they are called. Let's watch.'' The reliability of the actors' testimony was not mentioned in the introduction.

Familiarization trials. On each of three familiarization trials, children were presented with a clip of the same three actors and a different object. Trials began when the third actor, who stood between them in the center, placed an object on the table and asked each of the labeling actors, ''Can you tell me what this is called?'' On all three familiarization trials, one labeling actor consistently responded correctly. For example, when presented with a ball, the accurate informant said, ''That's a ball.'' The other actor consistently responded incorrectly. For example, in reference to the ball, the inaccurate informant said, ''That's a shoe.'' After both of the actors named the objects, children were asked, ''Can you tell me what this is called?''

For half of the participants the red-shirted actor was consistently reliable, and for the other half the blue-shirted actor was consistently reliable. The seating position (right vs. left side of the screen) of the labelers was counterbalanced within participants so that the reliable and unreliable labelers were never presented on the same side of the screen throughout the entire session.

After familiarization, children were presented with a total of 10 test trials of four types: (i) 2 explicit judgment trials, (ii) 2 prediction trials, (iii) 3 ask trials, and (iv) 3 endorsement trials. Finally, on completion of all test trials, children were presented with an explanation probe.

Test Trials

(i) *Two explicit judgment trials*. Both after the third familiarization trial and at the end of the test session, the experimenter paused, directed children's attention to a still image of the actors on the video monitor, and said ''One of these people was not very good at answering these questions. Which one was not very good at answering questions?''

(ii) *Two prediction trials*. Following the first explicit judgment trial, the experimenter said, ''Let me show you another thing'' and participants were shown a picture of a familiar object (i.e., a banana). Then the still image of the two actors was presented. The experimenter pointed to the red-shirted actor first, regardless of her prior accuracy, and asked, ''What will the person in the red shirt say?'' After the child's response, the experimenter pointed to the blue-shirted actor next and asked, ''What will the person in the blue shirt say?''

(iii) *Three ask trials*. After the two prediction trials, participants were presented with three test trials concerning three novel objects. Before each clip was played, participants were presented with a still image of the novel object for that trial. The experimenter said, ''Do you know what this is called?'' All children but one admitted to not knowing and were prompted: ''I bet one of these people can help—which one would you like to ask?'' The one child who claimed to know was corrected and also prompted: ''Actually, I don't think that's what it's called. I bet one of these people can help—which one would you like to ask?''

(iv) *Three endorsement trials*. After each ask trial, participants were presented with novel endorsement trials. Irrespective of whom children chose to ask, both informants responded with different novel names. In reference to the first novel object, for example, one actor said, ''That's a mido.'' The other actor said, ''That's a loma.'' Children were then asked, ''Can you tell me what this is called, a mido or a loma?'' See Table 1 for a complete list of names and objects.

Explanation probe. Recall that after the last endorsement trial, children were asked the explicit judgment question a second time, ''Which one of these people was not good at answering questions?'' After their response, children were asked, ''Why was she not good at answering questions?'' If children failed to respond or said, ''I don't know,'' they received the following forced-choice prompt: ''Was it because she didn't know or was it because she was pretending?'' The order in which the two choices (i.e., didn't know and pretending) were presented was counterbalanced across participants.

The entire session lasted approximately 5–10 min and was typically videotaped in order to record the spontaneous comments and explanations given by children during the session.

Table 1
Familiarization and Test Stimuli Used in Experiment 1

Familiar objects	Accurate labels	Inaccurate labels
	Familiarization stimuli	
Ball	"That's a ball"	"That's a shoe"
Cup	"That's a cup"	"That's a dog"
Book	"That's a book"	"That's a chair"
Novel objects	**Novel label A**	**Novel label B**
	Test stimuli	
Colorful bamboo object	"That's a mido"	"That's a loma"
White lumpy rubber object	"That's a wug"	"That's a dax"
Red textured paper object	"That's a blicket"	"That's a dawnoo"

Results

We first analyze performance on each of the various types of test question, namely explicit judgment questions, prediction trials, ask trials, endorse trials and the explanation probe. We then look at relations between the various types of test question.

Explicit judgment trials. With respect to measure (i), judgments of explicit accuracy, children were scored for the proportion of explicit judgment questions (out of two) that they answered correctly. A response was coded as correct only if the child appropriately pointed to, or verbally indicated, the previously inaccurate informant. Most 3- and 4-year-olds correctly identified which speaker had previously been inaccurate: 3-year-olds: $M = 0.74$, $SD = 0.37$, $t(20) = 2.91$, $p < .01$; 4-year-olds: $M = 0.83$, $SD = 0.30$, $t(17) = 4.76$, $p < .001$ (two-tailed, in this case and hereafter). No effect of age was found, $t(37) = 0.87$, *ns*. A total of thirteen 3-year-olds (62%) and thirteen 4-year-olds (72%) responded correctly on both explicit judgment questions, 4 children were incorrect on both, and 9 children were correct on one of the questions.

Thus, children were generally accurate in identifying which of the two informants was not very good at answering questions, both immediately after familiarization and again after the test trials. With the exception of one child who did not know which person to indicate, all incorrect responses were errors of identification (i.e., incorrect indications of the previously accurate rather than the inaccurate informant).

Prediction trials. Each child received a score of 0–2, depending on whether they correctly predicted what neither speaker would say (= 0), what the inaccurate speaker would say (= 1), what the accurate speaker would say (= 1), or what both speakers would say (= 2). When asked to predict what the accurate speaker would say, a response was coded as correct only if the child supplied the correct name of the object (e.g., "banana"). Regarding the inaccurate speaker, three types of responses were coded as correct. Given the vast number of false terms available in reference to any object, a child might rightly be at a loss to supply exactly one when asked to predict what a previously inaccurate informant would say. Thus, when asked to predict what the inaccurate speaker would say, children were given credit for a correct response when they (a) indicated that they did not know what the speaker would say, (b) negated the matching label ("not banana," "something else"), or (c) provided a mismatching label ("chair").

Four-year-olds performed better than 3-year-old children on this task, $t(37) = 2.31$, $p = .027$ (independent samples t test). We made the assumption that random responding across the two test trials with a either a correct label or alternatively a "don't know," label negation, or mismatching label would yield a chance score of 1 and a maximum score of 2. As a group, 4-year-olds predicted what the two informants would say at above-chance levels, $M = 1.56$, $SD = 0.61$, $t(17) = 3.83$, $p = .001$, whereas, as a group, 3-year-olds' performance did not differ from chance, $M = 1.10$, $SD = 0.62$, $t(20) = 0.70$, *ns*. Eleven 4-year-olds (61%) correctly predicted what both informants would say by providing the correct label for the accurate speaker and either a mismatching label (e.g., "Christmas tree," "apple," "rainbow") or a response of "I don't know" for the inaccurate speaker. In contrast, six of seven 4-year-olds who responded incorrectly said that both speakers would supply the correct label.

