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"Why Does Rain Fall?": Children Prefer to Learn From an Informant Who Uses Noncircular Explanations

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These two studies explored 3- and 5-year-olds' evaluation of noncircular and circular explanations, and their use of such explanations to determine informant credibility. Although 5-year-olds demonstrated a selective preference for noncircular over circular explanations (Experiment 1: Long Explanations; Experiment 2: Short Explanations), 3-year-olds only demonstrated a preference for the noncircular when the explanations were shortened (Experiment 2). Children's evaluation of the explanations extended to their inferences about the informants' future credibility. Both age groups demonstrated a selective preference for learning novel explanations from an informant who had previously provided noncircular explanations—although only 5-year-olds also preferred to learn novel labels from her. The implications and scope of children's ability to monitor the quality of an informant's explanation are discussed.

Children are surprisingly selective when deciding from whom to learn. By early preschool, children rely on multiple cues when determining informant credibility, such as prior accuracy in a particular domain, benevolence, and social group status (e.g., Corriveau & Harris, 2009a, 2009b; Corriveau, Fusaro, & Harris, 2009; Corriveau, Kinzler, & Harris, 2013; Harris, 2012; Kinzler, Corriveau, & Harris, 2011; Koenig & Woodward, 2010; Mascaro & Sperber, 2009).

To date, studies on children's selective learning have largely focused on how children use an informant's accurate or inaccurate labeling of a familiar object when subsequently deciding from whom to learn a novel *fact*—usually a novel object's name or function (e.g., Birch, Vauthier, & Bloom, 2008; Koenig & Harris, 2005). This focus on children's evaluation of single-word utterances is surprising, given that preschoolers shift from primarily asking "what" and "where" questions, which can be answered with one-word responses, to asking "why" and "how" questions, which require longer explanations (Chouinard, 2007; Frazier, Gelman, & Wellman, 2009; Issacs, 1930). Indeed, not only do preschool children begin to ask questions that call for causal explanations but they also begin to provide explanations that may help in their understanding of causal mechanisms (Kuhn & Katz, 2009; Legare, Gelman, & Wellman, 2010; Rittle-Johnson, Saylor, & Swyget, 2008).

Based on preschooler's developing understanding of the role of explanations in learning, it seems likely that children would determine an informant's future credibility by attending not only to her single-word utterances but also to her explanations. Indeed, recent research indicates that preschoolers can make judgments about the quality of explanations. Mercier, Clément, and Bernard (in press) demonstrated that children as young as 3 weigh the quality of explanations when making subsequent decisions. Mercier et al. presented 3-, 4-, and 5-year-olds with a series of vignettes where two speakers offered contradictory arguments (Task 1: argument supported by perceptual evidence [strong argument] vs. circular argument [weak argument]; Task 2: weak argument vs. no argument). Although all age groups endorsed the strong argument, only 4- and 5-year-olds endorsed the weak argument over no argument.

The data from Mercier et al. (in press) suggest that even young preschoolers can use explanation quality to make decisions. Nevertheless, little is known about the developmental origins of children's use of these evaluations to make inferences about source credibility. Here, we present the first set of studies exploring children's use of explanation quality to evaluate an informant's credibility.

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The task of evaluating explanations to determine informant credibility is more complex than evaluating single utterances. Children need to compare the speaker's utterance to their own background knowledge, as well as to evaluate the internal coherence of the statement (e.g., Harris, Kruithof, Meerum Terwogt, & Visser, 1981; Markman, 1979). These tasks are difficult even for adults and older children (e.g., Mercier, 2012). For example, Baum, Danovitch, and Keil (2008) presented 5- to 10-year-olds with explanations for why natural phenomena occur (e.g., why polar bears are white)—a circular explanation and a noncircular explanation. Whereas 5-year-olds had a fragile preference for noncircular explanations, 10-year-olds displayed a robust preference. Similarly, Bernard, Mercier, and Clément (2012) presented 3- to 5-year-olds with two speakers who provided differing explanations for the location of a hidden object. One explanation included the causal connective *because,* whereas the other explanation used the phatic term *well* (e.g., the ball is in "the blue box because Camille always puts her ball in the blue box" and "Well, Camille always puts her ball in the blue box"). Four- and 5-year-olds searched in the location identified by the speaker using causal connectives. Taken together, these studies suggest that children's evaluation of explanatory coherence develops over the preschool and elementary school years.

