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## Cognitive Development



# What do different beliefs tell us? An examination of factual, opinion-based, and religious beliefs



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### ABSTRACT

Children and adults differentiate statements of religious belief from statements of fact and opinion, but the basis of that differentiation remains unclear. Across three experiments, adults and 8–10-year-old children heard statements of factual, opinion-based, and religious belief. Adults and children judged that statements of factual belief revealed more about the world, statements of opinion revealed more about individuals, and statements of religious belief provided information about both. Children—unlike adults—judged that statements of religious belief revealed more about the world than the believer. These results led to three conclusions. First, judgments concerning the relative amount of information statements of religious belief provide about individuals change across development, perhaps because adults have more experience with diversity. Second, recognizing that statements of religious belief provide information about both the world and the believer does not require protracted learning. Third, statements of religious belief are interpreted as amalgams of factual and opinion-based statements.

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## 1. Introduction

How do children and adults reason about their own and other people's beliefs? More specifically, how do children and adults conceptualize statements concerning beliefs in the domain of religion as compared with the better-studied domains of fact and opinion? Situating this question in terms of epistemological understanding, the present study examines children's and adults' reasoning about beliefs. The work adds to understanding of religious cognition by investigating how children and adults conceive of others' religious beliefs. It also adds to research on epistemological understanding more broadly by clarifying how children and adults judge statements of religious belief as compared with statements of factual knowledge and statements of opinion. Finally, the present work clarifies the type of knowledge (knowledge about the world vs. knowledge about individuals) that children and adults judge statements of religious belief, as compared with statements of factual and opinion-based belief, to provide.

## 2. Epistemological development

We take the three levels of epistemological understanding identified by Kuhn and colleagues (Kuhn, Cheney, & Weinstock, 2000; Kuhn & Weinstock, 2002; see Hofer & Pintrich, 1997, for review) as a framework for our investigation. At the *absolutist* stage, individuals regard assertions as uncontestable facts. They judge that the external world, not the individual, is the source of information. If two people disagree, it must be because they have access to different information, not because they have interpreted the same information differently. At the next *multiplist* level, individuals regard assertions as akin to opinions. If two people disagree, both perspectives are seen as equally valid. Individuals at a third, *evaluativist* level judge that assertions can be evaluated in a framework of arguments and evidence. If two people disagree, both could be right, but one could be "more right" if stronger arguments and evidence support that individual's claim.

An individual's level of epistemological understanding influences a number of important outcomes. For example, in one study (Mason & Scirica, 2006), epistemological understanding predicted stronger argumentation skills in Italian 8th graders. Children at the evaluativist stage were more likely to generate valid arguments, counterarguments, and rebuttals than children at the multiplist stage. Levels of epistemological understanding also predict the type and quality of jurors' reasoning (Kuhn, Weinstock, & Flaton, 1994; Warren, Kuhn, & Weinstock, 2010; Weinstock & Cronin, 2003).

Especially relevant to the current studies is the flourishing literature investigating the influence of domain on epistemological understanding. Kuhn et al. (2000) found that children were likely to exhibit a multiplist level first in the domain of opinion and last in the domain of fact. Other studies have also shown that children differentiate between these two domains. For example, 3-year-olds acknowledge and understand disagreements between individuals about matters of taste and opinion more readily than disagreements about matters of fact (Flavell, Flavell, Green, & Moses, 1990). In addition, 6–10-year-olds are less likely to defer to experts regarding matters of taste as compared to matters of fact (Banerjee et al., 2007).

The distinction between opinion-based and factual beliefs undergoes consolidation in middle childhood. For example, 6-year-olds do not differ in the frequency with which they refer to internal (e.g., individual differences in taste) vs. external (e.g., access to information) factors in explaining whether or not disagreements in the domains of fact and opinion are acceptable. By contrast, 8-year-olds and adults tend to invoke internal factors in the context of opinion-based disagreements and external factors in the context of factual disagreements (Rowley & Robinson, 2007).

