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"I Believe in Cusk": The Effect of Explicit Belief Statements on Children's Reality Status Judgments and Beliefs about Consensus

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ABSTRACT

Children learn about the world through others' testimony, and much of this knowledge likely comes from parents. Furthermore, parents may sometimes want children to share their beliefs about topics on which there is no universal consensus. In discussing such topics, parents may use explicit belief statements (e.g., "Evolution is real") or implicit belief statements (e.g., "Evolution happened over millions of years"). But little research has investigated how such statements affect children's beliefs. In the current study, 4- to 7-year-olds (N = 102) were shown videos of their parent providing either *Explicit* ("Cusk is real") or *Implicit* ("I know about cusk") belief testimony about novel entities. Then, children heard another speaker provide either *Denial* ("Cusk isn't real") or *Neutral* ("I've heard of cusk") testimony. Children made reality status judgments and consensus judgments (i.e., whether people agree about the entity's existence). Results showed that explicit and implicit belief statements differentially influenced children's beliefs about societal consensus when followed by a denial: explicit belief statements prevented children from drawing the conclusion that there is societal consensus that the entity does not exist. This effect was not related to age, indicating that children as young as 4 use these cues to inform consensus judgments. On the reality status task, there was an interaction with age, showing that only 4-year-olds were more likely to believe in an entity after hearing explicit belief statements. These findings suggest that explicit belief statements may serve as important sources of both children's beliefs about novel entities and societal consensus.

Children learn about the world through the testimony of others, partially because it is impossible or quite difficult to have direct access to certain information (e.g., the existence of germs). Children receive much of this testimony in the context of parent–child conversations. In addition to conveying universally accepted information (e.g., basic scientific facts), parents also often want their children to share their beliefs about topics for which there is not universal consensus (e.g., religious convictions or controversial scientific topics). In some cases, these beliefs may not be shared by the child's peers or even other adult members of their community. If parents think it is important for their children to share their beliefs in certain areas, they may use explicit belief statements (e.g., "I believe in God," or "Evolution is real") to convey their views, rather than using solely

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implicit statements of belief ("God lives in heaven" or "Evolution happened over millions of years"). The research reported here suggests that the type of statements used can have important influences on both children's own beliefs about a novel entity's existence and their beliefs about societal consensus. In a study with 4- to 7-year-old children, we examine whether the effect of explicit versus implicit belief statements depends on the presence of later denial testimony and how the effects of such statements may differ across development.

There are conflicting predictions about the effect explicit belief statements may have on children's reality status judgments compared to implicit belief statements. On one hand, in everyday conversation about real things, both observable and unobservable, we rarely stipulate that we believe in the objects of our discussion. Indeed, one of the Gricean maxims of quantity—that one should not provide more information than is necessary—implies that we should not need to explicitly indicate that something is real when this information is not at question in the context of the conversation (Grice, 1975). Harris, Pasquini, Duke, Asscher, and Pons (2006) have argued that as children develop, they may come to recognize that the reality status of real things is almost never the topic of conversation, but, as Canfield and Ganea (2013) have shown, the reality status of fantastical entities, like Santa Claus, often is. This realization might lead children to doubt the existence of entities that are introduced with explicit belief statements (Harris et al., 2006).

There is remarkably little literature related to how children interpret explicit belief statements or how these might influence belief. In one study, Woolley, Ma, and Lopez-Mobilia (2011) addressed this question experimentally by presenting children with videos of conversations in which adults either implicitly acknowledged the existence of a novel entity (e.g., "When we went to Africa this summer, we saw a baby dugong being born") or explicitly acknowledged the existence of a novel entity without providing additional information (e.g., "Bilbies are real. I believe in them"). Results showed that 3-, 5-, and 7-year-olds did not discriminate between the two types of conversation. Nine-year-olds, on the other hand, behaved as Harris et al. (2006) predicted: they were more likely to say that the entities were real when their existence was implicitly acknowledged than when their existence was explicitly acknowledged. Thus, Woolley et al. concluded that by age 9 children use explicit belief statements as a cue that an entity might not exist. However, a later study by Dore, Jaswal, and Lillard (2015) found that when the amount of information in the explicit and implicit conversations was equated, 9-year-olds' belief was not influenced by the presence of explicit belief statements. In this study, in explicit belief conversations, children heard the speakers profess a belief in the novel entities, but they also heard the speakers describe other characteristics of the entities, similar to the information provided in implicit belief conversations. These findings suggest that even for 9-year-olds, explicit belief statements alone may not serve as a cue to doubt the existence of a novel entity.

One explanation for this lack of skepticism toward explicit belief statements could be that children are exposed to these statements about a wider range of entities than researchers have traditionally assumed. Hence, hearing them in an experimental context might not have triggered doubt. Researchers have noted that when talking to children, adults often use explicit belief statements to describe endorsed entities, like Santa Claus, even though they themselves do not actually believe these entities exist (Harris et al., 2006; Woolley et al., 2011). However, parents likely also express belief in various entities and

processes that they do believe exist—like God, evolution, and climate change. In these cases, the motivation for professing a belief may be to acknowledge that their existence is not universally accepted. Parents may use explicit statements of belief ("We believe in God," or "Evolution is real") to prepare children for (and perhaps inoculate them against) contrary testimony from others. Thus, these statements may serve a different purpose than simply implying the entity's existence ("God lives in heaven" or "Evolution happened over millions of years"). Instead, explicit belief statements may draw children's attention to the controversial status of these entities and lead them to be impervious to contradictory testimony later (e.g., "God doesn't exist" or "Evolution is just a theory").

Although 9-year-olds' belief is not influenced by explicit belief statements in either a positive or negative direction (Dore et al., 2015), the developmental origin of the way children react to these statements is unknown. No studies, to our knowledge, have assessed the effect of explicit belief statements on younger children's belief while equating the level of information between explicit and implicit statements. Woolley et al. (2011) show that 3-, 5-, and 7-year-olds do not differentiate between explicit and implicit belief statements, but, as discussed earlier, information level was not comparable between their explicit and implicit conditions. Thus, in the present study we focused on younger children (4- to 7-year-olds) to examine how explicit versus implicit belief statements affect their reality status judgments. At these earlier stages of cognitive development, young children might take explicit belief statements at face value, such that hearing someone state that an entity is real would make them more likely to endorse its existence compared to hearing someone implicitly acknowledge the entity's existence. In addition, these early years might be especially critical for looking at how children react to these kinds of statement, as parents might perceive this time as their best opportunity to influence beliefs before peers become increasingly important in their children's lives.

Another possibility is that these two types of belief statement may only differentially influence children's own beliefs in novel entities in the presence of later contradictory testimony. That is, in line with previous research with 9-year-olds, younger children may not use explicit belief statements *per se* to inform their beliefs. However, if, after hearing an entity described with an explicit belief statement, children later hear another person deny that entity's existence, children might not be as influenced by that negative testimony as they would have been if they had previously heard an implicit belief statement. This pattern would indicate that explicit belief statements are protective of children's beliefs in the face of later contradictory testimony, even though they may not influence belief independently. Of note, these two patterns could occur simultaneously, such that explicit belief statements increase children's belief overall relative to implicit belief statements, but the effect is stronger in the face of later denial testimony.