In the current set of studies, we focus on argument circularity as a marker of explanatory coherence. Circular explanations refer to statements that reiterate the information from the original question without adding new information. By contrast, noncircular explanations provide more information than was provided in the original question. We focus on argument circularity for several reasons. First, manipulating argument circularity allowed us to focus on the abstract structural properties of explanations, rather than on the content of the explanation themselves. Second, adults and older children selectively prefer noncircular explanations (Baum et al., 2008; Hahn & Oaksford, 2007; Rips, 2002). Circular explanations are ubiquitous in everyday conversation, suggesting that most preschoolers have been exposed to this type of explanatory structure. Finally, manipulating argument circularity allowed us to hold other markers of explanation complexity constant, such as utterance length, reading ease, and vocabulary difficulty.

Even if young children can monitor for argument circularity, do they use this information to make evaluations about an informant's future credibility? On the one hand, given that the task of evaluating explanation quality is taxing for young children, it is possible that children's evaluations will not extend to inferences about informant credibility. On the other hand, extensive research suggests that children use an informant's prior behavior to make such inferences at the single-word level (e.g., Harris & Corriveau, 2011). If children use similar mechanisms when evaluating explanations, they might also evaluate the *source* of the noncircular explanation as more credible. The present set of studies aimed to evaluate children's developing understanding of explanatory coherence, as well as to assess children's preference for learning *future information* from the explanation's source.

Three- and 5-year-olds were presented with pictures of two informants and tested in two phases. In the training phase, both informants provided explanations for familiar entities. Although the entities were familiar to the children, the causal explanations were not. In each of four trials, one informant consistently provided a noncircular explanation, whereas the other informant provided a circular explanation. Children were invited to endorse one of the two explanations.

In the test phase, the informants provided conflicting information about novel entities. In the novel explanations task, informants provided conflicting noncircular explanations about a novel object. In the novel labels task, informants provided conflicting labels for a novel object. Finally, children were asked to explicitly judge the credibility of the two informants.

We made three separate but related predictions. First, if children are able to judge the quality of the explanation, they should selectively prefer the noncircular over the circular explanation in training trials. Second, if children are able to use explanation quality to make inferences about the informants' future credibility, they should prefer to learn from the informant who had previously provided noncircular over circular explanations. Finally, individual differences in children's preference for noncircular explanations during the training trials should be related to their selective learning from the two informants in test trials.

Experiment 1

Method

Participants

Thirty-three children participated in the study: seventeen 3-year-olds (7 female, M = 3;7, SD = 5 months, range = 3;2–4;2) and sixteen 5-year-olds

(10 female, M = 5;1, SD = 4 months, range = 4;10–6;0). Children spoke English as their first language, and were recruited from local preschools and a children's exhibit at a local science museum. Ninety percent were White; 10% were Asian American. Although information on socioeconomic status was not collected, the preschools and museum serve a predominantly middle- and upper-middle-class population.

Materials

Children sat at a small table located in the corner of a quiet room where an experimenter presented two pictures of females wearing differently colored shirts (black, green). The females were matched for attractiveness and displayed neutral affect. During the training trials, four pictures of familiar entities were used (e.g., polar bear, car, rain, plant). During the novel explanations and novel labels tasks, eight pictures of novel objects were used (see Table 2).

Procedure

All children participated in four trial types: (a) training, (b) novel explanation, (c) novel label, and (d) explicit judgment. Trials were presented in a fixed order, with the exception of the novel explanation and novel label trials, which were counterbalanced across participants.

Training. The experimenter began by presenting pictures of the two informants and said, "Look at these girls. One is wearing a green shirt, and the other is wearing a black shirt. They are going to tell us about some things." For each of four trials, the experimenter placed a picture of an entity between the informants and said, "Look, here is a picture of (e.g., rain). Now these girls think that they know why it rains. Let's see what they say." In five cases, children offered unprompted explanations. No child's explanation was similar to either the circular or noncircular explanation.