Children aged 5–13 years are least likely to accept disagreements about moral beliefs (Wainryb, Shaw, Langley, Cottam, & Lewis, 2004; Wainryb, Shaw, & Maianu, 1998). Although children typically experience difficulty accepting moral disagreements, some interventions have enhanced children's acceptance of moral debate and disagreement. After participating in a discussion-based philosophy class, 2nd graders argued more effectively and were more likely to shift away from an absolutist level than children in a control group without discussion opportunities (Walker, Wartenberg, & Winner, 2013). This shift was observed only for the domain of moral values. No such shift was observed for the aesthetic, physical, or social domains, highlighting the distinctive nature of moral beliefs.

Research on epistemological understanding has rarely focused on religious beliefs. However, two recent studies are pertinent. First, working with middle-class Jewish children attending 5th, 8th, and 12th grade in secular or religious schools in Israel, [Gottlieb \(2007\)](#) found that older pupils were more likely than younger ones to argue for “non-rationalism”—to claim that disagreements about the existence of God cannot be resolved by rational procedures such as empirical investigation or logical proof. Thus, children increasingly recognize that there may be aspects of religious belief that reflect an individual’s personal stance rather than a rationally guided decision process. Second, [Shtulman \(2013\)](#) asked undergraduates at two selective colleges to justify their belief in various religious entities (e.g., God, souls, angels) as well as various scientific entities (e.g., electrons, fluoride, genes). Students were more likely to justify their beliefs by deferential reference to authority or instruction rather than by citing pertinent evidence. A dearth of evidential justifications was especially pronounced among those students who endorsed more of the religious items. Taken together, these two studies suggest that religious beliefs may be construed as reflections of an individual’s personal commitments rather than only reflecting empirical evidence. At the same time, individuals may believe that religious claims reveal at least some information about the world (e.g., because many religious claims, on their face, are statements about the world)—a prediction tested in the present research.

The present research extends the literature on epistemological understanding in two ways. First, we probed *how* children conceptualize different types of belief. More specifically, we tested the prediction that children and adults judge that statements concerning factual beliefs reveal information about the world whereas statements concerning opinion-based beliefs reveal information about the individual stating the belief. Second, we investigated religious beliefs, which, as noted above, have rarely been targeted in research on epistemological understanding. We tested the hypothesis that statements concerning religious beliefs would be perceived as providing information about individual believers as well as the world.

### 3. Children’s and adults’ reasoning about religious beliefs

Previous work clearly demonstrates the importance of religious beliefs to adults ([Atran, 2002](#); [Boyer, 2001](#)). Religious beliefs and rituals form an important component of adults’ social identities ([Ysseldyk, Matheson, & Anisman, 2010](#)), are associated with increased health and well-being ([McCullough, Friedman, Enders, & Martin, 2010](#)), and influence pro-social behavior ([Norenzayan & Shariff, 2008](#)). Moreover, even young children are able to reason about religious phenomena. For example, by the age of 5, children use theistic explanations to account for natural phenomena ([Kelemen, 2004](#)). Five-year-olds in the USA, Spain, and Greece attribute greater cognitive and perceptual abilities to God than to humans ([Barrett et al., 2001](#); [Giménez-Dasí et al., 2005](#); [Lane, Wellman, & Evans, 2010, 2012](#); [Makris & Pnevmatikos, 2007](#)). Additionally, 6–12-year-olds from Christian schools differentiate souls from other invisible aspects of human beings, such as minds and brains ([Richert & Harris, 2006](#)).

Religious beliefs share several features with other types of beliefs. As with scientific beliefs, children, like adults, acquire many religious beliefs via the testimony of other people, particularly when the beliefs concern non-visible phenomena such as the soul or the afterlife ([Harris & Corriveau, in press](#); [Harris & Koenig, 2006](#); [Shtulman, 2013](#)). Nevertheless, some theorists suggest that children distinguish religious beliefs from other ways of knowing. For example, [McCauley \(2000, 2011\)](#) argues that while religion is natural, science is not (see also [Barrett, 2000](#); [Boyer, 1994](#)). According to this framework, religious beliefs appeal to notions that are intuitively compelling to most people, such as the idea that an agent created the universe ([Guthrie, 1993](#); [Kelemen, 2004](#)). Yet there is also developmental evidence that some religious beliefs (e.g., the belief that God is omniscient and immortal) are counterintuitive rather than intuitive. In this respect, the gradual acquisition of certain scientific and religious beliefs display important, albeit neglected, parallels ([Lane & Harris, in press](#)).

