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Development of the Use of Conversational Cues to Assess Reality Status

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In this study, the authors assessed children's ability to use information overheard in other people's conversations to judge the reality status of a novel entity. Three- to 9-year-old children ($N = 101$) watched video clips in which two adults conversed casually about a novel being. Videos contained statements that explicitly denied, explicitly affirmed, or implicitly acknowledged the entity's existence. Results indicated that children of all ages used statements of denial to discount the reality status of the novel entity, but that this ability improved with age. By age 5, children used implicit existence cues to judge a novel entity as being real. Not until age 9, however, did children begin to doubt the existence of entities whose reality status was explicitly affirmed in conversation. Overall, results indicate that the ability to use conversational cues to determine reality status is present in some children as early as age 3, but recognition of the nuanced language of belief continues to develop during the elementary-school years.

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A fundamental developmental accomplishment is the ability to distinguish reality from nonreality. Scientific knowledge about how children evaluate new information and make proper assignment of entities to real and not-real categories is especially critical in the media-rich age in which we live, where children are taught about science by monsters (e.g., as on Sesame Street) and observe human children (e.g., Harry Potter) performing magic. During the preschool years, children begin to make various sorts of distinctions between entities and events that are real and those that are not real (e.g., Flavell, Flavell, & Green, 1987; Samuels & Taylor, 1994; Sharon & Woolley, 2004; Woolley & Wellman, 1990). However, whereas this line of research provides important information on children's ability to gauge the reality status of familiar entities and processes (e.g., toys, Santa Claus, wishing), it says little about how children assign reality status when they encounter information about novel entities and processes.

In many cases, when children encounter something new, reality status is immediately and effortlessly apprehended. Children often learn about the world through firsthand experience; they learn about people, animals, furniture, vehicles, and many more things through their physical interactions and perceptual experiences. However, there is a large set of concepts that children acquire without such experience. Often, this is because these concepts represent things that are immaterial and intangible, like mental states and air. Other times, they are scientific entities that are too small to be seen or touched, like germs, or otherwise inaccessible, like the planets in the solar system. Finally, some are simply supernatural or fantastical entities in which the culture would have children believe, such as God, Santa Claus, and the Easter Bunny. This set of concepts is clearly wide ranging and includes mental, physical, biological, religious, and fantastical domains. According to Harris (2002; Harris & Koenig, 2006), children acquire this set of concepts largely through the verbal reports of others.

These domains differ not only in content but also in basic assumptions about belief. With science and history, adults convey to children what they consider necessary truths—that germs cause disease, or that the atom bomb was used in World War II against Japan. When discussing religion, as with science, adults also often convey what they consider necessary truths, yet they are aware that others may not share their convictions. With certain fantastical entities, the situation is different—adults convey information that they themselves may not endorse but that they intend their children to. They are also aware that not all adults and not all children share these beliefs. So, for example, adults relay to children myths about Santa Claus and the Tooth Fairy even though they themselves do not subscribe to these beliefs (Clark, 1995).

These differences in underlying commitment are most likely reflected in the way adults talk about reality. Guerrero, Enesco, and Harris (2010)

propose that such differences in discourse patterns about religious and fantastical beings in particular play an important role in children's conceptions about these beings. This is a sensible claim, but it rests on two unexplored tenets. One is that discourse about these beings actually differs, and the other is that children are sensitive to these differences.

With regard to the first tenet, casual attention to everyday English discourse makes it clear that people rarely explicitly note the reality status of real objects and entities at all. Despite our firm belief that chairs, for example, are unambiguously real entities, none of us feels compelled to assert this explicitly to children, nor to profess our belief in their existence. Linguists term these background assumptions *presuppositions*; when we say, "Hand me the pencil," there is an assumption or presupposition that there really is a pencil to be handed over (see, e.g., Beaver & Guerts, 2011). One of the two Gricean maxims of quantity (Grice, 1975)—that one should not provide more information than is necessary—would stipulate that we not add the word *real* to such sentences. Thus, rather than explicitly marking real entities as such, we presume their existence in conversation. For example, despite our desperate need for our children to understand that germs are real-life threats to their health, we eschew statements like "Germs are real" or "I believe in germs" for statements like, "Wash the germs off your hands so you don't get sick" (Bloom & Weisberg, 2007).