The experimenter pointed to both girls sequentially and stated their explanations. One informant always provided a noncircular explanation, whereas the other informant always provided a circular explanation (see Table 1 for examples of explanations). Explanations were drawn from elementary school science textbooks (Macmillan, 2008) and were matched for complexity using Flesch Reading Ease Scores (Flesch, 1948). There were no significant differences between the two types of explanations ($M_{circular}$ = 87, $M_{noncircular}$ = 90.8), $t(6)$ = 1.06, *ns*, indicating that the explanations were of equal reading difficulty. Moreover, explanation difficulty was similar to the average levels of 81.5 and 85.1 used by Baum et al. (2008). After hearing the explanations, the experimenter repeated both explanations and asked, "Why do you think (e.g., rain falls)?" Both verbal (e.g., "What the girl in the green shirt

Table 1
Sample Explanations Used in Training in Experiments 1 and 2

Event	Statement	Circular explanation	Noncircular explanation
Experiment 1			
Rain	These girls think they know why it rains. Let's see what they think	Sometimes it rains because it is wet and cloudy outside, and water falls from the sky. When water falls from the sky it is called rain and it gets us all wet	Sometime it rains because there are clouds in the sky that are filled with water When there is too much water in the clouds it falls to the ground and gets us all wet
Flowers/ trees	These girls think they know why trees and flowers grow. Let's see what they think	Flowers and trees grow because they become taller and taller. They grow when their stem gets long and they get more and more leaves	Flowers and trees grow because we feed them water, which keeps them healthy and strong. The sun also helps them grow by giving them energy, which keeps them healthy and strong
Experiment 2			
Rain	These girls think they know why it rains. Let's see what they think	It rains because water falls from the sky and gets us wet	It rains because the clouds fill with water and get too heavy
Flowers/ trees	These girls think they know why trees and flowers grow. Let's see what they think	They grow because their stems get longer and longer and they get taller	They grow because we feed them water and the sun gives them light

said") and nonverbal (e.g., pointing) responses were accepted. The order of explanation and the informant providing the circular explanation was counterbalanced across participants.

Novel explanations. Immediately following the fourth training trial, children participated in either the novel explanations or novel labels task. The experimenter said, "Here are the same two girls again. Remember, this one is wearing a green shirt and this one is wearing a black shirt. They are going to explain some things that we don't know about." For each of the four trials, the experimenter placed a picture of a novel object between the informants, and said, for example, "Look at this object. Now I wonder why it has (e.g., a round thing there). Let's see what these girls think" (see Table 2).

The experimenter pointed to both girls sequentially and stated their explanations. Both explanations were always noncircular and equivalent in plausibility. For example, "The girl in the green shirt says it has a round thing there so that we can spin it on the table" and "The girl in the black shirt says it has a round thing there so that we can roll it on the table." Immediately following the explanations, the experimenter repeated the two explanations and asked, "Why do you think (e.g., it has a round thing)?" The order of the explanations, and the informant offering each explanation was counterbalanced across participants.

Novel labels. The experimenter began by saying, "Now the girls are going to tell us the names of some funny-looking things." For each of the four trials the experimenter placed a picture of a novel object between the informants and said, for example, "The girl in the green shirt says that's a foppick" and "The girl in the black shirt says that's a tillen" (see Table 2, lower panel). The experimenter repeated the two labels, and asked, "What do you think it's called?" The order of the labels, and the informant offering each label was counterbalanced across participants.

Explicit judgment. Finally, the experimenter pointed to the picture of each informant and said "Do you remember when the girl in the green shirt was talking about some things that we know about like polar bears and rain? Was she very good or not very good at explaining those things?" The same question was posed for the girl in the black shirt (counterbalanced across participants). Finally, children were asked to judge the relative quality of the informants: "Which girl was better at explaining those things?"

Results

Training Trials

Table 3 displays the children's mean preference for the informant providing noncircular explanations during the training trials along with comparisons with 50% chance performance. Responses offered by 5-year-olds were significantly different from those offered by 3-year-olds, $t(31) = 5.56$, $p < .001$, $d = 0.97$. Whereas 5-year-olds were above chance in choosing the noncircular explanations, 3-year-olds did not systematically choose either explanation.

Novel Explanations and Novel Labels

Table 3 also displays children's mean preference for the informant providing noncircular explanations and comparisons to 50% chance for both the

Table 2
Stimuli Used for Novel Explanations and Novel Labels Trials in Experiment 1 and Experiment 2

	Novel objects	Informant 1 response	Informant 2 response
Novel explanations	Plastic hook	It has a triangle in the middle so we can see through it	It has a triangle in the middle so we can put our fingers through it
	Metal hook	It has hooks so that we can hang scarves on it	It has hooks so that we can hang hats on it
	Sprinkler head	It is shiny so that we can see it from far away	It is shiny so that it looks bright like the sun
Novel labels	Car medallion	That's a nez	That's a cray
	Black door hinge	That's a modi	That's a seebo
	Citrus juicer	That's a foppick	That's a tillen
	Red retractable funnel	That's a rossi	That's a bobe