Novel test trials: ask. Children were presented with a still image of the novel object for each novel test trial and asked, "Do you know what this is called?" Children received a score from 0 to 3, depending on how often they correctly indicated the accurate labeler as the person they would like to ask. Coded as incorrect were responses that indicated the previously inaccurate labeler, refusals to respond, and "don't know" responses (on only 7 of 117 trials did children refuse to respond or say "don't know").

Four-year-olds chose to ask the previously accurate labeler for information at above-chance levels, $M = 2.33$, $SD = 0.69$, $t(17) = 5.15$, $p < .0001$, but 3-year-olds' performance did not differ from chance, $M = 1.29$, $SD = 1.00$, $t(20) = 0.98$, *ns*. An independent samples t test confirmed that 4-year-olds performed better than 3-year-old children on this task, $t(37) = 3.73$, $p = .001$.

Novel test trials: endorse. Each child received a score from 0 to 3, depending on how often he or she correctly indicated the reliable labeler's name for an object. A response was coded as correct only if the child appropriately supplied the correct name or rejected the wrong name. A response was considered incorrect if the child (a) supplied the name given by the inaccurate labeler, (b) gave an alternative name for an object, or (c) said "I don't know" (on 8 of 117 endorse trials, children responded with an alternative name or said "don't know").

Four-year-olds supplied the name given by the previously accurate labeler at levels that were above chance, $M = 2.11$, $SD = 1.08$, $t(17) = 2.40$, $p = .028$. Three-year-olds' performance, on the other hand, did not differ from chance, $M = 1.19$, $SD = 1.03$, $t(20) = 1.38$, *ns*, and an independent samples t test confirmed that 4-year-olds performed better than 3-year-olds, $t(37) = 2.72$, $p = .01$.

Children's explanations. Twenty-five of the 39 children, twelve 3-year-olds and thirteen 4-year-olds, provided spontaneous answers to the question, "Why was she not good at answering questions?" Among these participants, 12 children (five 3-year-olds, seven 4-year-olds) provided explanations that referred to speaker ignorance (e.g., "She didn't know the things," "She doesn't know what they are," "She didn't listen"); 3 children (two 3-year-olds, one 4-year-old) posited pretending as the explanation (e.g., "Coz she was being silly," "Maybe because she's sneaky. Sometimes I'm sneaky. I tease my dad sometimes"); 5 children (two 3-year-olds, three 4-year-olds) provided moral or emotional evaluations (e.g., "Blue was good. Blue's my friend. I like blue," "She was not good," "Maybe she was mad at her sister"); and 5 children (three 3-year-olds, two 4-year-olds) provided behavioral descriptions (e.g., "Because she said wrong things," "Because she said 'shoe,'" "Because she had a pink shirt"). In response to the experimenter's open-ended question, the remaining 14 children either did not answer or replied, "I don't know." The experimenter presented these children (nine 3-year-olds, five 4-year-olds) with a counterbalanced, forced-choice prompt (i.e., "Was it because she didn't know or because she was pretending?"). Four children (three 3-year-olds, one 4-year-old) chose "pretending" and 4 children (three 3-year-olds, one 4-year-old) chose "she didn't know." Six children (three 3-year-olds, three 4-year-olds) persisted with "don't know" responses.

In summary, 3- and 4-year-olds performed fairly well on the two explicit judgment trials in which they were asked to indicate: "which speaker was not very good at answering questions." Among those who offered interpretations of the inaccurate speaker's behavior, speaker ignorance was the explanation favored by both age groups. On the intervening test trials, however, consistent age differences emerged. On prediction trials, 4-year-olds exceeded chance expectation whereas 3-year-olds did not. Similarly, on ask and endorse trials, 4-year-olds systematically chose the accurate as opposed to the inaccurate speaker but 3-year-olds were indiscriminate. Finally, when the performance of the two age groups was compared for prediction, ask, and endorse trials, 4-year-olds performed better than 3-year-olds.

Relation between explicit judgment questions and subsequent test trials. To determine whether children did poorly on later test trials because they did not discriminate the sources of information, we compared the performance on prediction, ask, and endorsement trials of children who responded correctly on both explicit judgment questions and those who responded correctly on only one or neither of these questions.

Regardless of 3-year-olds' performance on both explicit judgment questions, their test trial performance remained at chance levels. In contrast, 4-year-olds' performance on test trials was due, in part, to their ability to identify the previously inaccurate informant. A total of thirteen 3-year-olds (62%) and thirteen 4-year-olds (72%) responded correctly on both explicit judgment questions. However, test trial performance was significantly above chance within this group for 4-year-olds (prediction: $M = 0.81$, $SD = 0.32$; ask: $M = 0.85$, $SD = 0.17$; endorse: $M = 0.82$, $SD = 0.26$; all p-values $< .01$) but not for 3-year-olds (prediction: $M = 0.57$, $SD = 0.34$; ask: $M = 0.49$, $SD = 0.37$; endorse: $M = 0.46$, $SD = 0.35$; all p-values $> .1$). A total of eight 3-year-olds and five 4-year-olds failed to answer both explicit judgments correctly. Overall, these 13 children performed at chance levels on the prediction trials ($M = 0.58$, $SD = 0.27$), $t(12) = 1.00$, *ns*, ask trials ($M = 0.44$, $SD = 0.28$), $t(12) = 0.811$, *ns*, and endorse trials ($M = 0.33$, $SD = 0.36$), $t(12) = 1.67$, *ns*.

Discussion

Consistent with prior research (Clément et al., 2004; Koenig et al., 2004), 4-year-olds picked out the informant who had been inaccurate in the past, predicted whether each informant would be accurate or inaccurate in the future, and preferentially endorsed the labels provided by the accurate informant. Moreover, 4-year-olds were not just selective in their reception of information; they also preferred to direct their questions to the accurate informant on ask trials.

In contrast to 4-year-olds, 3-year-olds failed to predict the informants' future behavior and failed to ask for and endorse information from the accurate informant. In spite of their poor performance on test trials, 3-year-olds did perform fairly well on measure (i)—the explicit judgment trials. This helps to clarify the mixed pattern of results discussed previously. Given that 3-year-olds successfully identified the unreliable informant on the explicit judgment trials at a rate that did not differ from 4-year-olds, it is unlikely that 3-year-olds' difficulty was in differentiating informants based on their past accuracy. Indeed, even 3-year-olds who answered both explicit judgment questions accurately did not proceed to display selective responding on the prediction, ask, and endorse trials. Moreover, some 3-year-olds could offer appropriate explanations for the behavior of the inaccurate informant. This pattern of results suggests that 3-year-olds have difficulty using information about a speaker's past inaccuracy when deciding whom to trust for future information.