In addition to influencing children's own beliefs about entities' existences, the way reality status beliefs are articulated may also inform children's views about societal consensus. Research shows that children as young as 3 can reason about consensus, endorsing a label that multiple informants used for a novel object rather than a label used by a lone dissenter, and preferring a non-dissenter as an informant on a subsequent labeling task (Corriveau, Fusaro, & Harris, 2009). However, little research has investigated factors that may affect children's beliefs about broader societal consensus based on specific instances of testimony. In the case of explicit belief, simply hearing someone state an

explicit belief in an entity may cause children to believe that the entity's reality status is controversial, relative to hearing an implicit statement of belief.

As with children's own beliefs, another possibility is that explicit belief statements may differentially affect children's beliefs about consensus only in the face of later contradictory testimony. In other words, simply hearing an explicit belief statement may not cause children to think an entity's existence is controversial. However, if children hear an explicit belief statement (e.g., "We believe in God") and then later hear another person deny that entity's existence (e.g., "God isn't real"), they may then be likely to believe that there is no societal consensus about the entity's reality status. In contrast, hearing a denial after hearing an implicit statement might cause children to endorse societal consensus that the entity is not real. As above, these possibilities are not mutually exclusive. That is, explicit belief statements on their own could cause children to believe that an entity's existence is controversial relative to hearing an implicit statement, but this effect might be stronger in the presence of later contradictory testimony. Although previous studies have investigated the role of explicit belief statements in children's own beliefs, to our knowledge, no research has explored how they might influence beliefs about consensus.

In the current study, we tested the effect of parents' explicit versus implicit belief statements on children's belief in novel entities and beliefs about consensus. Most testimony studies are conducted in laboratory settings, and this methodology necessarily sacrifices some amount of ecological validity in favor of experimental control. That is, in these studies children typically hear testimony from strangers, and sometimes even from puppets rather than people. The assumption that similar cognitive mechanisms operate in these settings and in real-life situations is not trivial. Children may respond quite differently when testimony comes from known others, such as family members, friends, or peers. Indeed, Dawkins (1995) has argued that children's credulity may require override rules, such as believing one's parents over other adults. Several studies have highlighted the idea that children might privilege the testimony of a familiar informant, showing, for example, that preschoolers trust their mother and their preschool teacher over a stranger (Corriveau & Harris, 2009; Corriveau et al., 2009). Here, we combined the experimental control that comes from a laboratory setting with the ecological validity of parent testimony by having parents participate in the testing session. Thus, all children see their own parent within the lab session, allowing us to draw stronger conclusions about the ecological validity of the findings.

In the study, children saw videos of their parent providing either *Explicit* ("Hux is real") or *Implicit* ("I know about hux") belief testimony. Both types of testimony included a description of the entity ("Hux is stuff that is pink and slimy"). Then, children heard another speaker provide either *Denial* ("Hux isn't real") or *Neutral* ("I've heard of hux") testimony. Afterwards, children made consensus judgments (e.g., "If we asked people whether there really is hux in the world, would people all say 'yes,' would they all say 'no,' would some say 'yes' and some say 'no?'"), as well as reality status and confidence judgments.

Notably, although the nature of the Explicit and Denial statements is fairly straightforward, what should be included in an Implicit belief statement and a Neutral statement is more ambiguous. As we operationalized them here, these statements are quite similar in nature and we use different labels primarily for clarity. Both Implicit belief statements and Neutral statements included a statement recognizing that the speaker knew of or had

heard about the entity in question but did not provide further information or description. Thus, the statements might seem to imply that the entities have "real" status in that people know about and discuss them. However, people know about and discuss both real entities (elephants, rabbis) and non-real entities (mermaids, Harry Potter), so this type of statement should not be informative about reality status.

The results of this study could show several different patterns that would shed light on our research questions. On the reality status task, although older children do not appear to be swayed by explicit—relative to implicit—belief statements, the beliefs of our younger sample may be boosted by such statements. In that case, we would expect to see that when a parent makes an explicit belief statement, children are more likely to believe in the entity than after hearing an implicit belief statement. Conversely, any effect of explicit belief statements may only be present when children hear a later denial. Then, we might expect that children would exhibit similar levels of belief when the later statement is neutral, regardless of whether the parent first made an explicit or an implicit belief statement; whereas an explicit belief statement before a denial would lead to higher levels of belief than when a denial is preceded by an implicit belief statement.

On the consensus task, if children use explicit belief statements as a cue to an entity's controversial status, we would expect to see a main effect of statement type, with children being more likely to indicate that the entity's existence is controversial after hearing an explicit belief statement than after hearing an implicit belief statement, regardless of whether the later testimony is a denial or a neutral statement. Conversely, explicit belief statements may only be an indicator to children that an entity's reality status is controversial in the presence of later denial testimony. In that case, we would expect children to respond similarly to both types of statement when the later testimony is neutral. However, when the statements are followed by a denial, children should be more likely to indicate that the entity's existence is controversial after hearing an explicit statement and more likely to indicate that an entity does not exist after hearing an implicit statement.

We also expected that these two types of belief statements might produce different developmental trajectories. For children's own reality status judgments, we might expect that any positive effect of explicit belief statements will decline as children get older, as children may come to recognize that these statements should not always be taken at face value. Implicit belief statements, on the other hand, might not yield developmental differences (Woolley et al., 2011). For children's judgments of societal consensus, we might expect to see the opposite pattern with regard to explicit belief statements. That is, using explicit belief statements as a cue as to an entity's controversial status may be a sophisticated strategy that only emerges in the older children in our sample. Here, we used age as a moderator to assess whether the effect of explicit versus implicit belief statements on children's own reality status judgments and beliefs about consensus change across development.

Method

Participants

Participants were 102 children: 25 four-year-olds (11 girls, M = *4;7*, range = 4;1–4;11) 25 five-year-olds (13 girls, M = *5;4*, range = 5;0–5;11), 26 six-year-olds (14 girls, M = *4;7*, range = 6;6–6;11), and 26 seven-year-olds (14 girls, M = *7;6*, range = 7;1–8;4). Five

additional children participated and were excluded due to experimenter error ($N = 1$), the parent being in the room during testing ($N = 1$), having previously participated in piloting the procedure ($N = 2$), and unusable parent videos, as described below ($N = 1$). Children were recruited from a participant database at a large Southwestern university in the United States. Sample size was based on convention and on previous studies with similar paradigms and was determined prior to beginning data collection.