With regard to ambiguously real (e.g., religious) beings and unambiguously not-real (e.g., fantastical) beings alike, we have the option of offering similar implicit cues to existence, as in statements like, "Jesus was God's son," and "Santa Claus will bring you some nice presents tonight." With regard to fantastical beings, Principe and Smith (2008) report that parents make numerous statements of this sort to their children regarding the Tooth Fairy, often asserting that, for example, "The Tooth Fairy can fly," or that she "comes in through children's windows." Regarding religious entities, these types of statement may in fact be common in parents' discussions with young children, with responses like "God makes the flowers grow" being offered as explanations for questions about natural phenomena (e.g., Callanan & Oakes, 1992). However, because belief in these beings is not universal, we also are sometimes compelled to make explicit assertions of belief, as in, "We believe in Jesus," or "Of course Santa Claus is real!" These sorts of avowals of existence, although intended to reinforce belief in the listener, have the potential to backfire. To the extent that the listener is aware of how rarely these kinds of statements are used with unambiguously real entities, they may arouse suspicion. Thus, an attempt to communicate the real nature of civets might be more successful with a statement like, "Civets are cat-like animals found in Sri Lanka," rather than by explicitly asserting that "civets are real" or that "I believe in civets."

Although it seems clear that adults offer cues to reality status in their discourse, and although it seems sensible to suggest that children learn from such discourse, there is no evidence regarding whether children are sensitive to these cues and hence whether such discourse informs children's reality status judgments. Some research suggests that children as young as 3 years old are able to pick up on mental state cues from evidential and certainty marking (Matsui, Rakoczy, Miura, & Tomasello, 2009; Matsui, Yamamoto, & McCagg, 2006). However, other studies show slightly later development (Aksu-Koc, 1988; Papafragou, Li, Choi, & Han, 2007). It has also been shown that children show some knowledge of the Gricean maxims of quantity in the preschool years (see, e.g., Eskritt, Whalen, & Lee, 2008). Although these findings indicate that young children may have the basic abilities to detect and use linguistic cues in the input, it is not clear at what age children will be sensitive to the sorts of reality status cues we investigate here.

There is, however, some evidence regarding children's use of direct testimony (i.e., statements addressed to the child) in making reality status judgments. Tullos, Woolley, and Ikpeme (2009) presented children with video clips in which a child and an adult made conflicting statements about the reality status of novel entities (Study 1). They found that children do not prefer the testimony of adults over children with regard to reality status, yet they do use consensus among speakers in making reality status decisions based on testimony (Study 2). Most directly relevant to the present study, Woolley and Ma (2009) presented 3- to 7-year-old children with three types of statements about novel entities and asked them to judge the reality status of the entities. Children watched videos in which people either explicitly expressed belief in the novel entities (e.g., "I believe in civets"), explicitly denied belief (e.g., "I don't believe in civets"), or made statements that presumed the existence of the entity (e.g., "I almost ran over a civet when I was driving home today"). Results showed that by age 5, children differentially used direct testimony involving explicit statements of belief and denial to make reality status judgments. That is, they were most likely to judge novel entities as real when the speaker made an explicit belief claim, and least likely to judge a novel entity as real when the speaker made an explicit denial. By age 7, however, responses showed no clear pattern, and further probing indicated that these older children found the videos to be unnatural and doubted their veracity.

Although children very often receive direct testimony (e.g., in ostensive labeling situations), this is certainly not the only way children receive information, and it may not even be the most common or effective method of conveying reality status. We know that children are continually exposed to conversations between others in their immediate environment that are not

necessarily intended for them. Indeed, there is evidence that children as young as 2 monitor other peoples' conversations—they interrupt, join in, and respond to requests directed toward others (e.g., Barton & Tomasello, 1991; Dunn & Shatz, 1989). Two recent studies indicated specifically that, in fact, overhearing can be an important source of word learning for young children. Akhtar, Jipson, and Callanan (2001) showed that older 2-year-olds learned novel words, both verbs and nouns, equally well when they were presented directly as compared with when they overheard them in others' speech. Using a similar overhearing paradigm, Akhtar (2005) embedded novel words in either directives or labeling statements and found that 2-year-olds were perfectly good at learning novel words when they were not explicitly labeled. This research suggests that children might also be able to learn other important concepts through overhearing.

The goal of the present study is to begin an investigation of children's use of cues in conversation to make reality status judgments. Aiming to most closely approximate children's everyday experiences, rather than utilizing direct testimony, we explore the potential effects of the cues children pick up from overhearing others' conversations. These sorts of conversations, which we suspect children overhear quite often, either between family members or between peers, are likely to be an important source of reality status information for preschool-aged and elementary school-aged children.

To explore this, we present children with three types of conversational cues: 1) explicit denial of reality status (e.g., as in, "Santa's not real"); 2) explicit affirmation of reality status (e.g., as in, "I believe in Santa"); and 3) implicit cues to reality status (e.g., as in, "Santa will come down the chimney tonight!"). We expect that explicit denial will be recognized earliest in development because of its unambiguous nature. With regard to explicit affirmation, it seems conceivable that young children might consider these sorts of statements as perfectly good cues to reality status. However, although we expect that the majority of young children will use these statements to conclude that the entity in question is real, at some point in development, we expect children to become sensitive to the admission of subjectivity inherent in such statements and thus to use them as cues to doubt the reality status of the entities in question. The predicted asymmetry between explicit belief and explicit denial assertions is also partly predicted on the basis of the Gricean maxim of quantity (Grice, 1975). Whereas explicit marking of *real* goes against Gricean pragmatics, and hence might arouse suspicion, as nonreality is normally marked, it should not trigger a similar suspicion or vigilance. Lastly, it is not clear to what extent young children will be sensitive to implicit cues to reality status. The most specific prediction we can make is that this sensitivity will increase with age.