Table 3
Mean Scores (Standard Deviations), Comparisons With Chance Performance, and Effect Sizes in Experiments 1 and 2

	3-year-olds			5-year-olds		
Experiment and score	*M*	*t*	*d*	*M*	*t*	*d*
Experiment 1						
Training score (max = 4)	2.17 (.72)	1.00	0.24	3.5 (.63)	9.49***	2.38
Novel explanations (max = 4)	2.52 (1.0)	2.17*	0.52	2.62 (.95)	2.61*	0.65
Novel labels (max = 4)	1.94 (.75)	0.32	0.08	2.93 (.93)	4.04**	1.0
Explicit judgment (max = 3)	1.76 (1.25)	0.78	0.19	2.56 (.63)	3.58**	1.67
Experiment 2						
Training score (max = 4)	2.56 (1.03)	2.18*	0.54	3.12 (.72)	6.26***	1.56
Novel explanations (max = 4)	2.63 (.89)	2.83*	0.71	2.63 (1.02)	2.44*	0.62
Novel labels (max = 4)	2.25 (1.0)	3.87	0.25	2.75 (.77)	3.87**	0.97
Explicit judgment (max = 3)	1.63 (1.1)	0.46	0.34	2.38 (1.02)	3.42**	0.37

Note. Mean scores indicate the number of trials on which the children preferred the noncircular explanation (on training trials) or the noncircular informant on the novel labels, novel explanations and explicit judgment tasks. Standard deviations are indicated in parentheses.
*$p < .05$. **$p < .01$. ***$p < .001$.

novel explanations and the novel labels task. In the novel explanations task, both 3- and 5-year-olds performed above 50% chance, systematically endorsing explanations from the informant who had provided noncircular explanations. In the novel labels task, 5-year-olds were also above chance in privileging this informant. By contrast, 3-year-olds did not systematically choose either informant.

To confirm these findings, a 2 (age group: 3-year-olds, 5-year-olds) × 2 (trial type: novel explanations, novel labels) repeated measures analysis of variance (ANOVA) was conducted. This analysis revealed a main effect of age group, $F(1, 31) = 4.75$, $p < .05$, $\eta_p^2 = .13$, and a Trial Type × Age Group interaction ($F(1, 31) = 5.24$, $p < .05$, $\eta_p^2 = .15$. The main effect of trial type was not significant.

To interpret the interaction, the simple effect of age group was calculated for each trial type. On the novel explanations tasks, both 3- and 5-year-olds demonstrated similar levels of selectivity, preferring to endorse explanations from the informant who had previously offered noncircular explanations, $F(1, 31) = .11$, *ns.* By contrast, in the novel labels task, 5-year-olds were significantly more selective than 3-year-olds, $F(1, 31) = 12.82$, $p < .001$.

Explicit Judgment

Table 3 displays children's average correct performance and comparison to 50% chance for the explicit judgment trials. Five-year-olds were significantly more likely than 3-year-olds to judge the noncircular informant as "better," $t(31) = 2.29$, $p < .05$, $d = 0.43$. Although 5-year-olds systematically judged the informant giving noncircular explanations as "better," 3-year-olds were at chance in judging the informants. Note that the data are similar when exploring the final forced-choice question only.

Discussion

In Experiment 1, we examined preschoolers' developing preference for circular versus noncircular explanations. We also investigated children's use of explanation type to determine an informant's future credibility across two novel learning tasks.

First, children's preference for noncircular explanations develops over the preschool years. In the training trials, 3-year-olds displayed no systematic preference for noncircular explanations, whereas 5-year-olds selectively preferred the noncircular explanations. This finding is consistent with previous research indicating that 5-year-olds choose a noncircular explanation as the "best" explanation for why something occurs (Baum et al., 2008; Experiment 1). Note that these data suggest that 5-year-olds' evaluation of explanation quality extends beyond the evaluation of a single word (e.g., a causal connective *because*; Bernard et al., 2012). Both the noncircular and circular explanations included a causal connective; thus, if children were simply monitoring for such target words, they should have been at chance in evaluating the explanations.

Second, both 3- and 5-year-olds used the quality of an informant's explanation when assessing her subsequent credibility. When asked to endorse a novel explanation, both 3- and 5-year-olds demonstrated a significant preference for learning from the informant who had provided noncircular explanations. Three-year-olds' preference is impressive, given that they did not display a selective preference for either explanation type in the training trials. Nevertheless, children's preference for learning from the informant who provided noncircular explanations is fragile in early preschool. Whereas 5-year-olds also preferred to learn novel labels from this informant, and to explicitly judge her as "better," 3-year-olds displayed no systematic preference.