Design

The study employed a 2 (Parent statement: *Explicit* vs. *Implicit*) × 2 (Second statement: *Neutral* vs. *Denial*) × 2 (Task: *Reality status* vs. *Consensus*) repeated-measures design. Children participated in eight test trials. In one block of four trials, children gave reality status judgments and confidence ratings; in the other block of four trials, children gave consensus judgments. Block order was counterbalanced across children. Within each block, there were four trial types, formed by crossing Parent statement (*Explicit* vs. *Implicit*) with Second statement (*Neutral* vs. *Denial*). Within each trial, children saw a video from their parent first (either *Explicit* or *Implicit*), and then a video of a researcher (either *Neutral* or *Denial*). Thus, the four trial types were: (1) Implicit-Neutral, (2) Implicit-Denial, (3) Explicit-Neutral, and (4) Explicit-Denial. Four trial orders were created and were counterbalanced across children. All orders changed both statement types from the first to the second trial, to encourage children to pay attention to differences between trial types.[1]

Materials and procedure

Test videos

At the beginning of the families' visit to the lab, parents filmed eight short videos describing different novel entities (e.g., bosa, hux). All videos described the entity's color and texture (e.g., "Hux is stuff that is pink and slimy") and started with a sentence asking if the child had heard of the entity (e.g., "Do you know about hux?"). Two videos used explicit belief statements and two videos implicitly acknowledged the entities' existence. Explicit videos included two explicit belief statements (e.g., "I believe in hux" and "Hux is definitely real"). To match the video types for length, the implicit videos included general statements not explicitly discussing the entity's existence (e.g., "Yeah, it's called hux" and "Yeah, I know about hux"). In the videos, parents were told to speak as if they were talking to their child. Children were in another room, out of earshot, during filming.

Prior to the testing session, similar videos were created of research assistants describing the same entities using either denial statements or neutral statements. Denial videos included two statements explicitly denying the entity's existence (e.g., "I don't believe in hux" and "Hux isn't real"). Neutral videos included a general statement, similar in nature to the implicit statements, not explicitly discussing the entity's existence (e.g., "I know

[1]The four orders were: Order A: Explicit-Neutral, Implicit-Denial, Explicit-Denial, Implicit-Neutral; Order B: Implicit-Denial, Explicit-Neutral, Implicit-Neutral, Explicit-Denial; Order C: Explicit-Denial, Implicit-Neutral, Explicit-Neutral, Implicit-Denial; Order D: Implicit-Neutral, Explicit-Denial, Implicit-Denial, Explicit-Neutral.

about hux"). All videos described the entity's color and texture, in agreement with the parent video (e.g., "Did you hear about hux—the pink stuff that's slimy?"). Although efforts were made to re-record unusable videos during the visit, several trials were deemed unusable after data collection: all eight trials for one parent who skipped the first sentence for each trial, two trials for one parent who misspoke a critical sentence (e.g., "Hux *has* stuff that is pink and slimy" instead of "Hux *is* stuff that is pink and slimy") and one trial for a parent who skipped one of the explicit belief statements.

Samples of both parent and research assistant videos are available in the Online Supplementary Materials.

Reality status task

Before seeing the test videos for the reality status task, children participated in a training and practice phase. First, children were told that they would play a game in which they needed to "figure out whether different things are real or not real, so if they really exist in the world or if they don't really exist in the world." Children were shown two boxes to use for sorting. The "Real" box had a picture of cats on it, and the "Not Real" box had a picture of a singing fish. For each item, the experimenter showed children a card and read the word aloud before asking children to place it where it belonged. Children were then asked if they were really sure or just a little sure, to assess confidence in their reality status judgments.

Two practice items, squirrels and flying pigs, were included to familiarize children with providing "real" and "not real" answers. Children who answered incorrectly were corrected. Two novel entity practice items, dugongs and bilbies, were also included to introduce children to the idea that they would be making judgments about entities that they had never heard of before. Children were not given any feedback for novel entity items. Several additional items for which children might have low confidence about their reality status judgment were included to encourage children to use the "a little sure" option when appropriate. These items were angels, witches, dragons, ghosts, and unicorns, in that order. The practice phase was ended if a child chose "a little sure" on one of these items. Children were not given any feedback on their responses.

After the practice phase, children were shown the test video sets. Each video was played twice to ensure that children had time to sufficiently process the content. Then, the experimenter showed children a card with the name of the entity on it, read the name aloud, and asked whether the card should be placed in the "Real" box or the "Not Real" box. After making a decision, children were asked how sure they were about their judgment. Children were not given any feedback during test trials.

Consensus task

Prior to seeing the test videos for the consensus task (adapted from Harris et al., 2006), children participated in a training and practice phase. Children were told that they needed to figure out what other people think about whether some different things are real or not real. They were shown three boxes, each of which had a picture of six faces on the front. On the "All Yes" box, all of the faces were smiling, on the "All No" box, all of the faces were frowning, and on the "Yes and No" box, three faces were smiling and three were frowning. After the boxes were introduced, children were tested for their understanding

by asking them what the people were saying on each box. If children responded incorrectly, they were corrected and the question was repeated until the child answered correctly. For each item, the experimenter showed children a card and asked, "If we asked people whether there really is X in the world, would they all say 'yes' like this [while pointing to the "All Yes" box] or would they all say 'no' like this 'while pointing to the "All No" box], or would some say 'yes' and some say 'no' like this [while pointing to the "Yes and No" box]?"

Two practice items—dogs and brains—were included to familiarize children with using the "all yes" response, whereas one item, green cows, was included to familiarize children with using the "all no" response. One item, fairies, was included to familiarize children with using the "yes and no" response. Children who answered incorrectly were corrected. Two novel entity items, tanzers and blickets, were included to introduce children to the idea that they would be making judgments about entities they had never heard of before. Children were not given any feedback on the two novel entity items.

After the practice phase, children were shown the test video sets. Each video was played twice to ensure that children had time to sufficiently process the content. Then, children were asked what other people would say about whether that entity was real or not real. Children were not given any feedback during test trials.

Results

Reality status task

Real/not real judgments and confidence ratings were combined to create a reality status score for each trial such that −2 represented "really sure that it is not real," −1 represented "a little sure that it is not real," +1 represented "a little sure that it is real," and +2 represented "really sure that it is real."[2] Mean scores by age group and trial type are presented in Table 1.

Before beginning the primary analyses, we examined the effect of task order on children's responses. Belief was somewhat lower when the reality status task was first, $B = -0.81$, $p = .003$. There was also an interaction between task order and parent statement, $B = 0.47$, $p = .03$, such that the effect of explicit belief statements on reality status judgments was stronger when the reality status task was first. However, neither the

Table 1. The effect of Parent statement (*Explicit* vs. *Implicit*) on reality status score, by age group (SD).

	4-year-olds	5-year-olds	6-year-olds	7-year-olds
Implicit-Neutral	.52 (1.7)	.17 (1.8)	.00 (1.6)	−.58 (1.3)
Explicit-Neutral	1.09 (1.4)	.21 (1.8)	−.50 (1.5)	−.52 (1.5)
Implicit-Denial	.04 (1.8)	−.43 (1.7)	−.68 (1.6)	−.27 (1.5)
Explicit-Denial	.88 (1.6)	.20 (1.7)	−.12 (1.6)	−.77 (1.5)

Note: Reality status scores could range from −2 (really sure that entity is not real) to +2 (really sure that entity is real).

[2]The pattern of results is consistent when this task is scored on a 1 to 4 scale, rather than on a −2 to 2 scale. We use the −2 to 2 scale here for ease of interpretation.

interaction between task order and Second statement nor the three-way interaction between order, Parent statement, and Second statement were significant. Regardless, to control for the main effect of order, this variable was included as a control covariate in all subsequent analyses.