Why were 3-year-olds indiscriminate on all three measures? Arguably, they did not take the false labeler seriously. They may have thought that an adult must be joking or pretending when she looked at a ball and called it a ''shoe.'' However, this interpretation seems unlikely given that ''pretending'' was not the preferred explanation of 3-year-olds. Moreover, the informants' demeanor was serious and children rarely laughed or gave other indications that they found the mistaken behavior funny.

A more plausible explanation, however, does concern the use of false labels in our study. People generally present young children with accurate names and descriptions. In fact, without this tradition, it is difficult to imagine how word learning could begin (Clark, 1993). In serious contexts, accurate labeling by adults may become an entrenched expectation among young children. Note that errors in the prediction task typically came in the form of crediting both adults as accurate informants. Children of this age may lack the conceptual tools needed to explain false statements that are produced seriously and sincerely. Such statements typically stem from people who hold false beliefs. A large body of research indicates that 3-year-olds, unlike 4-year-olds, are not able to anticipate mistaken utterances or attribute them to a speaker's false beliefs (Perner, Leekam, & Wimmer, 1987; Wellman, Cross, & Watson, 2001; Wimmer & Perner, 1983).

Another plausible explanation is that 3-year-olds' indiscriminate trust is due to their general inability to monitor the relationship between knowledge and access to particular sources of information. Several studies have found that 3-year-olds are poorer at differentiating sources of information than are 4-year-olds (Gopnik & Graf, 1988; O'Neill & Chong, 2001; O'Neill & Gopnik, 1991; Wimmer, Hogrefe, & Sodian, 1988). For example, when asked to report how they had learned the contents of a drawer, 3-year-olds were more likely than 4- and 5-year-olds to incorrectly claim that they had seen the object in the drawer when they had in fact been told about it (Gopnik & Graf, 1988). Hence, in Experiment 1, 3-year-olds' difficulty in choosing between different sources of information may stem from their limited ability to recognize that particular pieces of information are provided by particular sources and, more specifically, that reliable information tends to be provided by an accurate source whereas unreliable information tends to be provide by an inaccurate source. If 3-year-olds fail to monitor sources in this fashion, they might seek and endorse information indiscriminately even in the face of knowledge about the past reliability of a given source.

In Experiment 2, we tested these competing explanations by removing false labels from the procedure and presenting 3- and 4-year-olds with informants who were either knowledgeable or ignorant. Young children have proven sensitive to cues that signal differences in speaker knowledge (O'Neill, 1996; Sabbagh & Baldwin, 2001). In addition, 3-year-olds are generally more accurate in attributing ignorance than in attributing false beliefs (Hogrefe, Wimmer, & Perner, 1986; Perner & Wimmer, 1988). If 3-year-olds are puzzled by mistaken informants but not by ignorant ones, they should display selective trust toward a knowledgeable as opposed to an ignorant informant. If, on the other hand, they are generally deficient at monitoring good and bad sources of information, they should continue to respond indiscriminately.

Experiment 2

Method

Participants. Forty-two children participated in the study: twenty 3-year-olds, $M = 3$ years 7 months and range = 2 years 8 months to 4 years 0 months, and twenty-two 4-year-olds, $M = 4$ years 6 months and range = 4 years 1 month to 5 years 3 months. Approximately half of the children were female. All children were recruited from local Head Start and private child-care centers in Cambridge, MA. Approximately 60% of participants were White, 25% were African American, and 15% were Asian American; all were from middle-class backgrounds.

Design and procedure. The design and procedure were identical to those of Experiment 1 except that, during familiarization, children heard one informant name each object accurately (e.g., ''I like to play with it. It's a ball'') and the other informant repeatedly claim ignorance (e.g., ''I like to play with it. I don't know what it's called''). Again, children were given four different assessments of their differentiation between the two informants. They were given (i) an explicit judgment question on two occasions about which informant was ''not very good'' at answering the third actor's questions and were asked (ii) to predict what each informant would say regarding a final familiar object. In the period that intervened between the two explicit judgment questions, an identical test phase involving novel names and objects was presented during which children were invited (iii) to ask one of the informants for help and (iv) to offer an endorsement of one or the other of the conflicting names provided. Finally, after the last explicit judgment question, children were asked to explain why the unreliable labeler was not very good at answering questions.

Results

Explicit judgment trials. With respect to measure (i), explicit judgments of reliability, both age groups correctly picked out the unreliable informant. As in Experiment 1, 3-year-olds ($M = 0.78$, $SD = 0.34$, $t(19) = 3.58$, $p < .005$) and 4-year-olds ($M = 0.89$, $SD = 0.31$, $t(21) = 5.92$, $p < .0001$) identified the unreliable informant at above-chance levels. Again, there was no effect of age, $t(40) = 1.11$, *ns*.

Thus, children were generally accurate in identifying which of the two informants was not very good at answering questions, both immediately after familiarization and again after the test trials. All incorrect responses were errors of identification (i.e., incorrect indications of the previously knowledgeable rather than the ignorant informant).

Prediction trials. We applied a coding scheme similar to that of Experiment 1. Each child received a score of 0–2, depending on whether they correctly predicted what neither speaker would say (= 0), what the ignorant speaker would say (= 1), what the knowledgeable speaker would say (= 1), or what both speakers would say (= 2). When asked to predict what the knowledgeable speaker would say, a response was coded as correct only if the child supplied the correct name of the object (i.e., ''banana''). For the ignorant speaker, three types of responses were coded as correct. When asked to predict what the ignorant speaker would say, children were credited with a correct response when they (a) indicated that the speaker would not know, (b) negated the matching label (e.g., ''not banana,'' ''nothing,'' ''a mistake''), or (c) provided a mismatching label (e.g., ''ghost,'' ''cup''). Failures to respond and ''I don't know'' responses were coded as incorrect.

There was no age difference between 3- and 4-year-olds on this task, $t(40) = 0.377$, *ns* (independent samples *t* test). Three-year-olds predicted what both the knowledgeable and ignorant informants would say at levels that were above chance, $M = 1.50$, $SD = 0.76$, $t(19) = 2.94$, $p = .008$, as did 4-year-olds, $M = 1.41$, $SD = 0.80$, $t(21) = 2.41$, $p = .025$. Thirteen 3-year-olds (65%) correctly predicted what both the accurate and the inaccurate informant would say as did 13 (59%) 4-year-olds. Four children (three 4-year-olds and one 3-year-old) predicted that both speakers would provide the accurate label and 7 children (four 4-year-olds and three 3-year-olds) made contrasting but incorrect predictions.