A recent set of experiments ([Heiphetz, Spelke, Harris, & Banaji, 2013](#)) investigated the extent to which American 5–10-year-olds and adults distinguish religious from factual and opinion-based beliefs. When told that two characters disagreed about a particular type of belief, participants of all ages were most likely to say that only one person could be right when responding to factual beliefs (e.g., about the size of germs) and least likely to provide this answer when responding to opinion-based beliefs (e.g., about the prettiest color). Religious beliefs (e.g., about whether God can do miracles) fell

between these two extremes. Children and adults were more likely to respond that only one person could be right when judging factual disagreements rather than religious disagreements, but they were also more likely to respond that only one person could be right when judging religious disagreements rather than opinion-based disagreements.

These findings raise the important question of *how* children and adults make these distinctions. That is, what process leads them to position religious disagreements in an intermediate position between disagreements concerning factual beliefs and disagreements concerning opinion-based beliefs? We suggest that the findings by Heiphetz, Spelke, Harris, et al. (2013) indicate that children as well as adults think of religious beliefs as being more revealing about the world than opinion-based beliefs but also more revealing about the person than fact-based beliefs. These judgments may lead individuals to conclude that statements of religious belief are somewhat like statements of factual belief (because both reveal at least something about the external world) and somewhat like statements of opinion (because both reveal at least something about the person holding the belief). At the same time, religious statements do not completely overlap with either category. They may be perceived to provide more information about the person holding the belief than do correct factual statements but more information about the world than do statements of opinion. Thus, the present research extends the work of Heiphetz, Spelke, Harris, et al. (2013) by examining the types of knowledge (knowledge about the external world vs. knowledge about individual people) that children and adults judge different types of beliefs to provide.

#### 4. The relationship between children's and adults' cognition

If a great deal of experience with others' beliefs is needed to draw distinctions between different kinds of beliefs, adults—who typically have far more experience with others' beliefs—may reason differently from children. Adults have had more time to develop their own religious beliefs and to encounter people who disagree with their views. Furthermore, adults have had more time to learn their culture's messages about the supernatural, messages that can play an important role in shaping individuals' reasoning (Harris & Koenig, 2006; Legare, Evans, Rosengren, & Harris, 2012). Arguably then, children, who have less experience with religious diversity, are more likely to perceive statements of religious belief as akin to statements of fact, about which most people agree.

However, other aspects of religious cognition may depend on social learning to a lesser extent. For example, because religious claims are ostensibly claims about the external world, children may judge that such claims reveal at least some amount of information about the world. This prediction is bolstered by evidence suggesting that children sometimes demonstrate surprisingly adult-like cognition. For example, children as well as adults judge statements of religious belief to be more objective than statements of opinion-based belief but less objective than statements of factual belief (Heiphetz, Spelke, Harris, et al., 2013).

Admittedly, differences between children and adults do not reveal what is responsible for these differences. However, finding continuity in this aspect of cognition would suggest that the additional decades of social experience that adults have, compared to 8–10 year-olds, may not be necessary for adult-like reasoning about statements of religious belief to emerge.

#### 5. Overview of present experiments

We conducted three experiments, two with adults (Experiments 1A and 1B) and one with 8–10 year old children (Experiment 2). Participants learned about another person's factual, opinion-based, or religious belief and then indicated how much information had been provided about (a) the world in general and (b) the person holding the belief.