METHOD

Participants

Participants included a total of 101 children (49 girls). There were twenty-four 3-year-olds ($M = 3;7$; range = 3;0 to 4;2; 9 girls), twenty-six 5-year-olds ($M = 5;9$; range = 5;0 to 6;2; 10 girls), twenty-six 7-year-olds ($M = 7;7$; range = 7;1 to 8;1; 16 girls), and twenty-five 9-year-olds ($M = 9;7$; range = 9;1 to 10;0; 14 girls). Children were recruited from a participant database at a large Southwestern university in the United States. The sample included 76 children from Non-Hispanic families and 15 from Hispanic families (10 unidentified). Most participants were White ($n = 74$), with some Asian ($n = 3$) and some Mixed Race ($n = 17$) participants (7 unidentified). Children were tested individually in a 30-minute session and received a small toy or T-shirt at the end for participating.

Materials

There were four trial types including three types of conversational cues and one control: 1) *Explicit Belief*, 2) *Explicit Denial*, 3) *Implicit Belief*, and 4) *Known Real* (control). The stimuli were eight short video clips presented on a computer, two of each trial type. Each test clip depicted two female adults casually talking about a novel entity (e.g., sitting on a couch or standing in a hallway). The novel entities were all real animals that had been determined from previous studies to be unfamiliar to most children (and most adults): bilby, galah, takin, dugong, quokka, and civet. The primary criterion for generating the conversations was that each speaker had one turn in which she referred to the reality status of the novel entity in the manner specified by the trial type. Vignettes were approximately equated for length (10–20 seconds) and total number of conversational turns (ranging from three to five). The *Explicit Belief* video depicted two people explicitly affirming their belief in the reality status of the novel entity (e.g., by using the words "believe" or "real"). The *Explicit Denial* video depicted two people explicitly denying the reality status of a novel entity. In the *Implicit Belief* video, reality status of the novel entity was not explicitly asserted, rather it was implied in conversation (e.g., one person stated they "saw a baby [entity] being born"). The *Known Real* video, which served as a control, depicted two people confirming the reality status of a known real entity. (Video scripts can be found in the Appendix.) Animals used in the *Known Real* condition were ones that children would likely know about but also understand that others might not. As such, they were different for each age group to keep them age appropriate: 3-year-olds heard about penguins and

squirrels, 5-year-olds heard about crickets and hyenas, and 7- and 9-year-olds heard about pumas and armadillos.

At the end of the session, children were asked about the reality status of various familiar fantastical entities using a general skepticism task (GST). This task was included as an individual difference measure to assess potential relations between general skepticism and children's use of conversational cues. The names of 14 entities (8 fantastical, with 6 real inserted as fillers) were typed on colored, laminated cards: Santa Claus, the Tooth Fairy, dragons, monsters, dancing carrots, singing fish, Elmo, cooties, the garbage man, your mom, dinosaurs, tigers, the doctor, and germs. Two boxes were used for sorting the cards: one labeled "real" depicting a photograph of a cat, and the other labeled "pretend" depicting a line drawing of a ghost.

Procedure

During an initial practice phase, children were interviewed about two known entities, one real and one fantastical ("frogs" and "monsters") to familiarize them with providing "real" and "not real" answers. First, children were asked whether they had heard about the entity. If children said they had never heard of monsters, they were asked about other fantastical entities (e.g., mermaids, unicorns, dragons, etc.) until they responded that they were familiar with the entity. The probe question ("Do you think [entities] are real or do you think they're not real?") was embedded between two distracter questions ("Do you think [entities] are big or do you think they're small?" and "Do you think [entities] are mean or do you think they're friendly?"). The distracter questions, used in the practice trials and in the test trials, were included to discourage the development of response sets. They also made the questions more varied to help keep children engaged in the task.

After the warm-up, children were told that they would watch some videos and that they would answer some questions afterward. During the test phase, children sat in front of the computer and viewed the eight short video clips depicting conversations about the novel and familiar entities. Each clip was presented twice to ensure that children were paying attention to the conversational cues. After the first presentation, the experimenter called children's attention to the novel entity (e.g., "They were talking about [entities]—let's watch again"). Immediately after the second presentation of each clip, children were asked the reality status question (RSQ; "Do you think [entities] are real or do you think they're not real?") and then a distracter question (e.g., "Do you think [entities] fly or do you think they swim?"). The order of the options for the probe question (real, not real) was alternated between trials.