Novel test trials: ask. Children were presented with a still image of the novel object for each novel test trial and were asked, ''Do you know what this is called?'' Children received a score from 0 to 3, depending on how often they correctly indicated the accurate labeler as the person they would like to ask. Coded as incorrect were responses that indicated the previously ignorant labeler, refusals to respond, and ''don't know'' responses (on only 3 of 126 trials did children refuse to respond or say ''don't know'').

Children from both age groups chose to ask the previously knowledgeable labeler for information at above-chance levels—4-year-olds: $M = 2.18$, $SD = 1.00$, $t(21) = 3.17$, $p = .005$; 3-year-olds: $M = 2.05$, $SD = 0.89$, $t(19) = 2.77$, $p = .012$—and an independent samples *t* test did not reveal an age difference, $t(40) = 0.48$, *ns*.

Novel test trials: endorse. Each child received a score from 0 to 3, depending on how often he or she correctly indicated the knowledgeable labeler's name for an object. A response was considered incorrect if the child (a) supplied the name given by the ignorant labeler, (b) gave an alternative name for an object, or (c) said ''I don't know.'' On 4 of 126 trials, either alternative names were provided or children responded that both terms (e.g., ''mido'' and ''danu'') were correct. These responses were coded as incorrect.

Four-year-olds endorsed the name supplied by the previously accurate labeler at levels that were above chance, $M = 1.91$, $SD = 0.87$, $t(21) = 2.21$, $p = .038$. Three-year-olds' performance, on the other hand, did not differ from chance, $M = 1.75$, $SD = 0.85$, $t(20) = 1.31$, $p = .204$, but no age difference was found, $t(40) = 0.59$, *ns*.

Relation between explicit judgment questions and endorse trials. As in Experiment 1, to determine whether 3-year-olds did poorly on later test trials because they failed to discriminate the sources of information, we examined the performance on endorse trials of 3-year-olds who responded correctly on both explicit judgment questions. A total of thirteen 3-year-olds (65%) responded correctly on both explicit judgment questions. For 3-year-olds in this group, performance failed to reach significance on endorse trials ($M = 0.62$, $SD = 0.27$), $t(12) = 1.56$; $p = .145$. Thus, 3-year-olds' performance on endorse trials remained at chance levels regardless of their prior performance on explicit judgment questions.

Children's explanations. Twenty-eight of 42 children, eleven 3-year-olds and seventeen 4-year-olds, provided spontaneous answers to the question, ''Why was she not good at answering questions?'' Among these participants, 19 children (seven 3-year-olds, twelve 4-year-olds) provided explanations that referred to speaker ignorance (e.g., ''Maybe she really didn't know,'' ''She didn't know. I could teach her. This is not hard stuff. Some of them I know,'' ''Some people don't know how to answer questions''), 4 children (all 4-year-olds) provided moral, emotional, or motivational explanations (e.g., ''Blue is not good,'' ''Because she was mad,'' ''Because she wanted to''), and 5 children (four 3-year-olds, one 4-year-old) provided behavioral descriptions (e.g., ''Maybe she couldn't talk that well,'' ''Because she sat in that spot,'' ''Because she had a pink shirt''). Note that no child spontaneously offered ''pretending'' as an explanation for the informant's behavior. The remaining 14 children either did not answer the open-ended question or replied ''I don't know.'' The experimenter presented these children with a forced-choice prompt (i.e., ''Was it because she didn't know or because she was pretending?''). Four children (two 3-year-olds, two 4-year-olds) chose ''pretending,'' 3 children (two 3-year-olds, one 4-year-old) chose ''she didn't know,'' and the remaining 7 children persisted with ''I don't know'' responses.

In summary, 3- and 4-year-olds alike accurately picked out the unreliable speaker and, as in Experiment 1, favored ignorance as an explanation of her behavior. On the intervening test trials, no consistent age differences were found. Four-year-olds exceeded chance on prediction, ask, and endorse trials. Three-year-olds exceeded chance on prediction and ask trials but only approached above-chance levels on the endorse trials. Direct comparison of the two age groups revealed no age difference on any of the various types of test trial.

Discussion

Experiment 2 demonstrates that 3- and 4-year-olds can (i) distinguish between knowledgeable and ignorant informants, (ii) predict their future assertions, and (iii) seek information from a knowledgeable informant. Four-year-olds, but not 3-year-olds, also selectively endorsed the claims of the knowledgeable informant.

The age difference in Experiment 1 cannot be attributed to a general inability on the part of 3-year-olds to monitor different sources of information because, as shown in Experiment 2, 3-year-olds successfully predicted who would report ignorance and who would report knowledge of the object names and proceeded to seek information from the hitherto knowledgeable informant. Thus, Experiment 2 provides evidence that both age groups rapidly appraise an individual's past reliability and use that appraisal to anticipate and approach trustworthy informants in the future. The specific ability that does appear to develop over time is the realization that different kinds of unreliability are relevant for future trustworthiness. Note that the behavior of the trustworthy informant was identical across Experiments 1 and 2; only the behavior of the unreliable informant varied between studies. Three-year-olds selectively asked the trustworthy informant and somewhat less systematically learned from that informant when the alternative informant was ignorant (Experiment 2) but not when the alternative informant was inaccurate (Experiment 1). Indeed, we compared children's proportional scores on each test trial type (prediction, ask, and endorse trials) in a statistical comparison of Experiment 1 versus 2. This analysis revealed a significant Age $\times$ Experiment interaction, $F(1, 77) = 6.84$, $p < .02$. When each age group was analyzed separately, 3-year-olds of Experiment 2 performed better than those of Experiment 1 on prediction, ask, and endorse trials, $F(1, 40) = 11.38$, $p < .005$, whereas 4-year-olds performed similarly across the two studies, $F(1, 39) = 0.695$, *ns*.

Experiments 1 and 2 demonstrated that children are able to selectively trust information from reliable speakers over that provided by unreliable speakers. The primary aim of Experiment 3 was to examine the scope of this trust. It could be that children's choices and predictions derive from a very narrow evaluation of the reliable informant as someone who happened to have a correct knowledge of names, and thus would likely provide correct names in the future. Under this possibility, children would learn names selectively from the reliable informant but, without a more general attribution of reliability or

trustworthiness, they would prove indiscriminate when learning about a different topic, for example, how novel objects function. In fact, much of the relevant literature on trait-based reasoning suggests that children of this age do not readily attribute dispositions or traits to explain behavior (Kalish, 2002; Miller & Aloise, 1989; Ruble & Dweck, 1995). On the other hand, children might treat the reliable informant as generally knowledgeable. If this were the case, children should seek information about both object names and functions from the previously knowledgeable informant and endorse the information, of both types, that she provides. In line with this possibility is the finding that when provided with multiple examples of consistent past behavior and sensitive response measures, young children can indeed predict consistency across situations (Cain, Heyman, & Walker, 1997). If children treat someone who is knowledgeable about object names as a reliable source regarding other types of information, such as object functions, this would suggest that children's trust guides learning beyond the domain for which they observed differential reliability. Accordingly, in Experiment 3 we assessed whether children's attributions extend to both verbal and nonverbal information.