Because we sought to learn about how humans conceive of factual beliefs in general, regardless of the truth status of a particular belief, we chose to present both correct and incorrect factual beliefs. Had we presented only correct factual beliefs, we would not know whether our results show how individuals conceive of factual beliefs in general or how they conceive of statements known to be true. If participants reason about all factual beliefs in the same way, regardless of their truth status, they should respond similarly to both correct and incorrect factual beliefs. However, we also anticipated

that participants might judge that incorrect factual beliefs reveal less about the world than do correct factual beliefs because less accurate information is revealed in the former case.

## 6. Experiment 1A

The purpose of Experiment 1A was to investigate the distinctions adults may draw among statements of religious, factual, and opinion-based beliefs. We hypothesized that participants would judge that different beliefs reveal different types of information. Even preschoolers judge that factual beliefs reveal information about the world (Heyman, 2008) while opinion-based beliefs reveal information about people (Fawcett & Markson, 2010). Thus, we predicted that adults would judge that factual beliefs reveal more information about the world while opinion-based beliefs reveal more information about the person who holds the belief.

The main question of interest concerned religious beliefs. On their face, such beliefs are statements about the world; for example, the statement “God can hear prayer” implies the existence of an agent with particular abilities. However, religious beliefs are also controversial. Not everyone believes that God can hear prayer, or that God even exists. An individual making these statements distinguishes him- or herself from people holding different views and thereby also reveals information about the individual. Thus, we predicted that statements of religious belief are regarded as providing information both about the world and about the person holding the belief. Note that this prediction differs from the findings of Heiphetz, Spelke, Harris, et al. (2013) that children and adults positioned statements of religious beliefs between statements of factual belief and statements of opinion-based belief when presented with a disagreement and asked whether only one or both of the people who disagreed could be right. Rather than focusing on judgments of disagreements, here we investigate the amount and type of knowledge participants perceive statements of each category of belief to reveal. That is, we examine the thinking underlying children’s distinguishing statements of religious belief from statements of factual belief and of opinion. Whereas Heiphetz, Spelke, Harris, et al. (2013) demonstrated that children are capable of making such distinctions, here we investigate *how* these distinctions are made. The novel prediction of the present research is that statements of religious belief will be perceived to provide some knowledge about the external world (similarly to statements of factual belief) and some knowledge about individual people (similarly to statements of opinion).

### 6.1. Method

#### 6.1.1. Participants

The sample included 40 adults (24 women) between the ages of 17 and 40 years ( $M=21-11$ ). Participants were recruited through a psychology department subject pool, which includes both students and non-student community members. Participants received course credit or the opportunity to enter a gift certificate lottery. The sample was 53% White with the remainder a mixture of other races and ethnicities. On average, participants reported their educational attainment as “some college,” although the modal response was “some high school.” Participants self-identified as Protestant (10%), Catholic (10%), other Christian (10%), Jewish (8%), Muslim (15%), atheist or agnostic (40%), and some other, unlisted religion (8%). Participants identifying with any religious group were classified as theists, while those identifying as atheist or agnostic were classified as non-theists.

#### 6.1.2. Procedure

Participants completed the study online. They first read the following set of instructions:

In this study, you will read about some things that other people think. Sometimes people say things that tell us a lot about themselves, and sometimes people say things that don't tell us anything about themselves at all. And sometimes people say things that tell us a lot about the world in general, and sometimes people say things that don't tell us anything about the world at all. For example, if someone says that she won three games of Scrabble, she's telling us something about herself. If someone says that the Red Sox won three games of baseball, he's

telling us something about the world in general. After you read about what each person thinks, please use the scales provided to indicate how much that person has told you about themselves, and how much that person has told you about the world in general.

Following these instructions, participants read one person's belief at a time; beliefs were prefaced with the phrase, "Someone says that. . ." (e.g., "Someone says that God can do miracles"). Characters were not represented by images. Following each item, participants answered two questions: "How much has this person told you about the world in general?" and, "How much has this person told you about him/herself?" The order of these questions was consistent within participants but varied across participants. Participants answered using a scale from 1 ("nothing at all") to 4 ("a lot"). Statements concerned matters of factual belief (correct and incorrect), religious belief, and opinion-based belief. There were twenty items total, for a total of forty experimental questions (see [Appendix A](#)). Participants also completed a demographic questionnaire at the end of the session.