Test trials were presented in two blocks, with each block consisting of four different trials. The trial order within each block was fixed: *Known Real,*

Explicit Denial, Implicit Belief, Explicit Belief. *Known Real* was presented first in part to familiarize children with the task and in part to increase the chances that children would perceive the videos as relating to reality. The *Denial* trial was placed between the two belief trials to avoid having three consecutive trials with potential "real" responses. Half of the children received Block 1 first and half received Block 2 first.

After the video task, children were told they would play a different game with boxes and cards with "names of things they already know about" written on them. In this GST, children sorted cards with names of various familiar entities into either a "real" box or a "pretend" box. The two boxes were placed equidistant from the child, with the "real" box on the left for roughly half of the children. The children pulled the cards out of a plastic bag one at a time to ensure a different random order for each child. For each card, the experimenter read the word aloud to children and asked them to place it where it belonged ("This one says [entity]. What do you think? Is [entity] real or is [entity] not real? Where should we put this one?").

At the end of the session, children were debriefed about the reality status of the novel entities presented in the videos. The experimenter showed children a photograph of each animal and told them a few facts about each one.

RESULTS

Responses that the novel entities were real were scored as 1, and responses that they were pretend were scored as 0. Wilcoxon signed ranks tests were conducted on the two items of each trial type to assess potential item effects. The analyses revealed no significant differences between the two items of each type for *Explicit Belief, Implicit Belief*, or *Explicit Denial* conversations. For the *Known Real* trials, there was a significant effect of item, $Z = 2.11$, $p = .035$ (Known Real Item 1, $M = 0.86$; Known Real Item 2, $M = 0.93$). Because this effect reflected only a small number of 3- and 5-year-olds performing better on one item than on the other, we did not interpret it as necessitating analyzing the two items separately. Thus, responses across items were summed, yielding a range of zero to two correct answers per trial type. Figure 1 illustrates children's responses by age to the different types of conversations. The graph illustrates ceiling performance on the *Known Real* (control) trials for the 5- to 9-year-olds but apparent random responding in the 3-year-olds. A linear trend is apparent on the *Explicit Denial* trials, with increased attention to denial with age. The *Explicit Belief* trials appear to generate an upside-down U-shaped curve, with the children from the middle age groups endorsing explicit statements of belief as cues to reality status more so than both the youngest and oldest age groups. Use of *Implicit Belief*

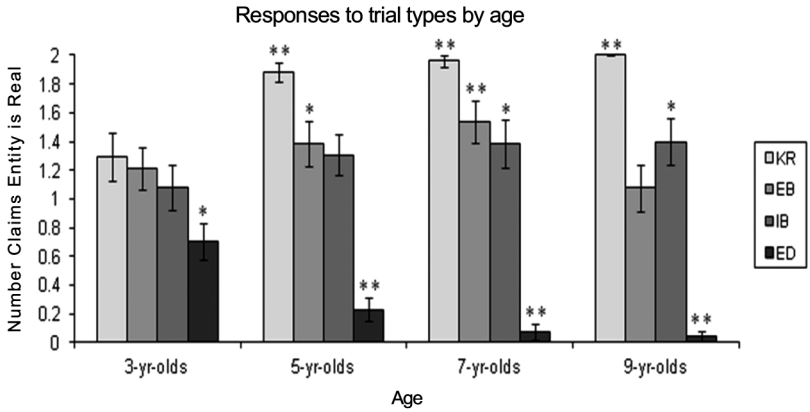

FIGURE 1 Mean number "real" claims (out of two) by age and trial type (KR = Known Real, EB = Explicit Belief, IB = Implicit Belief, ED = Explicit Denial). Error bars are 95% confidence intervals. $^{*}p < .05$. $^{**}p < .01$.

cues to make reality status decisions appears to increase slightly with age. To assess these patterns statistically, responses to the RSQ were subjected to a 4 (age: 3, 5, 7, 9) × 4 (trial type: *Known Real, Explicit Belief, Implicit Belief, Explicit Denial*) mixed-design analysis of variance (ANOVA), which revealed a main effect of trial type, $F(3, 291) = 134.85$, $p < .001$, $\eta_p^2 = .58$, which was qualified by a significant interaction between age and trial type, $F(9, 291) = 6.50$, $p < .001$, $\eta_p^2 = .17$. There were no effects of sex or any interactions involving it; therefore, sex was not included in any subsequent analyses.