Experiment 3

Method

Participants. Thirty-eight children participated in the study: twenty 3-year-olds, $M = 3$ years 6 months and range = 2 years 11 months to 4 years 3 months and eighteen 4-year-olds, $M = 4$ years 9 months and range = 4 years 4 months to 5 years 4 months. Approximately half of the children were female. Children were tested by a single experimenter at their preschools or in the laboratory. Approximately 80% of participants were White, 8% were African American, and 11% were Asian American; all were from middle- to upper-class backgrounds.

Materials. The visual stimuli were a series of seven video clips, corresponding to three familiarization trials and four test trials (two function and two name trials). Each clip presented children with the same three actors and a different object. On each video clip, a female actor wearing a red shirt and a female actor wearing a blue shirt sat at a table, and appeared at the left and right sides of the screen. All trials began when the third female actor placed an object on the table. On *familiarization* trials, the objects were familiar: a ball, a cup, and a book. On *test* trials, the objects were unfamiliar. Two objects were used on function trials: (1) a colorful, woven object and (2) a black object with a threaded stem on one end and a round opening on the other. Two objects were used on name trials: (1) a large photograph of a reddish, rubber faucet head and (2) a large photograph of a standing garlic press. The order of familiarization trials (ball, cup, book) was maintained across participants. The order of test trials was counterbalanced: half of the participants were first presented with function trials and half were first presented with name trials.

Design and procedure. To minimize the potential disruption that any given object might introduce during the task, the experimenter allowed children to examine all of the experimental objects and photos before the study began. After these stimuli were put away, the experimenter introduced the task by indicating a picture of the actors, ''I've got these two friends. See? One has a blue shirt and one has a red shirt. They're going to show you some things and tell you what they are called. Let's watch.'' The reliability of the actors' testimony was not mentioned in the introduction.

Familiarization trials. On each of three familiarization trials, children were presented with a clip of the same three actors and a different object. Trials began when the third actor, who stood between them in the center, placed an object on the table and asked each of the labeling actors, ''Can you tell me what this is called?'' On all three familiarization trials, one labeling actor consistently responded correctly. For example, when presented with a ball, the accurate informant said, ''That's a ball.'' The other actor consistently responded with ignorance. For example, in reference to the ball, the ignorant informant said, ''I don't know what it's called.'' After both of the actors had commented on the object, children were asked, ''Can you tell me what this is called?''

For half of the participants the red-shirted actor was consistently reliable, and for the other half the blue-shirted actor was consistently reliable. The seating position (right vs. left side of the screen) of the labelers was counterbalanced within participants so that the reliable and unreliable labelers were never presented on the same side of the screen throughout the entire session.

After the familiarization period, children were presented with a total of 10 test questions of three types: (1) 2 explicit judgment questions, (2) 4 ask probes (2 concerning names and 2 concerning functions), and (3) 4 endorsement probes (2 concerning names and 2 concerning functions). To ensure that the overall length of the procedure remained manageable for both 3- and 4-year-olds, the prediction trials were omitted.

Two explicit judgment Questions. Both after the third familiarization trial and at the end of the test session, the experimenter paused, directed children's attention to a still image of the actors on the video monitor, and said, ''One of these people was not very good at answering these questions. Which one was not very good at answering questions?''

Four novel test trials. After the first explicit judgment question, participants were presented with 4 test trials—two function trials, two name trials—concerning a series of four novel objects. On each trial, children's trust was assessed with two probes: an ask probe and an endorsement probe. Test trial presentation was counterbalanced so that half of the participants received name trials followed by function trials. The other half of the participants were presented with function trials followed by name trials.

Name trials: ask probe. Before the video clip was played, participants were presented with a still image of the novel object for that trial. The experimenter asked, ''Do you know what this is called?'' Children who admitted to not knowing were prompted: ''I bet one of these people can help—which one would you like to ask?'' Children who claimed to know were corrected and also prompted: ''Actually, I don't think that's what it's called. I bet one of these people can help—which one would you like to ask?''

Name trials: endorsement probe. Irrespective of whom children chose to ask, both informants responded with different novel names. In reference to one novel object, for example, one actor said, ''That's a mido.'' The other actor said, ''That's a loma.'' Children were then asked, ''Can you tell me what this is called, a mido or a loma?''

Function trials: ask probe. Before playing the video clip, participants were presented with the novel object for that trial. The experimenter asked, ''Do you know what this is for?'' Children who admitted to not knowing were prompted, ''I bet one of these people can help—which one would you like to ask?'' Children who claimed to know were corrected and also prompted: ''Actually, I don't think that's what it's for. I bet one of these people can help—which one would you like to ask?''

Function trials: endorsement probe. Again, regardless of whom children chose to ask, both informants responded nonverbally by demonstrating different novel functions. In reference to one of the novel objects, one actor said, ''You do this with it'' and demonstrated a sweeping action on top of the table. The other actor said, ''You do this with it,'' put it to her lips, and treated it like a windblown instrument. Children were asked, ''Can you show me what this is for?'' See Table 2 for a complete list of test objects, names, and functions.

After the four test trials, children were given the second explicit judgment trial in which they were asked, ''One of these people was not very good at answering questions. Which one was not good at answering questions?''

Explanation probe. After children responded to the final explicit judgment question, children were asked, ''Why was she not good at answering questions?'' If children did not reply or said, ''I don't know,'' they were presented with a forced-choice question, ''Was it because she really didn't know or because she was just pretending?''

Awareness probe. To assess their awareness of the source of their knowledge, children were asked, ''You knew what a lot of objects do and what they are called! How did you know those things?''

The entire session lasted approximately 5–10 mins and was typically videotaped.

Results

Explicit judgment trials. Children were scored for the proportion of explicit judgment questions (out of two) that they answered correctly. A response was coded as correct only if the child appropriately pointed to, or verbally indicated, the previously ignorant informant. Most children correctly identified which informant had been ignorant in the past. Both 4-year-olds ($M = 0.94$, $SD = 0.16$), $t(17) = 11.66$, $p < .0001$, and 3-year-olds ($M = 0.93$, $SD = 0.24$), $t(19) = 7.77$, $p < .0001$, performed at above-chance levels. There was no effect of age, $t(36) = 0.286$, *ns*.