Reality status scores were used as the dependent variable in a mixed-effects regression model with Parent statement (*Explicit* vs. *Implicit)* and Second statement (*Neutral* vs. *Denial*) and age (as a continuous variable) as predictors, as well as the random effect of subject to account for the repeated measures design. The initial model also included all possible interactions between these variables. Nonsignificant predictors were systematically removed using model comparison (Akaike information criterion, a measure of the relative goodness of fit; see Anderson, 2008) until a final model with only significant predictors was obtained.

The final model included Parent statement (*Explicit* vs. *Implicit), B* = 2.12, $p = .0004$, $d = .10$, Second statement (*Denial* vs. *Neutral), B* = −0.18, $p = .09$, $d = .11$, age, *B* = −0.26, $p = .04$, and the interaction between Parent statement and age, *B* = −0.32, $p = .001$. The effect of Second statement (*Neutral* vs. *Denial*) showed that children tended to have somewhat lower reality status scores on *Denial* trials ($M = -0.14$, $SD = 1.68$) than on *Neutral* trials ($M = .03$, $SD = 1.67$), although the difference was not statistically significant at the $p < .05$ level. In the model with all two-way interaction terms, there was not a significant interaction between Parent statement and Second statement, $p = .18$, or between Second statement and age, $p = .14$.

We further examined the interaction between Parent statement and age by conducting regressions for each age group separately. As shown in Figure 1, 4-year-olds had higher reality status scores for entities that their parents described with explicit belief statements ($M = .98$, $SD = 1.5$) than for entities their parents implicitly acknowledged ($M = .28$, $SD = 1.77$, $B = 0.72$, $p = .007$, $d = .4$), whereas reality status scores for the two types of trial did not significantly differ for the other age groups, ps > .15. When age group, instead of age as a continuous variable, is used in the model, the effect of Parent statement (*Explicit* vs. *Implicit*) in 4-year-olds differs from the effect in 6- and 7-year-olds ($B = -0.73$, $p = .02$ and $B = -0.95$, $p = .002$, respectively) but not in 5-year-olds ($p = .16$). The effect in 5-year-olds is slightly but not significantly different from the effect in 7-year-olds ($B = .51$, $p = .097$). The effect does not significantly differ between 6- and 7-year-olds ($p = .46$). These data can also be examined by looking at whether children in each age group and with each type of statement were likely to believe consistently in the described entities or not. Among 4-year-olds, belief was significantly above zero when parents used explicit belief statements ($M = 0.98$, $t(47) = 4.5$, $p < .0001$, $d = .65$), but not when parents used implicit belief statements ($p = .27$). Five- and six-year-olds' belief was not significantly different from the zero point on the scale for either explicit or implicit belief statement trials (ps > .15). Among 7-year-olds, both explicit ($M = -0.65$, $t(50) = -3.15$, $p = .003$, $d = .43$) and implicit ($M = -0.42$, $t(51) = -2.15$, $p = .04$, $d = .3$) trial types were significantly below zero, reflecting the pattern that older children were less likely to believe in the described entities overall (correlation between belief and age: $r = -.28$, $p < .0001$).

Because overall group means were close to chance, we also explored individual subject patterns to assess whether children were responding randomly. Results showed that on the two explicit belief trials, 81 children responded consistently, either saying both entities were real or both were not real, whereas only 18 said real for one and not real for the

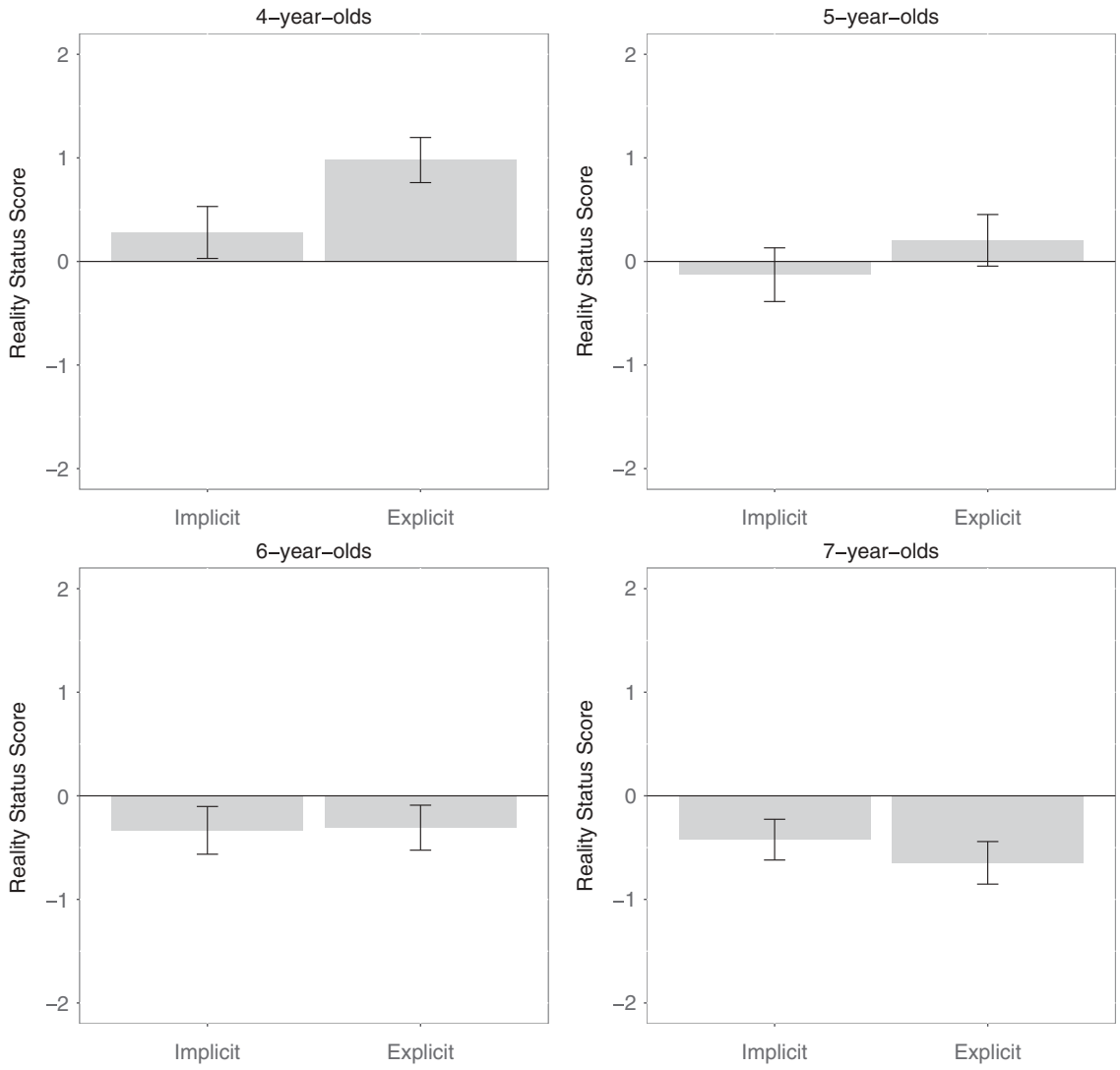

Figure 1. The effect of Parent statement (*Explicit* vs. *Implicit*) on reality status score, by age group.

other; 10 of these children chose real on the neutral and 8 on the denial trials. On the two implicit belief trials, 71 responded consistently, whereas 30 children offered different responses for each trial. Of the children who responded inconsistently, 20 indicated that the entity was real on the neutral trials but denied that the entity was real on the denial trials, whereas 10 indicated the reverse. Overall, these results show that children's responding across both explicit and implicit trials appears, for the most part, principled rather than random.