A series of simple-effects ANOVAs was conducted to explore the interaction. First, with regard to age differences, a univariate ANOVA assessing age differences on the *Known Real* (control) trials revealed a significant effect of age, $F(3, 97) = 14.03$, $p < .001$, $\eta_p^2 = .30$. Bonferroni-corrected post-hoc multiple comparisons indicated that 3-year-olds ($M = 1.29$, $SD = 0.81$) claimed that the entity was real significantly less often than each of the other three age groups (5-year-olds, $M = 1.88$, $SD = 0.33$; 7-year-olds, $M = 1.96$, $SD = 0.20$; 9-year-olds, $M = 2.0$, $SD = 0$, all $ps < .001$). A univariate ANOVA indicated that there were no significant age differences on the *Explicit Belief* trials, but, as indicated in Figure 1, the responses appeared to form an inverted U-shaped pattern, with the 3- and 9-year-olds making "real" claims less often than the 5- and 7-year-olds. This pattern was supported statistically by a significant quadratic trend, $F(1, 97) = 4.18$, $p = .043$. A univariate ANOVA on children's responses on the *Implicit Belief* trials revealed no significant effects of age. Finally, analysis of children's responses to the *Explicit Denial* conversations revealed a significant effect

of age, $F(3,97) = 13.67$, $p < .001$, $\eta_p^2 = .30$, with 9-year-olds ($M = 0.04$, $SD = 0.20$) claiming the entity was not real significantly more often than 5-year-olds ($M = 0.23$, $SD = 0.43$), $t(49) = 2.02$, $p = .049$, $d = -0.57$, and 5-year-olds claiming the entity was not real significantly more often than 3-year-olds ($M = 0.71$, $SD = 0.62$), $t(48) = 3.17$, $p < .01$, $d = -0.90$.

Simple-effects analyses were also conducted to explore differences between trial types within each age group. Four univariate ANOVAs were conducted on RSQs, one for each age group. Analysis of 3-year-olds' responses revealed a main effect of trial type, $F(1, 23) = 3.93$, $p = .012$, $\eta_p^2 = .15$. Paired-samples *t*-tests indicated that performance on the *Explicit Denial* trials ($M = 0.70$, $SD = 0.62$) was significantly different from performance on *Explicit Belief* trials ($M = 1.21$, $SD = 0.72$), $t(23) = 2.40$, $p = .025$, $d = -0.74$. Analyses also revealed main effects of trial type for both 5- and 7-year-olds, $F(3, 75) = 43.05$, $p < .001$, $\eta_p^2 = .63$, and $F(3, 75) = 69.0$, $p < .001$, $\eta_p^2 = .73$, respectively. For children in both of these age groups, post-hoc tests indicated that *Explicit Denial* trials ($M = 0.23$, $SD = 0.43$ for 5-year-olds; $M = 0.08$, $SD = 0.27$ for 7-year-olds) were significantly different from all other trials (all ps $< .001$). There was also a main effect of trial type for the 9-year-olds, $F(3, 72) = 58.45$, $p < .001$, $\eta_p^2 = .71$. Again, *t*-tests revealed that *Explicit Denial* ($M = 0.04$, $SD = 0.20$) trials were significantly different than the other trials (all ps $< .001$); however, a new pattern emerged that was not present in the younger groups—performance on *Implicit Belief* trials was significantly different from performance on *Explicit Belief* trials, with children more likely to claim that the novel entity was real on *Implicit Belief* ($M = 1.40$, $SD = 0.82$) than on *Explicit Belief* ($M = 1.08$, $SD = 0.81$) trials, $t(24) = 2.14$, $p = .043$, $d = 0.39$.

Further assessments of age-related patterns were made by comparing children's responses to chance. As is apparent from Figure 1, the only trial type on which 3-year-olds' responses differed from chance was the *Explicit Denial* conversations, $t(23) = 2.29$, $p = .032$, $d = -0.95$. For both the 5-year-olds and 7-year-olds, responding on all four trial types was significantly different from chance. For the *Explicit Denial* trials, 5- and 7-year-olds consistently claimed that the entities were real at a level less than what would be expected by chance, $t(25) = 9.13$, $p < .001$, $d = -3.65$, and $t(25) = 17.32$, $p < .001$, $d = -6.93$, respectively. For the *Explicit Belief* and *Implicit Belief* trials, children of both age groups consistently claimed that the entities were real at a level greater than chance: for *Explicit Belief* trials, $t(25) = 2.44$, $p = .022$, $d = 0.98$ for 5-year-olds and $t(25) = 3.61$, $p = .001$, $d = 1.44$ for 7-year-olds; for *Implicit Belief* trials, $t(25) = 2.13$, $p = .043$, $d = 0.85$ for 5-year-olds and $t(25) = 2.30$, $p = .03$, $d = 0.92$ for 7-year-olds. Both 5- and 7-year-olds' responses were significantly greater than chance on the *Known Real* (control) trials, $t(25) = 13.84$, $p < .001$, $d = 5.54$, and $t(25) = 25$, $p < .001$, $d = 10.0$,

TABLE 1
Number of Children in Each Age Group Claiming Zero, One, and Two Entities Were Real for Each Conversation Type