Table 2
Test Stimuli Used in Experiment 3

Novel test objects (photographs)	Novel label A	Novel label B
Red, rubber, faucet attachment	''That's a mido''	''That's a loma''
Garlic press, standing upright	''That's a blicket''	''That's a dawnoo''
Novel test objects (real objects)	**Novel function A**	**Novel function B**
Colorful bamboo object with long tubes	Sweeping	Playing like a wind instrument
Black object shaped like a screw on one end with a hole on the other	Spinning	Looking through hole

Again, children were generally accurate in identifying which of the two informants was not very good at naming the objects, both immediately after familiarization and again after the test trials.

Name trials: ask. Children were presented with a still image of the novel object for each of two name trials and asked, ''Do you know what this is called?'' In response, all children admitted to not knowing and were prompted: ''I bet one of these people can help—which one would you like to ask?'' Children received a score of 0–2 on name trials, depending on how often they correctly indicated the knowledgeable person as the person they would like to ask about the novel objects' names. Coded as incorrect were responses that indicated the previously ignorant labeler, refusals to respond, and ''don't know'' responses. On 100% of ask trials, children clearly indicated the knowledgeable or ignorant informant.

Four-year-olds' performance was above chance, $M = 1.44$, $SD = 0.70$, $t(17) = 2.68$, $p = .016$, and 3-year-olds indicated the knowledgeable informant at a level that was marginally significant, $M = 1.30$, $SD = 0.73$, $t(19) = 1.83$, $p = .08$. No significant age difference was found, $t(36) = 0.62$, *ns*.

Name trials: endorse. Next, children were scored for the proportion of endorse trials (out of two) on which they chose to accept the name offered by the knowledgeable informant. A response was coded as correct only if the child appropriately supplied the correct name or rejected the wrong name. A response was considered incorrect if the child (a) supplied the name given by the ignorant labeler, (b) gave an alternative name for an object, or (c) said ''I don't know.'' On only 4 of 76 trials, children provided an alternative name.

Three-year-olds supplied the name of the previously accurate labeler at levels that were above chance, $M = 1.35$, $SD = 0.67$, $t(19) = 2.33$, $p = .031$, as did 4-year-olds, $M = 1.39$, $SD = 0.70$, $t(17) = 2.36$, $p = .03$. No significant age difference was found, $t(36) = 0.172$, *ns*.

Function trials: ask. Children were presented with each novel object for two function trials and were asked, ''Do you know what this is for?'' On function trials, children were scored for the proportion of ask trials (out of two) on which they chose to ask the previously knowledgeable informant. Coded as incorrect were responses that indicated the previously ignorant labeler, refusals to respond, and ''don't know'' responses. On 100% of ask trials, children clearly indicated the knowledgeable or ignorant labeler.

Both 3-year-olds, $M = 1.35$, $SD = 0.74$, $t(19) = 2.10$, $p = .049$, and 4-year-olds performed at above-chance levels, $M = 1.50$, $SD = 0.62$, $t(17) = 3.43$, $p = .003$. No significant age difference was found, $t(36) = 0.77$, *ns*.

Function trials: endorse. Next, children were scored for the proportion of endorse trials (out of two) on which they chose to accept the function offered by the knowledgeable informant. Responses were coded as correct only if children performed the function offered by the reliable informant, indicated the knowledgeable informant (e.g., ''what red did''), or appropriately negated the ignorant informant or the function she offered (e.g., ''not what the blue shirt did''). Incorrect responses included selection of the function given by the previously ignorant informant, selection of the ignorant informant, and incorrect negations of the knowledgeable informant (on only 1 of 76 endorse trials did a child provide an alternative function).

Three-year-olds' performance was above chance, $M = 1.35$, $SD = 0.59$, $t(19) = 2.66$, $p = .015$, as was 4-year-olds' performance, $M = 1.56$, $SD = 0.70$, $t(17) = 3.34$, $p = .004$. There was no significant age difference, $t(36) = 0.79$, *ns*.

Children's explanations. Thirty-two of 38 children, sixteen 3-year-olds and sixteen 4-year-olds, provided spontaneous answers to the question, ''Why was she not good at answering questions?'' Among these participants, 25 children (ten 3-year-olds, fifteen 4-year-olds) provided explanations that referred to speaker ignorance (e.g., ''She didn't know what they were,'' ''She wasn't too smart,'' ''She never saw them before,'' ''She didn't know anything''), 5 children (four 3-year-olds, one 4-year-old) provided behavioral descriptions (e.g., ''She didn't have the red shirt on,'' ''She was not answering''), and two 3-year-olds provided a motivational explanation (e.g., ''Because she didn't want to say it''). Again, as in Study 2, children did not spontaneously offer ''pretending'' as an explanation for the informant's behavior. The remaining 6 children either did not answer the open-ended question or replied, ''I don't know.'' The experimenter presented these children with a forced-choice prompt (i.e., ''Was it because she didn't know or because she was pretending?''). Two 4-year-olds chose ''pretending'' and three 3-year-olds chose ''she didn't know.'' One 3-year-old persisted with a ''don't know'' response.

Awareness questions. To assess children's awareness of their selective learning strategy, the experimenter said, ''You knew what a lot of objects do and what they're called. How did you know all those things?'' Seventeen children said that they ''didn't know'' how they knew, 7 children said that they were ''just guessing,'' and 6 children said they knew because of their own intelligence (e.g., ''Coz I'm

smart,'' ''I have a smart brain,'' ''I didn't know at first but then I knew. . .''). Four children indicated that they knew because of some relevant perceptual experience (e.g., ''I have lots of books and stuff at home,'' ''By the shape of it, you can tell that it's for looking''). Of primary importance, we found that only 4 children attributed their knowledge to the testimony of the informants (e.g., ''Coz she (blue) told us!,'' ''Because they said it,'' ''Because I heard it!,'' ''Because they do everything'').

In summary, 3- and 4-year-olds alike accurately picked out the unreliable speaker and, as in Study 2, favored ignorance as an explanation of her behavior. On the intervening test trials, no consistent age differences were found. Children of both ages generally performed at above-chance levels on name and function trials, regardless of whether they were asking or endorsing the knowledgeable informant. In spite of this successful performance, children generally failed to report that the knowledge they acquired derived from one of the two informants. Caution should be exercised with respect to this latter finding, however. Given that this question was asked once at the end of the experiment, children may not have understood that they were being asked about the new information that they had learned during the experiment (rather than the names they were already familiar with at the outset).