In sum, the results from the reality status task indicated that parental explicit belief statements had a positive effect on 4-year-olds' belief in novel entities compared to implicit statements of belief. On the other hand, type of statement appeared to have little effect on the beliefs of older children. Further, older children were less likely to believe in the entities overall, regardless of what type of statements they heard.

Consensus task

The raw descriptive data for children's response to the consensus task are presented in Table 2. To analyze the data from the consensus task, we conducted a series of mixed-effects multinomial logistic regressions. Our dependent variable is a (K = 3 levels) categorical variable – "all yes," "all no," and "yes and no." Accordingly, for each analysis that follows we estimated two (K-1) mixed-effect binary logistic regressions, one for "yes and no" versus "all no" and one for "yes and no" versus "all yes," where each utilized a random intercept term for subject. The −2 log likelihoods (−2LL) for these two regressions were aggregated and the aggregated results were used in likelihood ratio tests with Parent statement and Second statement. This general procedure for conducting a mixed-effect multinomial analysis is described in Agresti (2002), Hosmer and Lemeshow (2000) and other sources.

Our preliminary analyses revealed no main or interactive effects of age, suggesting that any use of explicit belief statements in informing children's perceptions of societal consensus is consistent across this age range, rather than being a more sophisticated strategy that only emerges in older children. Analyses did reveal that task order was significantly associated with responses, $X^2(2) = 17.04$, $p = .0002$, such that children were more likely to choose the "all no" response when the consensus task took place second than when the consensus task took place first. There was also a significant interaction between task order and Second statement, $X^2(2) = 6.27$, $p = .04$, showing that the effect of Second statement (*Neutral* vs. *Denial*, discussed below) is stronger when the consensus task took place first. However, neither the interaction between task order and Parent statement nor the three-way interaction between order, Parent statement, and Second statement were significant. Regardless, to control for the main effect of order, this variable was included as a control covariate in all subsequent analyses.

Table 2. Percentage of children giving each response to consensus task by trial type.[a]

	All no	All yes	Yes and no
Implicit-Neutral	23.5	33.3	43.1
4-year-olds	20.0	28.0	52.0
5-year-olds	24.0	40.0	36.0
6-year-olds	23.1	26.9	50.0
7-year-olds	26.9	38.5	34.6
Explicit-Neutral	22.7	35.6	41.6
4-year-olds	12.0	40.0	48.0
5-year-olds	25.0	45.8	29.2
6-year-olds	23.0	15.4	61.5
7-year-olds	30.1	42.3	26.9
Implicit-Denial	39.2	13.7	47.1
4-year-olds	36.0	32.0	32.0
5-year-olds	44.0	20.0	36.0
6-year-olds	46.2	0.0	53.8
7-year-olds	30.8	3.8	65.4
Explicit-Denial	24.5	21.6	53.9
4-year-olds	20.0	36.0	44.0
5-year-olds	24.0	28.0	48.0
6-year-olds	30.8	7.7	61.5
7-year-olds	23.1	15.4	61.5

[a]All percentages do not sum to 100 due to rounding.

We initially explored whether there was a two-way interaction between Parent statement (*Explicit* vs. *Implicit*) and Second statement (*Neutral* vs. *Denial*). Using the process described above, −2LLs were estimated for a full model containing both factors as main effects plus the interaction term and for a reduced model containing only the two main effects. The likelihood ratio test comparing the two models showed that the interaction was not significant, $X^2(2) = 4.05$, $p = .13$. However, we noted that children's consensus judgments for *Implicit-Neutral* trials and *Explicit-Neutral* trials cells looked very similar, and a test comparing those two cells confirmed that no significant difference in responses existed across these two trial types, $X^2(2) = 2.54$, $p = .28$, indicating that in the absence of a denial, explicit belief statements do not make children more likely to indicate that an entity's existence is controversial than do implicit belief statements. We therefore collapsed across these two trial types to form a baseline against which we tested the other two trial types (*Explicit-Denial* and *Implicit-Denial*).

To examine whether differences in patterns were apparent between the remaining trial types, we examined the association between trial type (combined *Neutral* baseline, *Explicit-Denial*, and *Implicit-Denial*) and children's consensus judgments by estimating −2LLs for a full model that included trial type as the lone main effect factor and for a reduced model that contained only an intercept term. The likelihood ratio test comparing these two models confirmed that significant differences existed in responses across the three trial types, $X^2(4) = 29.31$, Bonferroni-corrected[3] $p < .001$ (uncorrected $p < .001$), indicating that children's consensus judgments differed dependent on which combination of Parent and Second statements they heard. We conducted follow-up tests to compare both *Explicit-Denial* and *Implicit-Denial* to the combined *Neutral* baseline. That is, we examined how children's consensus judgments differed in the presence of a denial (after hearing either an explicit or implicit statement from a parent), compared with when they heard a neutral statement. Likelihood ratio tests revealed that the overall differences in consensus judgments between *Explicit-Denial* and the combined *Neutral* baseline was not significant, $X^2(2) = 3.37$, Bonferroni-corrected[4] $p = 1.00$ (uncorrected $p = 19$). However, overall differences in consensus judgments between the *Implicit-Denial* and the combined *Neutral* baseline were significant, $X^2(2) = 26.78$, Bonferroni-corrected $p < .001$(uncorrected $p < .001$), indicating that children's consensus judgments after hearing an implicit statement from their parent and then a denial from a second speaker differed from their consensus judgments after hearing either statement from a parent and then a neutral statement from a second speaker.

To further examine how responses differed across trial types, we used the outputs from the two mixed-effect binary logistic regressions that constituted the full model with condition as the sole factor to generate predicted odds of "all yes," "yes and no," and "all no" responses. These odds were then transformed into probabilities to arrive at the full set of model-predicted probabilities shown in Figure 2. The model-predicted probabilities

[3]Bonferroni corrections were conducted for the four plausible ways to combine two cells and test the combination against both of the others (i.e., combining both explicit cells, combining both implicit cells, combining both denial cells, and combining both neutral cells).

[4]Bonferroni corrections were conducted for the eight ways to test any plausible combined pair cells against any other single cell.