Why would 3-year-olds display selectivity in some test trials, but not in explicit judgment trials? One possibility is that 3-year-olds' poor performance on the training trials, and subsequent fragile preference on test trials, was due to task demands. The explanations used in Experiment 1 were relatively long ($M = 27$ words). Note that we had attempted to decrease memory load by repeating the two explanations prior to inviting the child to respond. Nevertheless, in Experiment 2, we probed children's explanation monitoring further by decreasing the explanation length in the training trials.

Experiment 2

Method

Participants

Thirty-two different children participated in the study: sixteen 3-year-olds (14 female, $M = 3;7$, $SD = 5$ months, range = 3;3–4;3) and sixteen 5-year-olds (10 female, $M = 5;7$, $SD = 4$ months, range = 5;2–6;2). Children spoke English as their first language and were recruited from local preschools. Seventy-five percent were White, 12.5% were Southeast Asian American, and 12.5% were East Asian American. Although information on socioeconomic status was not collected, the preschools serve a predominantly middle- and upper-middle-class population.

Procedure

The procedure was identical to Experiment 1, with the exception of the explanations in the training trials (see Table 1, bottom panel). For all four training trials both the circular and noncircular explanations were matched for length (explanation length < 13 words) and for readability (Flesch, 1948). There were no significant differences in readability between the two types of explanations ($M_{circular} = 84.3$, $M_{noncircular} = 92.3$), $t(6) = 1.68$, *ns*, suggesting that, as in Experiment 1, the explanations were of equal reading difficulty. Moreover, there were no significant differences in the readability, when comparing the explanations from Experiments 1 and 2.

Results

Training Trials

Table 3 (bottom panel) displays mean preference for the noncircular explanations and comparisons to 50% chance. Both 5-year-olds and 3-year-olds were above 50% chance in choosing noncircular explanations. There were no significant differences between the responses given by 3- and 5-year-olds, $t(30) = 1.79$, *ns.*

Novel Explanations and Novel Labels

Table 3 also displays mean preference for endorsing the informant who had previously provided noncircular explanations and comparisons to 50% chance for the novel explanations and novel labels tasks. As in Experiment 1, both 3- and 5-year-olds performed above 50% chance in endorsing the novel explanations from the informant who had provided noncircular explanations. Whereas 5-year-olds performed above 50% chance in endorsing novel labels, 3-year-olds were unsystematic in endorsing the novel labels provided by either informant. However, these differences in chance-level performance should be interpreted with caution, as a 2 (age group: 3-year-olds, 5-year-olds) × 2 (trial type: novel explanations, novel labels) repeated measures ANOVA revealed no significant main effects or interactions.

Explicit Judgment

As in Experiment 1, 5-year-olds were significantly more likely than 3-year-olds to judge the noncircular informant as "better," $t(30) = 2.07$, $p < .05$, $d = 0.34$. Whereas 5-year-olds systematically judged the informant giving noncircular explanations as "better," 3-year-olds were at chance in judging the informants. Note that the findings are similar when exploring the final forced-choice question only.

Relation Between Training Trials and Test Trials

Finally, we assessed the relation between children's judgment of explanation quality and their preference for learning from the informant who had provided noncircular explanations. We examined children's mean test performance (novel explanations + novel labels, max = 8) as a function of the mean number of noncircular explanation choices in the training trials (max = 4), collapsed across Experiments 1 and 2. Children displayed a stronger preference for the noncircular informant in the test trials if they had shown more sensitivity toward noncircular explanations during training trials. Almost two thirds of the children tested (40 of 65) chose the noncircular explanations for at least three of four training trials. Of these 40 children, 58% endorsed the informant who had provided noncircular explanations on at least six of the eight test questions. By contrast, of the 25 children who chose the noncircular informant for < 3 training trials, only 16% endorsed the informant who had provided noncircular explanations on at least six test questions. This difference in test performance by training performance is significant, $\chi^2(1, N = 65) = 10.91$, $p < .001$, $\phi = .41$.

To further examine these findings, we conducted a multiple linear regression with total test score as the dependent variable and age in months, training score and experiment as independent variables. Age was a significant predictor ($\beta = 0.35$, $SE = 0.01$, $p < .05$), accounting for 9% of the variance in test performance. In addition, training performance accounted for 28% of the variation in performance on the test trials ($\beta = 0.79$, $SE = 0.19$, $p < .001$). No other main effects or interactions were significant. Thus, children's preference for noncircular explanations during training trials predicted their preference for learning from the noncircular informant during test trials even after controlling for age in months and experiment.