Relation between name and function trials. To examine the extent to which children generalized from names to functions, children's responses to function test trials were examined in relation to their answers to the name trials. Children were scored for the proportion of name and function probes on which they selected the previously knowledgeable informant. Data were examined in a two-way ANOVA with a between-subjects factor of age (3, 4) and a within-subjects factor of trial content (name or function). There was no effect of age, $F(1, 36) = 0.83$, *ns*, or trial content, $F(1, 36) = 0.60$, *ns*. Furthermore, there was no difference between children's tendency to Ask the knowledgeable informant on Name ($M = 0.68$, $SD = 0.36$) as compared with Function ($M = 0.71$, $SD = 0.34$) trials, $t(37) = 0.495$, *ns*. Similarly, there was no difference between children's tendency to Endorse the knowledgeable informant on Name ($M = 0.68$, $SD = 0.34$) as compared with Function ($M = 0.72$, $SD = 0.32$) trials, $t(37) = 0.62$, *ns*.

Next, we compared the test trial performance of two subgroups: those who responded correctly on 3–4 name trials (twelve 3-year-olds, ten 4-year-olds) and those who responded correctly on 0–2 name trials (eight 3-year-olds, eight 4-year-olds). Children who performed well on name trials, with 3–4 correct, performed at above-chance levels on function trials ($M = 3.27$, $SD = 0.88$), $t(21) = 6.76$, $p \leqslant .0001$. Children who responded poorly on name trials with 0–2 correct responded at chance levels on function trials ($M = 2.31$, $SD = 0.79$), $t(15) = 1.57$, *ns*. Thus, these analyses indicate that the children treated the reliable informant as generally knowledgeable about both names and functions.

Discussion

In Experiments 1 and 2, children's extensions of selective trust were restricted to decisions about object labels. To examine the scope of children's selective trust in Experiment 3, children were familiarized with knowledgeable and ignorant labelers. They were then invited to learn different types of information from them—object labels as well as object functions. Children of both age groups preferentially directed their labeling and function questions to the knowledgeable speaker and went on to accept new labels and new functions from this person. Furthermore, when asked to explain the behavior of the unreliable informant, children gave predominantly epistemic explanations.

One unexpected finding was that children were very accurate on the explicit judgment questions in Experiment 3 as compared with Experiments 1 and 2. For example, 34 out of 38 children (89%) answered both questions correctly. Sampling differences may explain this variation. A plausible alternative possibility, however, is that children's explicit judgments were facilitated because they had been given an opportunity to examine the stimulus objects before the start of the study. This procedural change may have enabled them to devote more attention to the informants and to thereby distinguish them more accurately. Whatever the exact explanation, it would be advisable in future studies to let children scrutinize the stimulus objects and the informants before they move on to the familiarization trials. Finally, to avoid any hint that the speakers should be judged in moral terms, it would be advisable to ask them ''Which person did not tell us what the things were called?'' rather than ''Which person was not very good at answering questions?''

These results suggest that preschool children may be able to attribute knowledge and ignorance to speakers as epistemic traits. This interpretation is consistent with recent research, which demonstrates that trait-based reasoning is an ability that emerges in the preschool years. In labeling tasks that encouraged children to think categorically about people or their characteristics, children made trait-based

inferences (Gelman & Heyman, 1999; Heyman & Gelman, 1999). Cain et al. (1997) provided 4- to 5-year-old children with multiple pieces of consistent information about a person's past moral behavior and asked them to predict their future behavior in various sociomoral, intellectual, and athletic situations. Children predicted that people who had displayed positive social behaviors would behave prosocially in various future situations. Children also judged that people who displayed prosocial behaviors would prove to be more intelligent and athletic than those who treated others poorly. As we will discuss later, the present findings are also consistent with the possibility that young children make attributions in relatively global terms (Rholes & Ruble, 1984; Stipek & Daniels, 1990).

General Discussion

Experiment 1 showed that both 3- and 4-year-olds distinguish between accurate and inaccurate informants but only 4-year-olds use that judgment to (i) predict their future assertions, (ii) seek information from the hitherto more accurate speaker, and (iii) endorse her claims. Experiment 2 demonstrated that 3- and 4-year-olds distinguish between knowledgeable and ignorant informants and that both age groups use that judgment to display selective trust. Finally, in Experiment 3, children trusted a knowledgeable over an ignorant informant when learning both new object names and functions.

We consider three important implications of these findings. First, we consider the differential pattern of sensitivity displayed by 3- as compared with 4-year-olds in relation to the development of their social cognition and source-monitoring abilities. Second, we discuss the ways in which children's performance on the present tasks differs from and extends previous work in this area by focusing on stable rather than transient variation among individuals in their reliability. Finally, we ask about the nature of the process by which children establish selective trust and the scope of that trust once it is established.

In Study 1, children were presented with an informant who described objects in ways that conflicted with the descriptions of both the child and the accurate informant. Three-year-olds proved sensitive to these differences in behavior and described them accurately. Specifically, they rejected false labels and encoded the identity of the individual who produced them. However, 3-year-olds failed to systematically query and accept subsequent novel information from the accurate informant over the inaccurate informant. Even when analysis was confined to those 3-year-olds who answered both explicit judgments correctly, no evidence of selective trust emerged. Thus, although 3-year-olds rejected false labels and successfully identified the inaccurate speaker's past behavior, these abilities were not enough to support extensions of selective trust when evaluating novel information. We speculate that in order to extend trust to reliable over unreliable informants, children must be able to conceptualize speakers' mistakes in epistemic terms.

It is noteworthy that 3-year-olds did not favor silliness or pretending as explanations of a speaker's behavior, providing evidence that they took the speaker's false labels seriously. There are two remaining explanations of a speaker who seriously produces mistaken utterances. One explanation is that the speaker has false beliefs about the names of objects and is reporting those false beliefs. Another possibility is that the speaker has correct beliefs about object names but is misreporting those beliefs, perhaps, because they are lying. Many 3-year-olds lack the conceptual tools needed to invoke either of these possibilities. Children of this age have difficulty attributing deceptive intent to liars (Lee, Cameron, Doucette, & Talwar, 2002; Peterson, Peterson, & Seeto, 1983; Strichartz & Burton, 1990) and it is well documented that they struggle under a variety of conditions to identify false beliefs in others (Moses & Flavell, 1990; Perner et al., 1987; Wellman et al., 2001; Wimmer & Perner, 1983). Thus, children who lack the conceptual resources to explain such false labeling may lack sufficient reason to mistrust this person in the future. Preliminary support for this interpretation comes from the finding that when false labels were removed from the procedure and replaced by explicit reports of ignorance (Experiments 2 and 3), children readily made appropriate judgments about whom (not) to trust. This result is consistent with the finding that 3-year-olds are generally more accurate in attributing ignorance than in attributing false beliefs (Hogrefe et al., 1986; Perner & Wimmer, 1988).