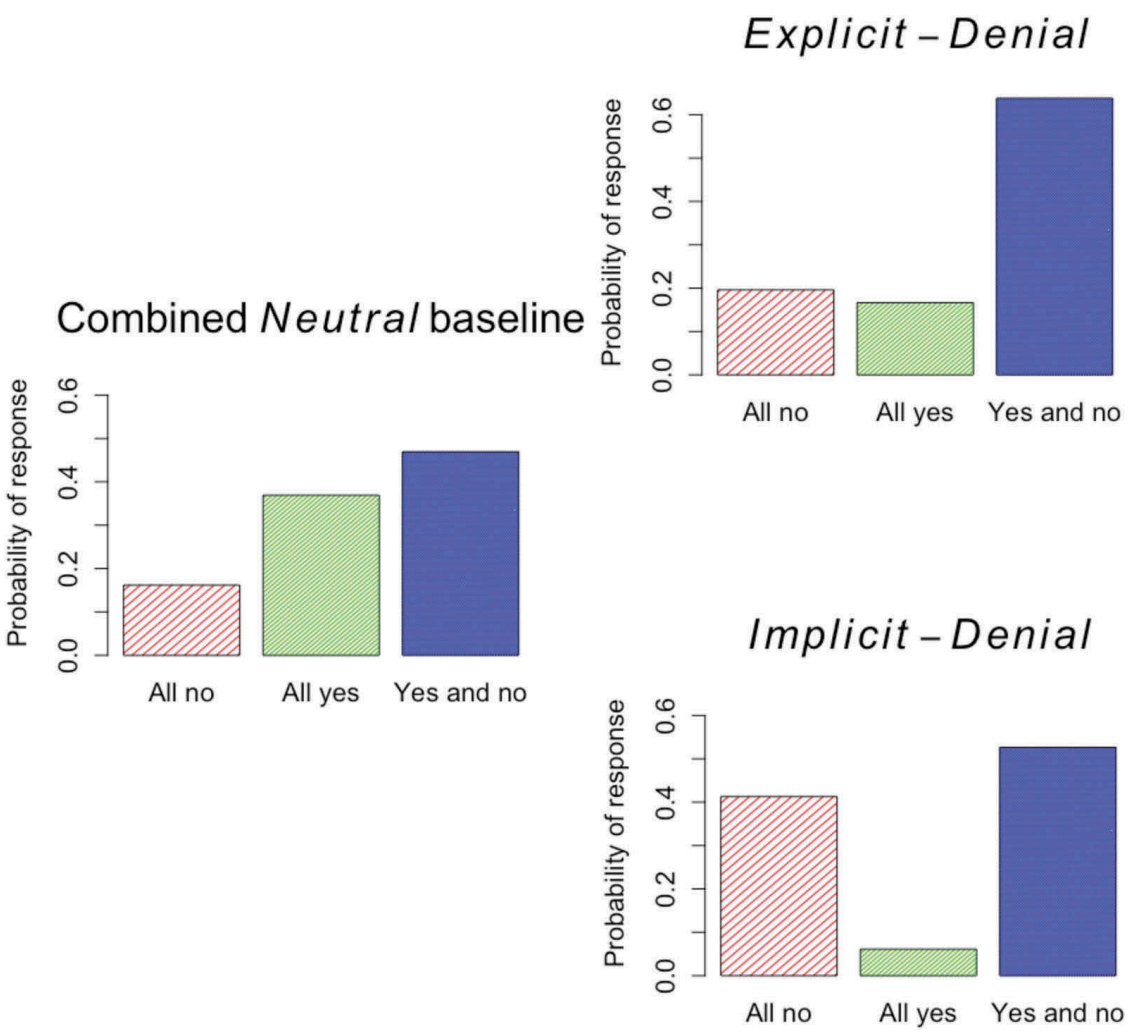

Figure 2. The model-predicted probabilities showing the effect of trial type on consensus judgments.

shown are independent of random subject effects and reflect the weighted average of the two task orders employed in the design.

We then further examined the association between trial type and consensus judgments by focusing on each possible response individually. Considering "all yes" responses, both *Explicit-Denial* (model-predicted probability = .17) and *Implicit-Denial* (model-predicted probability = .06) resulted in significantly fewer of this response type than the combined *Neutral* baseline (model-predicted probability = .37), $X^2(1) = 7.49$, Bonferroni-corrected $p = .05$ (uncorrected $p = .006$) and $X^2(1) = 17.98$, Bonferroni-corrected $p < .001$ (uncorrected $p < .001$), respectively, indicating that hearing a denial after hearing either an explicit or implicit statement made children less likely to indicate a societal consensus that the entity was real than if they had not heard a denial; in the face of a denial, both explicit and implicit belief statements resulted in fewer claims that everyone believed.

Considering "all no" responses, *Implicit-Denial* trials elicited significantly more of this response type (model-predicted probability = .41) than the combined *Neutral* baseline, (model-predicted probability = .16) $X^2(1) = 12.39$, Bonferroni-corrected $p < .01$ (uncorrected $p < .001$), suggesting that hearing an implicit statement before a denial made

children more likely to indicate a societal consensus that the entity was not real than hearing either type of statement without a subsequent denial. Conversely, "all no" responses on *Explicit-Denial* trials (model-predicted probability = .20) did not differ significantly from baseline, $X^2(1) = 0.12$, Bonferroni-corrected $p = 1.00$ (uncorrected $p = .73$), suggesting that hearing an explicit statement before a denial did not influence children's tendency to indicate a societal consensus that the entity was not real. Thus, whether the initial statement was implicit or explicit affected children's consensus judgments following a denial of that entity's reality status, with only implicit statements leading to more endorsements of a "not real" societal consensus.

Finally, considering "yes and no" responses, this response type did not differ significantly on *Explicit-Denial* trials (model-predicted probability = .64) or *Implicit-Denial* trials (model-predicted probability = .53) compared with the combined *Neutral* baseline (model-predicted probability = .47), $X^2(1) = 4.71$, Bonferroni-corrected $p = .24$ (uncorrected $p = .03$), and $X^2(1) = 0.79$, Bonferroni-corrected $p = 1.00$ (uncorrected $p = .38$), respectively. This suggests that hearing either an explicit or an implicit statement before a denial did not significantly influence children's tendency to indicate a lack of consensus. (Note that the "yes and no" response results are statistically not independent of "all no" and "all yes" response results because these probabilities must sum to 1, but we present them for reference.)

In sum, the results from the consensus task show that hearing a denial led children to be less likely to report "all yes" consensus, regardless of the initial testimony. However, when children heard an implicit belief statement prior to a denial, they were more likely to report an "all no" societal consensus, whereas hearing an explicit belief statement from a parent before hearing a denial from a second speaker did not relate to increases in "all no" consensus responses.

Discussion

In this study, children used their parents' explicit and implicit belief statements to inform their own beliefs about the existence of novel entities and their perceptions of societal consensus. Thus, this research reveals potentially important consequences of such statements, identifying both developmental change in effects on children's own reality status judgments and age-invariant effects on beliefs about consensus.

First, our results showed that the effects of explicit versus implicit belief statements on children's own beliefs appears to change with age. Four-year-olds were more likely to believe in an entity that their parent described with an explicit belief statement than one whose existence their parent only implicitly acknowledged. Conversely, older children's belief was not affected by explicit belief statements in either direction, in line with Dore et al.'s (2015) findings with 9-year-olds in a different paradigm. Thus, 4-year-olds, but not older children, seem to use their parent's explicit belief statements as an indicator that they should believe that an entity is real.