## 6.2. Results

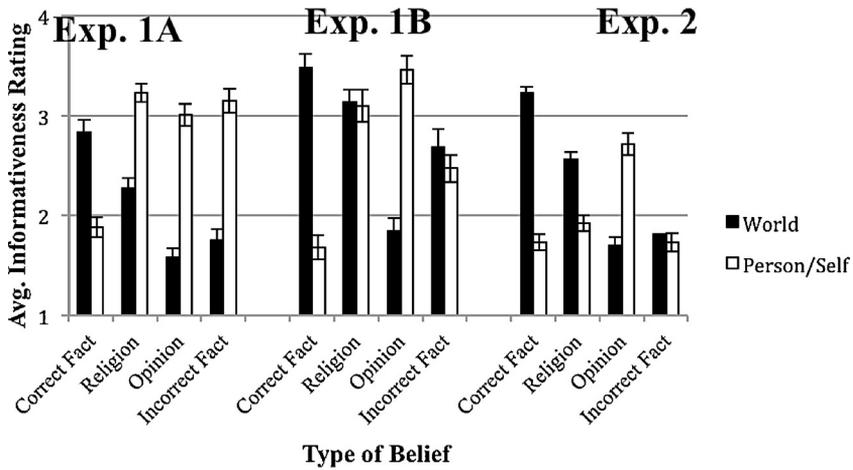
We analyzed responses to questions concerning how much participants had learned using a 4 (Belief Category: correct fact vs. incorrect fact vs. religion vs. opinion)  $\times$  2 (Question Category: person vs. world)  $\times$  2 (Participant Background: theist vs. non-theist)<sup>1</sup> mixed-model ANOVA with repeated measures on the first two factors. Three main effects emerged. First, we found a main effect of Background: participants who self-identified as members of a religious group reported learning less about individuals and the world combined than did participants who self-identified as atheist or agnostic ( $M_{\text{theist}} = 2.42$ ,  $SD_{\text{theist}} = .41$ ,  $M_{\text{non-theist}} = 2.68$ ,  $SD_{\text{non-theist}} = .37$ ,  $F(1, 38) = 5.01$ ,  $p < .05$ ). This result was unpredicted and was not replicated in Experiments 1B and 2; therefore, additional replication is needed before it can be interpreted. Second, we found a main effect of Question Type,  $F(1, 38) = 72.52$ ,  $p < .001$ . Third, we found a main effect of Belief Type,  $F(3, 114) = 15.56$ ,  $p < .001$ . The latter two effects were qualified by a Question Type  $\times$  Belief Type interaction,  $F(3, 114) = 59.40$ ,  $p < .001$ . This interaction is illustrated in [Fig. 1](#) (left panel). No other interactions reached significance.

When indicating how much they had learned about the world, participants reported learning more from statements of correct factual belief ( $M = 2.84$ ,  $SD = .78$ ) than from statements of religious belief ( $M = 2.27$ ,  $SD = .66$ ,  $p < .001$ ) but more from statements of religious belief than from either statements of opinion-based belief ( $M = 1.58$ ,  $SD = .56$ ,  $p < .001$ ) or statements of incorrect factual belief ( $M = 1.75$ ,  $SD = .70$ ,  $p < .001$ ), which did not differ from each other. At the individual level, this pattern (statements of religious belief occupying an intermediate position between statements of correct factual belief and statements of opinion) occurred among 70% of participants.

When indicating how much they had learned about the person holding the belief, participants reported learning equal amounts from statements of religious belief ( $M = 3.23$ ,  $SD = .57$ ), incorrect factual beliefs ( $M = 3.15$ ,  $SD = .76$ ), and opinion-based belief ( $M = 3.01$ ,  $SD = .68$ ; in all pairwise comparisons,  $ps > .05$ ). Participants reported learning less about individuals after hearing their correct factual beliefs ( $M = 1.88$ ,  $SD = .64$ ) than their opinion-based beliefs ( $p < .001$ ). At the individual level, this pattern (statements of correct factual belief rated as providing less information about the person than statements of religious belief and opinion) occurred among 80% of participants.