	Number of 'real' responses		
Age	*0*	*1*	*2*
Known Real			
3 years	5	7	12
5 years	0	3	23
7 years	0	1	25
9 years	0	0	25
Explicit Belief			
3 years	4	11	9
5 years	5	6	15
7 years	4	4	18
9 years	7	9	9
Implicit Belief			
3 years	6	10	8
5 years	4	10	12
7 years	6	4	16
9 years	5	5	15
Explicit Denial			
3 years	9	13	2
5 years	20	6	0
7 years	24	2	0
9 years	24	1	0

respectively. Nine-year-olds' responses were significantly greater than chance on the *Known Real* (performance at ceiling level of 100%) and *Implicit Belief* trials, $t(24) = 2.45$, $p = .022$, $d = 1.00$, and significantly less than chance on the *Explicit Denial* trials, $t(24) = 24.0$, $p < .001$, $d = -9.80$. Unlike younger children, however, their performance on the *Explicit Belief* trials was not significantly different from chance responding, $t(24) = 0.49$, $p = .63$.

Examination of individual participant patterns offers further insight into the overall pattern of results. Table 1 shows the number of children claiming that zero, one, or both entities were real as a function of the different types of conversational cues. These patterns are particularly helpful in interpreting group means that are at or close to chance. As can be seen in the table, although 3-year-olds' scores were significantly different from chance on the *Explicit Denial* trials, a large number of children of this age still performed randomly on these trials. Inspection of the patterns on the *Implicit Belief* trials reveals a trend that is not apparent in the group means. Although 5-, 7-, and 9-year-olds as a group each performed significantly differently from chance on these trials, many 5-year-olds performed randomly,

indicating that use of these cues does appear to develop between the ages of 5 and 7. Finally, with regard to the *Explicit Belief* trials, 9-year-olds appear evenly split between claiming that zero, one, and two entities were real. Thus, it is not the case that all 9-year-olds doubted these statements nor were they all at chance; rather there was a mix of skepticism and belief.

Finally, to explore the nature of 3-year-olds' poor performance, using scores on the control *Known Real* trials as an indicator of overall task comprehension, we divided 3-year-olds into those who performed correctly on both *Known Real* trials ($n = 12$) and those who did not ($n = 12$). We then explored whether 3-year-olds who understood the basic format of the task might have used the conversations to make reality status judgments. Indeed, 3-year-olds who "passed" (scored 2 out of 2) these control trials were significantly more likely to claim that the novel entities were real than children who failed them on both *Explicit Belief* ($M = 1.67$, $SD = 0.49$ vs. $M = 0.75$, $SD = 0.62$, $t(22) = 4.01$, $p < .001$, $d = 1.63$) and *Implicit Belief* trials ($M = 1.50$, $SD = 0.67$ vs. $M = 0.67$, $SD = 0.65$, $t(22) = 3.08$, $p < .005$, $d = 1.26$). Additionally, unlike the group of 3-year-olds as a whole, this group of children who passed the control task performed significantly differently from chance on both the *Explicit Belief,* $t(11) = 4.69$, $p < .001$, $d = 2.83$, and *Implicit Belief* trials, $t(11) = 2.57$, $p = .026$, $d = 1.55$.

General Skepticism Task

A univariate ANOVA was first conducted to explore effects of age on performance on the overall GST. Correct categorization of each entity (as real or pretend) was coded as 1, and incorrect categorization was coded as 0; responses were summed for a total possible score of 14. As expected, the analysis revealed a main effect of age, $F(3, 92) = 37.94$, $p < .001$, $\eta_p^2 = .55$. Post-hoc multiple comparisons ($p < .001$; Bonferroni correction) indicated that 9-year-olds ($M = 11.62$, $SD = 1.10$) performed similarly to 7-year-olds ($M = 10.84$; $SD = 1.21$) but better than 5-year-olds ($M = 10.04$, $SD = 1.40$) and 3-year-olds ($M = 7.48$, $SD = 1.86$). In addition, both 5- and 7-year-olds performed better than 3-year-olds. We also examined performance on a subset of the GST—the four cultural fantasy figures: Santa Claus, the Tooth Fairy, monsters, and dragons (FF-GST). This analysis also revealed a significant effect of age, $F(3, 99) = 12.03$, $p < .001$, $\eta_p^2 = .27$. Post-hoc comparisons indicated that 9-year-olds ($M = 3.36$, $SD = 0.86$) tended to perform better than 7-year-olds ($M = 2.65$, $SD = 1.06$), $p = .062$, and performed better than both 5-year-olds ($M = 2.31$, $SD = 0.68$), $p = .001$, and 3-year-olds ($M = 1.83$, $SD = 1.03$), $p < .001$. In addition, 7-year-olds performed better than 3-year-olds, $p = .02$.

To examine whether belief in familiar fantastical beings was related to performance on the conversation tasks, we computed partial correlations

(controlling for age) on scores for FF-GST and the four conversation tasks. These revealed two marginally significant positive relations, one with *Explicit Belief,* $r(97) = .18$, $p = .055$, and one with *Implicit Belief,* $r(97) = .19$, $p = .058$. Examination of each age group separately revealed significant positive relations between 7-year-olds' performance on the FF-GST and their performance on *Explicit Belief,* $r(24) = .49$, $p = .011$, and *Implicit Belief,* $r(24) = .47$, $p = .017$, trials, but no other significant correlations.