Before turning to the development of source monitoring, it is worth considering an alternative, potentially more parsimonious interpretation of the selective trust displayed by 3-year-olds in Experiments 2 and 3 but not in Experiment 1. Arguably, the key difference between the studies was that the unreliable informant in Studies 2 and 3 offered no names during familiarization trials. Thus, from the perspective of 3-year-olds, there was only one supplier of names in Studies 2 and 3 and they turned to her on test trials to learn new names. There are three reasons for doubting this interpretation. First, on the

prediction trials of Experiment 2, 3-year-olds often recognized not just that the ignorant speaker would fail to supply a name but also that she would acknowledge or convey ignorance. Thus, 3-year-olds did not simply demur or say ''I don't know'' when asked what the ignorant speaker would say; they explicitly stated that she would not know or would make a mistake. Second, in both Studies 2 and 3, half of the 3-year-olds providing an explanation referred to speaker ignorance when explaining why the informant was ''not very good at answering questions.'' Finally, in Experiment 3, 3-year-olds treated the ignorant speaker as an unreliable model of nonverbal behavior, not just as a poor supplier of names. In sum, we conclude that when 3-year-olds displayed selective trust, they turned to someone whom they deemed to be better informed. They did not narrowly construe the reliable informant as the sole supplier of names. Nevertheless, as we discuss in more detail below, the exact process by which that selective trust is established warrants further analysis.

The competence of 3-year-olds in Studies 2 and 3 sheds light on the early development of source monitoring. In experimental tasks that probe children as to whether they learned a new fact by seeing, hearing, inferring, or touching, 3-year-olds typically struggle to identify and report the appropriate information source (Gopnik & Graf, 1988; O'Neill, Astington, & Flavell, 1992; Taylor et al., 1994). However, in contexts that present children with human speakers as communication sources, sources that are ubiquitous and pivotal in the lives of young language learners, children demonstrate greater proficiency. In the present studies, children preferred to trust a previously knowledgeable over an ignorant speaker when learning both verbal and nonverbal information. In addition, young children are more likely to learn new words from speakers who express confidence when labeling than from uncertain speakers (Sabbagh & Baldwin, 2001). They recognize that proper nouns, rather than common nouns, name entities that are known only by people with the relevant past experience (Birch & Bloom, 2002). Furthermore, young children reject testimony from an informant who is less informed than they are (Robinson & Whitcombe, 2003). Thus, in contrast to the deficits found in standard source-monitoring experiments, children as young as 3 years of age demonstrate significant skill when evaluating information that has come from a more or less trustworthy communication source. It may be that young children first discriminate between different people as sources of information and only later develop a sensitivity to the modality-specific nature of knowledge (e.g., that different information is gained from sight vs. touch).

We now consider in more detail how the present findings both add to and differ from previous work in this area. Earlier studies have also explored the conditions under which children will accept or reject information provided by a speaker. However, such studies typically treated knowledge as a temporary, person-independent state and focused on claims about immediately available facts. For example, much of this research has pitted a child's direct perception against a person's claim (Robinson, Mitchell, & Nye, 1995; Zaitchik, 1991) or varied a speaker's immediate access to information (Povinelli & de Blois, 1992; Robinson & Whitcombe, 2003). Although it is important that children realize that speakers who have privileged access to certain facts will likely provide reliable information about those facts, only a limited range of statements can be evaluated in this way. It is often the case that speakers make assertions about the world that cannot be checked by listeners with reference to facts in the immediate environment. Furthermore, speakers naturally bring with them different knowledge about the world. By presenting children with speakers whose knowledge differences were stable and not the result of differential access to information, we showed that they were able to demonstrate their sensitivity to stable differences in knowledge and to use this information in judging the reliability of informants' subsequent claims.

What is it about the behavior of the two informants that led children to display selective trust on test trials? There are at least two ways in which selective trust might emerge. One possibility is that children build up trust in the reliable informant over the course of the familiarization trials. This would imply that interlocutors constantly add to their stock of trust in an informant whenever that informant makes a claim that is known to be true, for example, whenever he or she names an object correctly. A second possibility is that children reevaluate the unreliable informant. Instead of building up trust in the reliable informant, children trust her by default and subsequent reliability does nothing to alter that default setting. Rather, it is the default trust that children initially invest in the unreliable informant that is undermined by her subsequent behavior. The observed age difference in Experiment 1 lends preliminary support to the second interpretation. Given that the behavior of the reliable informant in Experiments 1 and 2 never changed (i.e., she was an accurate labeler in both cases) and only the behavior of the unreliable informant varied, the nature of the

untrustworthy informant appears critical. More specifically, inaccuracy and ignorance undermines the trust of 4-year-olds, and ignorance (but not inaccuracy) undermines the trust of 3-year-olds.

It is also helpful to reflect in more detail on the situations in which children might favor one informant over another. In particular, it is important to distinguish between situations in which two contrary claims are made versus those in which there is only one claim to consider. In thisstudy, children's selective mistrust of information provided by the unreliable informant should be interpreted in light of the fact that there happened to be alternative information provided by the reliable informant. Thus, it remains an open question as to how children would interpret novel information from only one speaker who had a history of unreliability. That is, when no other information is available and a previously unreliable speaker calls a novel object a ''dax,'' would this information be rejected as it was in the present studies? A future experiment that presented children with only one informant during the test would directly examine this issue.

Turning to the scope of children's selective trust in reliable informants, the results of Experiment 3 indicate that children's selectivity extends beyond object names. Having been familiarized with knowledgeable and ignorant labelers, children generalized their selective trust to demonstrations of object functions as well as verbal messages about objects' names. First, it is important to note that any firm conclusions about the scope of children's trust will depend on further examination of the domain of information presented. For example, it may be that if informants were to present conflicting claims about facts outside the domain of object names and functions, such as biological or mathematical facts, children would again treat a previously unreliable labeler as untrustworthy (Taylor et al., 1994). However, a further point to consider is that children, if asked, may credit the reliable informant with all kinds of positive behaviors (e.g., faster running, dressing prettier, sharing toys) or dispositions (e.g., neat, friendly, happy). Such attributions would not, strictly speaking, constitute demonstrations of epistemic trust but, rather, a global ''halo effect'' reflecting a bias to extrapolate from one positive characteristic to other personality characteristics about which nothing is objectively known (Yuill, 1997). In short, an important task for future research is to delineate the scope of children's trust in a more precise fashion.

Children, and adults, are deeply dependent on other people for their knowledge of the world. Our results demonstrate that young children do not navigate this ''sea'' of testimony with unquestioning credulity, but with an interest in the validity of what they are told. As adults, we bring a host of tools to the task of distinguishing reliable from unreliable information. Here, we demonstrate young children's emerging use of one key tool: the epistemic appraisal of an informant's past and future trustworthiness.

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