Discussion

Both 3- and 5-year-olds preferred the noncircular explanations during the training trials. Recall that these explanations were shorter than those used in Experiment 1, suggesting that 3-year-olds' selective preference for noncircular explanations in Experiment 2 may be due to the decreased memory load required to make these judgments.

Taken together, the results from Experiment 2 provide additional support for the findings in Experiment 1. Both 3- and 5-year-olds monitored the quality of the informants' explanations, and used those explanations to make inferences about the informants' future credibility. They endorsed novel explanations provided by the informant who previously used noncircular explanations. However, as in Experiment 1, only 5-year-olds selectively endorsed this informant in the novel labels task and explicitly judged her as "better," a point that we turn to again in the General Discussion. Moreover, when collapsing across both experiments, children's preference for the noncircular explanations in the training phase accounted for unique variance in their subsequent learning from the informant who used noncircular explanations, even after controlling for age.

General Discussion

Taken together, Experiments 1 and 2 support the conclusion that, counter to previous findings (Baum et al., 2008), preschoolers can judge the quality of an explanation by attending to the circularity of the argument. Moreover, preschoolers demonstrated this preference even though both explanations included the causal connective *because* (Bernard et al., 2012). Thus, these data extend previous work by showing that children's evaluation of explanation quality develops over the preschool years and is relatively robust by age 5 (Frazier et al., 2009; Mercier et al., in press).

To the best of our knowledge, no research has explored how children use assessments of explanation quality to judge an informant's credibility. Instead, previous research has focused on children's judgments of an informant's expertise at the single-word level (Sobel & Corriveau, 2010; Koenig & Jaswal, 2011). Across two experiments, we find that both age groups selectively chose the informant who had provided noncircular explanations on a near transfer task (novel explanations). Similarly, 5-year-olds preferred this same informant when learning novel labels. Children's endorsement of this informant was also related to their judgment of explanation quality even after controlling for age. Taken together, preschoolers are surprisingly selective, not only in using single words but also in using entire utterances to judge an informant's credibility.

Although preschoolers selectively endorsed the claims of the informant who had previously used noncircular explanations, in both experiments only 5-year-olds explicitly judged this informant as "better." This discrepancy in performance between explicit judgment and test performance is in contrast to previous findings demonstrating a relation between performance on these two tasks (e.g., Koenig, Clément, & Harris, 2004). One difference between our setup and previous research was that although the circular explanation was fallacious, it did not have the same degree of blatant inaccuracy as would be seen by an informant mislabeling a shoe a "car." If anything, the difference between a circular and a noncircular explanation might be seen as a difference between an accurate explanation and a more neutral one. Some previous research has compared children's selective preference for an accurate labeler over a neutral labeler (who simply states "let me take a look at that"; Corriveau, Meints, & Harris, 2009). Although 4-year-olds were able to explicitly judge the accurate labeler as "better," 3-year-olds were not, suggesting that 3-year-olds may struggle when explicitly evaluating two informants who display more subtle differences in accuracy. An alternative explanation is that selectivity in explicit judgment questions may require more metacognitive abilities than needed for simple endorsement. Future research should include both endorse and explicit judgment questions to explore children's selective learning in these more complex settings.

What is developing in the preschool years in children's learning from explanations? We suggest that children's ability to monitor explanations may display a similar pattern to their monitoring of single-word utterances (e.g., object labels; Jaswal & Neely, 2006; Koenig & Harris, 2005). Whereas older preschoolers (4- and 5-year-olds) use multiple strategies to infer informant credibility (e.g., accuracy and inaccuracy of object labeling), younger preschoolers use more narrow strategies (e.g., inaccuracy only; Pasquini, Corriveau, Koenig, & Harris, 2007). Similarly, when monitoring for explanation quality, older preschoolers may be more flexible when attending to global strategies (e.g., argument circularity). By contrast, younger preschoolers can use these strategies when selectively learning from informants—but only in certain situations and under certain conditions. Future research should explore the developmental sequence of the cues used for explanation monitoring.