Notably, this effect held even in the face of later denial testimony. Although children's belief was influenced by a later denial, denials did not moderate the effect of explicit belief statements. This nonsignificant interaction between parental testimony and the second speaker's testimony seems to indicate that children used these two pieces of information independently to inform their judgments about the entity's existence. This finding

suggests that rather than an inoculation effect, where explicit belief statements protect children against later denials, for the youngest children such statements may have a broader "vitamin effect"—increasing overall belief regardless of later testimony.

Our results do not address why there is an age difference in the effect of explicit versus implicit belief statements on children's reality status judgments. However, we offer two speculations. First, children begin to use terms like "real" and "really' to denote reality status distinctions around age 3, so these terms are relatively new for 4-year-olds. Because the concept of reality status is novel and perhaps salient for children at this age, explicit reality statements may carry more weight for them than they do for older children. Second, as Harris et al. (2006) have noted, as children get older they may be more likely to have experiences suggesting that explicit belief statements are not always accurate. Upon school entry, children are likely exposed to a greater range of beliefs about entities that parents refer to as real (e.g., Santa, Tooth Fairy). This sort of exposure may not be strong enough to lead children to use explicit belief statements as a cue for skepticism, but it may dilute their belief-boosting power.

The positive effect of explicit belief statements on young children's reality status judgments may have implications for encouraging young children to accept new information. Although many tend to think of children as fantasy-prone and likely to believe in non-real entities such as Santa Claus and fairies, research suggests that children are just as, or even more likely, to reject true information as they are to accept incorrect information (Woolley & Ghossainy, 2013). Woolley and Ghossainy (2013) argue that children's rejection of new information stems from an "illusion of omniscience" or overestimation of their own knowledge. The current findings suggest that, for 4-year-olds and perhaps also younger children, using explicit belief statements may help to reduce children's initial skepticism. Jaswal (2004) found that 3- and 4-year-olds' reluctance to apply an unexpected label to a novel animal was overcome when the speaker noted that the label was unexpected (i.e., "You're not going to believe this but…"). In a similar way, explicit belief statements may acknowledge that the following information may sound unlikely, thus helping children to overcome their skepticism and believe the speaker's statement.

In contrast with the developmental change observed for the effects of explicit belief statements on children's own beliefs, the current results indicate an age-invariant effect showing that children between the ages of 4 and 7 differentially use explicit and implicit belief statements to inform their perceptions of societal consensus. Specifically, when children heard their parent implicitly acknowledge an entity's existence prior to denial testimony, they responded there was societal consensus that the entity was not real. In contrast, hearing their parent explicitly acknowledge an entity's existence did not have this effect. Instead, hearing an explicit affirmation of belief before hearing a challenge to that belief helped led children's views about consensus to be more similar to when they never heard a denial. In our data, this effect did not change with age, indicating that even children as young as 4 are able to use testimony from only two speakers, one of whom is a parent, to come to the conclusion that societal consensus about the existence of an entity may be lacking. This is notable because it shows that even young children do not simply align their perceptions of others' views with their parent's stated belief.

This pattern is quite reasonable. Indeed, in children's everyday lives parents might often describe the traits of non-real entities, such as mermaids or witches, without explicitly noting their reality status. In fact, explicit comments (e.g., "Mermaids aren't

real") about the reality status of fantastical entities in storybooks are quite rare; implicit statements (e.g., "Look at the mermaid; she's swimming") are much more common (Woolley, 2007). These kinds of implicit references are not different in any way from how parents talk about everyday real entities with which children lack direct experience—such as sharks or nuns, for example. Then when children later receive testimony that, for example, mermaids are not real, they may assume that testimony reflects societal consensus, given that their parent provided no information about reality status. As our data show, when a parent has made only an implicit statement about an entity, a later denial from another speaker is quite influential on children's beliefs about societal consensus. However, when a parent notes explicitly that the described entity is real and then a later speaker explicitly claims that the entity is not, children have good evidence to counter the idea that there is consensus about the entity's (non-)existence.

One might be concerned that children are not actually responding based on perceived societal consensus more generally but believe that the question is asking specifically about the two speakers they just heard. We believe this is unlikely for two primary reasons. First, children chose the "yes and no" response over 40% of the time, even on the trials with a neutral second statement where they had not heard a disagreement between the speakers. If children were responding based on the two speakers they had just heard, they would have no reason to believe that there was disagreement. Second, children are trained on the procedure and respond to five practice items prior to answering the test questions. On the practice items, children receive no information about the entities before assessing societal consensus, so, to succeed, they must create a mental representation of the task as referring to people in general. Indeed, the majority of children answered the familiar entity practice items (dogs, brains, green cows) correctly, indicating that children understood the question and the response options. Regardless, this possibility is a limitation of the current data and exploring children's interpretation of consensus questions and understanding of societal consensus will be an important direction for future research.

This relatively high base rate of choosing the "yes and no" response may be seen as surprising: why would children assume a lack of a consensus when society agrees about most entities children hear about (e.g., trees, brains, fairies, monsters)? Although further research is needed to investigate this question, one possibility is that children are using their own initial skepticism in contrast with their parents' apparent endorsement to conclude that there is a lack of consensus in society generally. On the reality status trials, children chose "not real" on about half of the trials (between 48% and 60% across trial types). Previous research has shown that, when introduced to novel entities, some children exhibit an initial skepticism, apparently based on their lack of experience with the entity (Tullos & Woolley, 2009; Woolley et al., 2011). This initial doubt, in combination with hearing their parent either explicitly endorse the entity's existence or indicate that they had heard of it (implying to some degree that it may exist), may have led some children (about 40% on Neutral trials) to assume that societal consensus about the entity's existence is lacking. Additional children came to this conclusion after hearing an explicit belief statement from their parent and then a denial from a stranger.

This study makes several important novel contributions, both theoretical and applied. First, contrary to hypotheses that explicit belief statements may be an indicator that an entity is not real (Harris et al., 2006), our findings suggest that, for 4-year-olds, parents' explicit endorsement of an entity's existence can actually strengthen children's belief.

Thus, parents of young children could use explicit belief statements to promote children's belief in unobservable or controversial entities (i.e., global warming, evolution, God). Further, from ages 5 to 7 (and age 9 in prior research; Dore et al., 2015), explicit belief statements do not seem to decrease children's belief, indicating that older children's belief is unlikely to be negatively affected by hearing these statements. Second, our findings show that explicit belief statements may also influence children's beliefs about societal consensus, possibly preventing them from drawing the conclusion that there is societal consensus that a previously supported entity does not exist when they are faced with later denial testimony. This has practical and novel implications for how parents talk to children about beliefs that they would prefer their children hold: parents would do well to use explicit belief statements with children at least up to age 7, to protect against the possibility that children might accept denial testimony that contradicts family beliefs. For example, a child who hears a parent discuss God implicitly (i.e., "God lives in heaven") and later hears a peer say that God does not exist may be more likely to take the peer's judgment as evidence of negative societal consensus than a child who hears a parent make explicit statements about God's existence (i.e., "I believe in God").