Finally, participants reported learning more about the world than about the person from statements of their correct factual beliefs, whereas for the remainder of the belief categories, participants reported learning more about the person than the world (in all pairwise comparisons,  $ps < .001$ ).

<sup>1</sup> We believe the distinction between people who subscribe to any religious belief and people who subscribe to no religious view to be theoretically important. For example, differences of belief between people who hold religious beliefs and those who do not are likely larger than differences between people who are members of different religious sects.



**Fig. 1.** Children's and adults' perceptions of how much information characters had revealed about the world in general and about themselves after making statements concerning factual, religious, and opinion-based beliefs. Like adults, children perceived statements of religious belief as amalgams of statements of fact and statements of opinion. However, unlike adults, children judged that statements of religious belief provided more information about the world than about the believer.

### 6.3. Discussion

These results suggest that adults may view statements concerning religious beliefs as amalgams of statements of factual beliefs and statements of opinion-based beliefs. On the one hand, like statements of correct factual belief, statements of religious belief were perceived to provide some information about the world in general—more so than statements of opinion-based belief or incorrect factual belief. On the other hand, like statements of opinion-based belief, statements of religious belief were perceived to provide information about the individual holding the belief—and, in fact, to provide more information about the individual than about the world. Thus, adults may view statements of religious belief as somewhat akin to statements of factual belief and somewhat akin to statements of opinion-based belief without being exactly like either one.

However, adults' responses to statements of incorrect factual belief present a puzzle. Specifically, adults responded that they had learned a great deal about others after learning their incorrect factual beliefs—as much as after learning their religious and opinion-based beliefs, and significantly more than after learning their correct factual beliefs. Yet the statements of incorrect factual belief did not contain any explicit statements concerning the self. One possibility is that, contrary to our expectations, adults interpreted the question, “How much has this person told you about him/herself?” to include accidental revelations. For example, they may have judged that a person who claimed that germs are very big unintentionally revealed his or her ignorance.

If adults interpreted our questions to include accidental revelations, this may have accounted for their responses to the religion items. Adults hold more positive attitudes toward religious in-group members than toward out-group members (Heiphetz, Spelke, & Banaji, 2013; Rowatt, Franklin, & Cotton, 2005) and especially negative attitudes toward atheists (Gervais, Shariff, & Norenzayan, 2011). Thus, adults may have judged that characters making religious claims with which they agreed more positively than characters making religious claims with which they disagreed. In this case, adults' responses would not provide information about how they reasoned about *statements* of religious belief; rather, their responses would provide information about how they reasoned about *people* who espouse particular religious views. We sought to block this potential influence in Experiment 1B by providing more detailed instructions and phrasing our dependent measures in a way that specifically highlighted the character's intentional revelations.

## 7. Experiment 1B

### 7.1. Method

#### 7.1.1. Participants

The sample included 26 adults (21 women) between the ages of 18 and 30 years ( $M=21-11$ ). Recruitment and compensation were identical to Experiment 1A. The sample was 58% White. On average, participants reported their highest educational attainment as “four-year college degree,” though the modal response was “some college.” Participants self-identified as Protestant (19%), Catholic (27%), other Christian (4%), atheist or agnostic (42%), and some other, unlisted religion (8%).

#### 7.1.2. Procedure

The procedure was identical to that in Experiment 1A, with the following exception: The last line of the instructions read, “. . . indicate how much you think that person intended to tell you about themselves, and how much that person intended to tell you about the world in general.” The questions were changed to, “How much is this person trying to tell you about [the world in general/him/herself?]”

### 7.2. Results

We performed eight independent-samples *t*-tests to investigate the effect of religious background on responses to how much participants thought the character intended to reveal about the world and, separately, about him/herself in each of the four belief domains (correct fact, incorrect fact, religion, and opinion). After performing a Bonferroni correction, these analyses revealed no differences between religious and non-religious participants; therefore, subsequent analyses collapsed across these groups.