What are the limits of children's explanation monitoring? On the one hand, children might endorse all claims from an informant providing high-quality explanations. Indeed, research on children's learning of scientific concepts indicates that young preschoolers blindly accept an informant's explanations without considering how these claims match with real-world evidence (e.g., Kuhn, Cheney, & Weinstock, 2000). An alternative possibility is that children continue to monitor explanation quality even after determining that an informant is credible. Indeed, in some instances, at least a minority of children and adults weight perceptual experience over information from others (Asch, 1956; Corriveau & Harris, 2010). Future research should examine how children approach novel situations when they have access to both high-quality informants and real-world evidence.

One further question concerns the scope of children's knowledge about a given domain. In the present experiments, the informants supplied information about scientific phenomena. Given the influence of context on children's sensitivity to explanations (Kuhn, 2001), it is plausible that children might employ different strategies to evaluate explanations across domains. For example, recent research indicates that adults' explanations influence how children understand nonobservables such as religious phenomena (Canfield & Ganea, 2013; Woolley, Ma, & Lopez-Mobilla, 2011).

In summary, during the preschool years, children become increasingly sophisticated questioners, thereby prompting a rapidly expanding exposure to multiword explanations. Our research provides evidence that children are capable of assessing an entire explanation in judging its quality. Perhaps even more compelling, children not only monitor explanations for quality but they also use this information to make judgments about an informant's future credibility.

References

Asch, S. E. (1956). Studies of independence and conformity. A minority of one against a unanimous majority. *Psychological Monographs*, *70*(No 9, Whole No. 416).

Baum, L., Danovitch, J., & Keil, F. (2008). Children's sensitivity to circular explanations. *Journal of Experimental Child Psychology*, *100*, 146–155. doi:10.1016/j.jecp.2007.10.007

Bernard, S., Mercier, H., & Clement, F. (2012). The power of well-connected arguments: Early sensitivity to the connective because. *Journal of Experimental Child Psychology*, *11*, 128–135. doi:10.1016/j.jecp.2011.07.003

Birch, S. A., Vauthier, S. A., & Bloom, P. (2008). Three and four-year-olds spontaneously use others' past performance to guide their learning. *Cognition*, *107*, 1018–1034. doi:10.1016/j.cognition.2007.12.008

Canfield, C., & Ganea, P. (2013). "You call it magic": What parents and siblings tell preschoolers about unobservable entities. *Journal of Cognition and Development*. Advance online publication. doi:10.1080/15248372.2013.777841

Chouinard, M. M. (2007). Children's questions: A mechanism for cognitive development. *Monographs of the Society for Research in Child Development*, *72*(1). doi:10.1016/j.cogdev.2007.11.00

Corriveau, K. H., Fusaro, M., & Harris, P. L. (2009). Going with the flow preschoolers prefer nondissenters as informants. *Psychological Science*, *22*, 372–377. doi:10.1111/j.1467-7687.2010.00965.x

Corriveau, K. H., & Harris, P. L. (2009a). Preschoolers continue to trust a more accurate informant 1 week after exposure to accuracy information. *Developmental Science*, *12*, 188–193. doi:10.1111/j.1467-7687.2008.00763.x

Corriveau, K. H., & Harris, P. L. (2009b). Choosing your informant: Weighing familiarity and recent accuracy. *Developmental Science*, *12*, 426–437. doi:10.1348/2044-835X.002009

Corriveau, K. H., & Harris, P. L. (2010). Preschoolers (sometimes) defer to the majority in making simple perceptual judgments. *Developmental Psychology*, *46*, 437–445. doi:10.1037/a0017553

Corriveau, K. H., Kinzler, K. D., & Harris, P. L. (2013). Accuracy trumps accent in children's endorsement of object labels. *Developmental Psychology*, *49*, 470–479. doi:10.1037/a0030604

Corriveau, K. H., Meints, K., & Harris, P. L. (2009). Early tracking of informant accuracy and inaccuracy by young children. *British Journal of Developmental Psychology*, *27*, 331–342. doi:10.1348/026151008X310229

Flesch, R. F. (1948). A new readability yardstick. *Journal of Applied Psychology*, *32*, 221–233.

Frazier, B., Gelman, S., & Wellman, H. (2009). Preschoolers' search for explanatory information within adult–child conversation. *Child Development*, *80*, 1592–1611. doi:10.1111/j.1467-8624.2009.01356.x

Hahn, U., & Oaksford, M. (2007). The rationality of informal argumentation: A Bayesian approach to reasoning fallacies. *Psychological Review*, *114*, 704–732.

Harris, P. L. (2012). *Trusting what you're told: How children learn from others*. Cambridge, MA: Belknap Press/Harvard University Press.