Notably, reality status research typically assumes that children see speakers' testimony as factual claims. However, it is not clear whether children interpret explicit belief statements as references to facts or to religious or ideological beliefs. The above example ("I believe in God") is clearly perceived by adults as a statement of religious beliefs, whereas it is less clear how one would interpret an explicit belief statement about an unknown entity (e.g., "Cusk is real"). Heiphetz, Spelke, Harris, and Banaji (2013) have shown that both 5- to 10-year-olds and adults see religious beliefs as intermediate between facts, in which there is a right and wrong answer, and preferences, in which two people can disagree and both be right. Future research could investigate how children interpret explicit belief statements and whether these interpretations influence the effect of such statements on beliefs.

Given these findings about the effects of explicit belief statements, it is worthwhile to consider how often such statements are used, particularly in the context of parent–child conversations. Although some research has begun to explore how parents talk to children about unobservable entities (Canfield & Ganea, 2013), future research examining explicit belief statements in these conversations would be valuable. In addition to lab-based studies, examinations of large databases of parent–child conversations like CHILDES[5] may shed light on the prevalence and characteristics of these statements in children's everyday experiences.

It will also be important for future research to examine whether explicit belief statements spoken by parents have a unique effect on children's beliefs and views about consensus, or whether the effects seen here would generalize to any speaker. As noted above, we chose to use parents in this initial study because they may be an especially potent source of information for children. Results may differ with a stranger or another known speaker (e.g., a teacher or a peer). For example, a denial from a second speaker may have a stronger effect on belief if the first speaker was a less trusted source. Similarly, the identity of the second speaker may influence how children process their denial or

[5]The CHILDES database consists of children's conversations with family members in everyday situations at home.

neutral statements. Here, we used an adult stranger, but effects may differ for known adults or for a peer.

Relatedly, Corriveau, Harris, et al. (2009) have shown that children's trust in their mothers' testimony varies by attachment status. Whether children accepted their parents' explicit belief statements in the current data may likewise be related to the quality of children's relationships with their parents. However, future research using both parents and non-parents as speakers is needed to disentangle whether the individual differences seen here resulted from the nature of children's relationships with their parents or from other factors.

In this study we focused on explicit versus implicit affirmations of belief, in which parents stated or implied that an entity was real. Explicit affirmations of belief were of particular interest due to previous predictions that such statements may negatively influence children's belief (Harris et al., 2006; Woolley et al., 2011). It is also interesting to consider how children's beliefs might be affected by hearing a parent explicitly or implicitly deny an entity's existence. Although our data do not shed light on this question, one prediction might be that, as with affirmative statements, explicit denials (e.g., "Santa Claus is not real") would have stronger effects on younger children's reality judgments than would implicit denials (e.g., "I've never seen Santa Claus"), in part due to the newness and salience of the term *real*, relative to older children. Alternatively, children's understanding of how to interpret negative evidence—as in statements like, "I've never seen Santa Claus"—likely changes with age: younger children might conflate them with denials, whereas older children might recognize their inconclusive nature. With regard to consensus, we expect that hearing a parent's explicit denial would lead to lower levels of belief and higher likelihoods of reporting an "all no" societal consensus relative to implicit statements; but, again, a better understanding of how children interpret implicit denials is an important question for future research.

Future studies could also examine the role of the order in which children hear explicit belief statements and other types of testimony. Here, we had parents give explicit belief testimony prior to children hearing about the entity from another speaker, on the assumption that parents often have the opportunity to introduce their children to ideas that they consider important before children receive additional input from others. However, the effects of parents' explicit belief statements may differ if they come after rather than before denial testimony from another speaker.[6] Indeed, Dawkins (1995) argued that children may employ several different types of override rules for dealing with contradictory testimony, and although one possibility is that parental testimony is privileged, another is that whichever information is heard first should be taken as true.

Notably, in the current studies, children responded to consensus and reality status questions for different entities in order to avoid having one question influence responses on the other. However, future research should examine whether awareness of a lack of consensus regarding a particular entity is related to children's own beliefs about that entity. Children who believe that others' opinions are mixed, regardless of whether they hear explicit or implicit belief testimony, may be more likely to believe in the entity in the face of subsequent denial testimony. Even reflecting on consensus more generally could

[6]We thank Ruth Lee for this valuable comment at SRCD (Society for Research in Child Development, Austin, TX) 2017.

potentially affect how children make reality status judgments; increasing children's awareness that certain entities are controversial could possibly affect how children think about the reality of other entities. One might consider our finding of differences in children's responses based on the order in which they saw the two tasks (reality status and consensus) as tentative evidence for this possibility. Although the current study was not designed to assess this, it seems a worthy topic for further investigation.

Finally, although using children's own parents in the study increases the ecological validity of the current findings relative to other lab-based testimony research, it is important to note that this situation differs from real-world settings in a variety of ways. First, the time frame during which children first hear about the entities from their parent and hear a subsequent statement from a second speaker are condensed relative to exposure to such testimony in children's everyday lives. It is possible that the effects of parental testimony may decline over time. On the other hand, parents' testimony may be encoded more strongly and thus have longer-lasting effects on children's beliefs than testimony from others, suggesting that if children's beliefs were solicited after a delay, parents' views may exert even more influence. Second, children do not typically receive testimony in a one-way transmission of information, but rather in conversations in which they are active participants. The effect of explicit belief statements on children's views may differ if children had the opportunity to engage in discussion and ask further questions about the entities.

Indeed, hearing parent testimony through brief video clips is not a typical way a child would encounter that information and was likely a novel experience for children. However, much of the testimony literature is based on studies using testimony from puppets (e.g., Aguiar, Stoess, & Taylor, 2012; Birch, Vauthier, & Bloom, 2008; Mills, Legare, Bills, & Mejias, 2010) or from videos of strangers (e.g., Koenig, 2012; Lane, Harris, Gelman, & Wellman, 2013; Vanderbilt, Liu, & Heyman, 2011). As noted previously, the field tends to assume that similar cognitive mechanisms operate in these settings and in real-life situations. Thus, regardless of the artificiality of the video format use here, it is likely a move toward ecological validity while retaining some aspects of experimental control.

Relatedly, using children's own parents in stimuli means that each child's experience was necessarily unique. For example, some parents appeared to be more comfortable with the camera than others and thus may have appeared more natural in their videos. However, the fact that we find consistent differences across trial types when including any noise coming from the idiosyncrasies of each parent's performance is evidence of the robustness of these findings.

Overall, these data suggest that implicit and explicit belief statements may serve as important sources of both children's belief about novel entities and their beliefs about societal consensus. Although denial testimony might, in many cases, cause children to believe there is societal consensus that an entity is not real, hearing a parent give an explicit belief statement first may reduce this effect, and rather, encourage children to believe that the entity's reality status is controversial. Furthermore, for younger children, hearing an explicit belief statement from their parent seems to promote belief in the entity, regardless of what kind of testimony children hear subsequently. These findings indicate that explicit belief statements may be a particularly significant way that parents influence children's beliefs about the world.

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