We analyzed responses to questions concerning how much information participants thought characters intended to provide by using a 4 (Belief Category: correct fact vs. incorrect fact vs. religion vs. opinion)  $\times$  2 (Question Category: person vs. world) repeated-measures ANOVA. A main effect of Belief Category,  $F(3, 72) = 17.21, p < .001$ , was qualified by a Belief Category  $\times$  Question Category interaction,  $F(2.11, 50.69) = 56.18, p < .001$ .<sup>2</sup> This interaction is illustrated in Fig. 1 (middle panel). The main effect of Question Category did not reach significance.

Participants reported that characters intended to convey more about the world in stating correct factual beliefs ( $M = 3.48, SD = .73$ ) than in stating their religious beliefs ( $M = 3.14, SD = .61, p < .05$ ); more in stating their religious beliefs than their incorrect factual beliefs ( $M = 2.68, SD = .97, p < .01$ ); and more in stating their incorrect factual beliefs than their opinion-based beliefs ( $M = 1.84, SD = .67, p < .001$ ). At the individual level, this pattern (statements of religious belief occupying an intermediate position between statements of correct factual belief and statements of opinion) occurred among 62% of participants.

Participants also reported that characters intended to convey more about themselves in stating their opinion-based beliefs ( $M = 3.46, SD = .74$ ) than their religious beliefs ( $p < .05$ ); more in stating their religious beliefs than their incorrect factual beliefs ( $M = 2.47, SD = .72, p < .001$ ); and more in stating their incorrect factual beliefs than their correct factual beliefs ( $M = 1.68, SD = .61, p < .001$ ). At the individual level, this pattern (statements of religious belief occupying an intermediate position between statements of correct factual belief and statements of opinion) occurred among 69% of participants.

Finally, participants reported that characters intended to convey more information about the world than about themselves when making correct factual claims ( $p < .001$ ), more about themselves than the world when making opinion-based claims ( $p < .001$ ), and equal amounts about both the world and themselves when making religious claims and incorrect factual claims ( $ps > .05$ ). To directly assess the influence of highlighting intentionality in Experiment 1B, we analyzed the data from Experiments 1A and 1B together by conducting a 4 (Belief Category: correct fact vs. incorrect fact vs. religion vs. opinion)  $\times$  2 (Question Category: person vs. world)  $\times$  2 (Experiment: 1A vs. 1B) mixed-model

<sup>2</sup> In this and all subsequent *F*-tests with non-integer degrees of freedom, we used a Greenhouse–Geisser adjustment to correct for lack of sphericity.

ANOVA with repeated measures on the first two factors. Each of the variables exerted a main effect: Belief Category:  $F(3, 189) = 33.61, p < .001$ ; Question Category:  $F(1, 63) = 12.12, p = .001$ ; Experiment:  $F(1, 63) = 7.24, p < .01$ . These main effects were qualified by a Belief Category  $\times$  Question Category interaction,  $F(2.49, 157.06) = 108.74, p < .001$ , by a Question Category  $\times$  Experiment interaction,  $F(1, 63) = 23.85, p < .001$ , and by a Belief Category  $\times$  Question Category  $\times$  Experiment interaction,  $F(2.49, 157.06) = 10.90, p < .001$ . The Belief Category  $\times$  Experiment interaction did not reach significance.

To better understand the 3-way interaction, we examined the simple effect of Question Category for each of the 8 combinations of Belief Category and Experiment. These simple effects tests reinforced and extended the conclusions already drawn from the analysis of each experiment considered separately. Participants in both experiments judged that correct factual claims revealed (or were intended to reveal) more information about the world than about the individual (both  $ps < .001$ ). Conversely, participants in both experiments judged that opinion-based claims revealed (or were intended to reveal) more information about the individual than about the world (both  $ps < .001$ ). The results of the two experiments differed for the two remaining belief categories. In the categories of religion and incorrect fact, participants judged that characters had revealed less about the world than about themselves in Experiment 1A (both  $ps < .001$ ) whereas participants judged that characters had intended to reveal statistically equivalent amounts about themselves and the world in Experiment 1B (both  $ps > .05$ ). The most plausible explanation of these differences between the two experiments is that adults in Experiment 1A focused on what speakers had actually conveyed about the world and judged them to be only partially successful relative to what they had inadvertently revealed about themselves. By contrast, adults in Experiment 1B recognized that speakers had intended to convey more information about the world—as much as they conveyed about themselves.