Harris, P. L., & Corriveau, K. H. (2011). Young children's selective trust in informants. *Philosophical Transactions of the Royal Society*, *366*, 1179–1187. doi:10.1098/rstb.2010.0321.

Harris, P. L., Kruithof, A., Meerum Terwogt, M., & Visser, T. (1981). Children's detection and awareness of textual anomaly. *Journal of Experimental Child Psychology*, *31*, 212–230. doi:10.1016/0022-0965(81)90013-8

Issacs, S. (1930). *Intellectual growth in young children*. Oxford, UK: Harcourt, Brace.

Jaswal, V. K., & Neely, L. A. (2006). Adults don't always know best: Preschoolers use past reliability over age when learning new words. *Psychological Science*, *17*, 757–758. doi:10.1111/j.1467-9280.2006.01778.x

Kinzler, K. D., Corriveau, K. H., & Harris, P. L. (2011). Children's selective trust in native accented speakers. *Developmental Science*, *14*, 106–111. doi:10.1111/j.1467-7687.2010.00965.x

Koenig, M. A., Clément, F., & Harris, P. L. (2004). Trust in testimony: Children's use of true and false statements. *Psychological Science*, *15*, 694–698. doi:10.1111/j.0956-7976.2004.00742.x

Koenig, M. A., & Harris, P. L. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development*, *76*, 1261–1277. doi:10.1111/j.1467-8624.2005.00849.x

Koenig, M. A., & Jaswal, V. K. (2011). Characterizing children's expectations about expertise and incompetence: Halo or pitchfork effects? *Child Development*, *82*, 1634–1647. doi:10.1111/j.1467-8624.2011.01618.x

Koenig, M. A., & Woodward, A. L. (2010). Sensitivity of 24-month-olds to the prior inaccuracy of the source: Possible mechanisms. *Developmental Psychology*, *46*, 815–826. doi:10.1037/a0019664

Kuhn, D. (2001). How do people know? *Psychological Science*, *12*, 1–8. doi:10.1111/1467-9280.00302

Kuhn, D., Cheney, R., & Weinstock, M. (2000). The development of epistemological understanding. *Cognitive Development*, *15*, 309–328. doi:10.1016/S0885-2014(00)00030-7

Kuhn, D., & Katz, J. (2009). Are self-explanations always beneficial? *Journal of Experimental Child Psychology*, *103*, 386–394. doi:10.1016/j.jecp.2009.03.003

Legare, C. H., Gelman, S. A., & Wellman, H. M. (2010). Inconsistency with prior knowledge triggers children's causal explanatory reasoning. *Child Development*, *81*, 929–944. doi:10.1111/j.1467-8624.2010.01443.x

Macmillan. (2008). *Science: A closer look*. New York, NY: Mcgraw-Hill.

Markman, E. M. (1979). Realizing that you don't understand: Elementary school children's awareness of inconsistencies. *Child Development*, *50*, 643–655.

Mascaro, O., & Sperber, D. (2009). The moral, epistemic, and mindreading components of children's vigilance towards deception. *Cognition*, *112*, 367–380. doi:10.1016/j.cognition.2009.05.012

Mercier, H. (2012). The social functions of explicit coherence evaluation. *Mind and Society*, *11*, 81–92. doi:10.1007/s11299-011-0095-4

Mercier, H., Clement, F., & Bernard, S. (in press). Early sensitivity to arguments: How preschoolers weight circular arguments. *Journal of Experimental Child Psychology*.

Pasquini, E., Corriveau, K. H., Koenig, M., & Harris, P. L. (2007). Preschoolers monitor the relative accuracy of informants. *Developmental Psychology*, *43*, 1216–1226. doi:10.1037/0012-1649.43.5.1216

Rips, L. J. (2002). Circular reasoning. *Cognitive Science*, *26*, 767–795.

Rittle-Johnson, B., Saylor, M., & Swyget, K. (2008). Learning from explaining: Does it matter if mom is listening? *Journal of Experimental Child Psychology*, *100*, 215–224. doi:10.1016/j.jecp.2007.10.002

Sobel, D. M., & Corriveau, K. H. (2010). Children individuals' expertise for word learning. *Child Development*, *81*, 669–679. doi:10.1111/j.1467-8624.2009.01422.x

Woolley, J., Ma, L., & Lopez-Mobilla, G. (2011). Development of the use of conversational cues to assess reality status. *Journal of Cognition and Development*, *12*, 537–555. doi:10.1080/15248372.2011.554929