DISCUSSION

In this study, children selectively used information in the conversations of adults to make decisions about the real existence of novel entities. This research thus identifies a new and previously untapped source of information about reality status and verifies suggestions in the literature of its importance.

Our research indicates that the ability to extract very basic reality status information from conversations is present in some children as young as age 3. Three-year-olds show a significant grasp of certain fundamental reality status issues in experimental situations (e.g., Harris, Brown, Marriot, Whittall, & Harmer, 1991; Woolley & Van Reet, 2006; Woolley & Wellman, 1990), and they begin talking about reality status by late in their third year (Woolley & Wellman, 1990). Information that they glean from overhearing others talk may be one important source of information for these early conceptions. Admittedly, the videos we used were somewhat unnatural in that the actors were instructed not to convey the nonverbal cues that would normally accompany statements of disbelief, such as head shaking or facial expressions. This way, we could be certain that children were attending to specific cues in speech. However, these youngest children may have performed even better if such nonverbal cues had been present.

The results also indicate that with age, children begin to recognize the implications of subtle differences in the way people talk about real and not-real things. Children as young as 5 were able to use statements that presumed the real existence of novel entities to conclude that those novel entities were real, and the number of children with this ability increased by the age of 7. Children's understanding also was reflected in their spontaneous comments, like that of one child who claimed that quokkas were real "because they did a class report on them" and another who said, "If they were not real, how would someone bring it into their classroom?" However, certain more nuanced aspects of people's speech about subjectively real entities were not appreciated until later in the elementary school years. Not until age 9 did children begin to interpret explicit statements of belief

affirmation, such as "I believe in galahs," to indicate a more questionable reality status. As one 9-year-old explained, "You can tell they're not real, because they said 'I *believe*,' you know like 'I *believe* in monsters.'" These sorts of explicit belief statements were taken as less indicative of reality status than were implicit references.

These findings join a set of recent discoveries regarding how children make reality status judgments. In addition to the present findings that children can extract and utilize cues from the conversations of others, we know that children can use the context in which they encounter a novel entity to make reality status judgments. For example, Woolley and Van Reet (2006) demonstrated that children who heard about novel entities with reference to scientists or doctors (e.g., "doctors collect surnits") were more likely to claim that the entities were real versus children who heard novel entities described with reference to fantastical entities (e.g., "ghosts collect surnits"). Vaden and Woolley (2011) showed that children use the involvement of God in an event to decide whether the event really happened. By presenting children with standard and altered Bible stories (stories with references to God removed), they showed that children's decisions about whether extraordinary events could really happen are influenced by whether the event contains reference to God; these authors argue that reference to God causes children to shift their reality/fantasy boundaries.

The developmental abilities and trajectories identified in this study extend beyond making accurate reality status judgments. As Harris so forcefully argues (Harris, 2002; Harris & Koenig, 2006), children rely on the testimony of others to learn about a host of domains of knowledge, including science, history, and religion. Our finding that young children, by the age of 5, are sensitive to implicit cues to reality status that are present in others' conversations helps to explain how it is possible for children of this age to form concepts about which they receive little or no direct instruction, and for which they lack direct firsthand experience, such as that of germs. Without presumably ever hearing anyone explicitly acknowledge their existence, preschool-aged children appear to understand that invisible entities can have causal effects on the human body (Au, Sidle, & Rollins, 1993; Kalish, 1996). It is likely that one source of this knowledge is the sorts of implicit statements, like, "that hospital was full of germs" that children often overhear. At the same time, it may not be until around age 9 that children come to appreciate the subtle implications of parents, other children, or even teachers stating that they "believe in evolution."

Research by Harris and colleagues indicates that, although children do believe strongly in certain invisible entities like germs, they are less confident of the existence of certain other invisible beings like the Tooth Fairy and God (Harris, Pasquini, Duke, Asscher, & Pons, 2006). They suggest that an

important component of this differential level of belief is sensitivity to the discourse that surrounds these supernatural beings. They note that, with regard to Santa Claus, for example, children might be likely to hear statements like, "There really is a Santa Claus" or "I believe in Santa Claus," and that they may conclude from these statements that "the existence of such special beings is not altogether beyond doubt" (Harris & Koenig, 2006, p. 520). Our research indicates that, although children are indeed sensitive to various verbal cues to existence, awareness of the subjectivity implied by these sorts of explicit avowals of belief is not present until around age 9.

We expected that the ability to use the sorts of conversational cues included in this study might be related to children's beliefs about the existence of various familiar fantastical beings. Results revealed that among 7-year-olds only, children who correctly categorized more familiar fantastical beings as pretend used the statements of belief in these conversations to infer an entity's reality status. These findings are consistent with the possibility that use of the kinds of cues we presented in our research might influence reality status judgments in everyday life.

It is most likely, however, that multiple factors contribute to individual variation in beliefs in these entities. To date, researchers have identified parental support (Boerger, Tullos, & Woolley, 2009; Rosengren & Hickling, 1994), fantasy orientation (Sharon & Woolley, 2004; Singer & Singer, 1981), beliefs in related fantastical entities (Boerger et al., 2009; Woolley, Boerger, & Markman, 2004), and use of evidence (Tullos & Woolley, 2009) as contributing to individual differences in making reality status decisions. Use of conversational cues might be relevant to other aspects of belief as well, such as the understanding of belief subjectivity. This would be consistent with Harris et al.'s (2006) finding that not until 8 years old did children recognize that the reality status of certain fantastical beings is equivocal; that is, some people may believe in them and some people may not. Their results indicated that 4- and 6-year-olds showed very limited understanding of this fact with regard to three fantastical beings—ghosts, monsters, and angels—and that this understanding appeared to emerge around age 8. It may be that part of children's developing awareness of this subjectivity is due to increased attention to cues in speech such as those investigated in our study.

There are still a number of unanswered questions regarding how children learn about reality from the conversations, and verbal reports more generally, of others. One remaining task is to identify the nature of the input children receive regarding various types of scientific, fantastical, and religious entities at home, in school, and with peers. It will also be important to examine use of these cues in children from a wide range of cultural and linguistic backgrounds. Cultural variation in assignment of reality status to entities and events as well as linguistic variability in marking reality may contribute

to important developmental and cultural differences in making reality status judgments. Another task will be to explore effects on belief of the kinds of questions children are asked. It is commonly thought that the act of defending one's beliefs can strengthen those beliefs (see, e.g., Bateson, 1975, for evidence of this with regard to religion). On this view, asking children questions like, ''Do you believe in (x)?'' and following that up with a request for an explanation would be predicted to increase belief level. Simple questioning about reality status (e.g., ''Is Santa Claus real or pretend?''), like many researchers do, could potentially also affect belief level.

It will also be important to probe the effects of causal language on belief. Harris et al. (2006) suggest that ''testimony that implicates the entity in a causal sequence'' may be especially valuable. Guerrero et al. (2010) suggest that it indeed may not be the endorsement of these entities that is critical; rather, it may be children's understanding of the ''larger causal narratives'' in which the entities play a role. The implicit statements used in our study did not have particularly strong causal components. Perhaps if we included a stronger causal reference in these statements, even younger children might successfully use them to make accurate reality status judgments. Finally, future studies would benefit from including certainty measures, as there may be situations in which different conversational cues might lead to similar reality status judgments while producing differences in certainty about those judgments. Answers to these questions will build upon the basic finding in this study that children's attention to others' conversations is an important mechanism in the development of reality status judgments.

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APPENDIX

Scripts for Videos

Explicit Belief (EB1)

A: Hey, do you know about bilbies?
B: Yeah, I do. Bilbies are real. I believe in them.
A: Yeah: I believe in bilbies, too.
B: Oh (looks at watch), I've got to go!

Explicit Belief (EB2)

A: Hi. Hey, have you heard of takins?
B: Yeah, for sure. I believe in takins. They're really real.
A: Yeah: I believe in takins, too.
B: OK, bye!

Explicit Denial (ED1)

A: Hi. You know, there's this thing called civets, but they're not real. I don't believe in civets.
B: Yeah, I don't believe in civets either. They don't really exist.
A: That's right.

Explicit Denial (ED2)

A: Hi. Did anyone ever tell you about galahs? They're not in real life. I don't believe in galahs.
B: Yeah, I know they're not in real life. I don't believe in them either.
A: See ya.

Implicit Belief (IB1)

A: Hi. Do you know what happened?
B: What?
A: When we went to Africa this summer, we saw a baby dugong being born!
B: Wow, that's neat. When we went there, we met some people who were trying to protect the dugongs from hunters.
A: Oh. That sounds like a good trip.

Implicit Belief (IB2)

A: Hi. I have so much homework for my science class tonight. We have to write a five-page report about quokkas.
B: I remember that science class. When I took it we studied quokkas for 2 weeks.
A: Wow, well, good luck in your classes!

Known Real: 7- and 9-year-Olds (KR1)

A: Hi. I bet you've never heard of pumas. Pumas are a kind of wild cat that lives in the mountains in some countries. They really exist.
B: Oh, yeah, I know about pumas. They're kind of like leopards. They're real, for sure.
A: Yeah. Hey, let's go get some coffee.

Known Real (KR2)

A: My friend lives in New York City. They don't even have any armadillos in New York. I told her armadillos are real. They live in Texas!
B: Of course armadillos are real. Everyone knows that!
A: Yeah, they're all over Texas.