### 7.3. Discussion

Like Experiment 1A, Experiment 1B suggests that adults perceive statements of religious belief as somewhat similar to statements of factual belief and somewhat similar to statements of opinion-based belief. On the one hand, adults judged that characters making religious claims and correct factual claims intended to provide some information about the world in general—more so than when characters made opinion-based or incorrect factual claims. On the other hand, adults judged that characters making religious claims and opinion-based claims intended to provide some information about themselves. The two ratings for religious beliefs were less asymmetric than the ratings for either correct factual beliefs or opinion-based beliefs, suggesting that adults perceive statements of religious belief to share some (but not all) properties of statements concerning correct factual beliefs and statements concerning opinion-based beliefs.

The results from Experiment 1B also suggest that the unexpected responses of Experiment 1A participants, who reported learning more about individuals than about the world in response to statements concerning both religious and incorrect factual beliefs, may have been due to participants including unintentional revelations in their judgments. When the question was clarified to block such judgments, both types of statements were perceived to provide equal amounts of information about the world and the individual. Moreover, the rating of statements concerning religious belief fell between the extreme ratings for statements concerning correct factual belief and opinion-based belief both in response to questions about the world and in response to questions about the person.

## 8. Experiment 2

Experiments 1A and 1B showed that adults judge that statements of religious belief provide some information about the world, like statements of factual belief, and some information about individual people, like statements of opinion-based belief. The purpose of Experiment 2 was to determine the extent to which children respond to such statements in an adult-like fashion.

## 8.1. Method

### 8.1.1. Participants

The sample included 84 children (45 girls) between the ages of 8 and 10 years ( $M = 9-1$ ). Children of this age, like adults, distinguish statements of religious belief from statements of factual as well as opinion-based belief (Heiphetz, Spelke, Harris, et al., 2013); pretesting revealed that they could also easily use continuous scales to respond to questions. Children were recruited through a departmental database and in a museum in the northeastern USA, and they received a small toy in exchange for their participation. The sample was 69% White. On a demographic questionnaire completed during the experiment, parents identified their children as Protestant (20%), Catholic (32%), Jewish (10%), Muslim (16%), and atheist or agnostic (14%); the remaining parents (8%) did not identify their child's religious affiliation.

### 8.1.2. Procedure

The procedure was identical to that used in Experiment 1A, except that children participated in person rather than online and an experimenter read all items aloud. During each trial, participants viewed a photograph of a child who ostensibly held the belief. Reasoning that children may be more comfortable answering questions about peers, we used photographs of children previously rated by adults as appearing approximately the same age as participants.

Due to the presence of photographs, the phrasing of the experimental items was changed slightly; rather than prefacing items with the phrase “someone says that,” the experimenter pointed to the photograph and said, “This child says that. . .” The pairings of particular photographs with particular statements were counterbalanced across participants. We chose to use the phrasing of questions from Experiment 1A rather than 1B because research on natural pedagogy suggests that children readily infer that individuals convey information intentionally (Gergely & Csibra, 2013). That is, if someone makes a statement like “germs are very big,” children are likely to infer that the individual intended to convey the information explicitly contained in the statement (germs are big). The natural pedagogy research does not speak to inferences that children may make about people who make incorrect factual statements, but this literature does suggest that children assume that people intentionally convey the information in their statements. Thus, it did not seem necessary to use instructions explicitly highlighting the intentional nature of people's statements in Experiment 2.

## 8.2. Results

After controlling for multiple comparisons, preliminary *t*-tests showed no significant effects of test location (campus lab or museum) or participant religion on any dependent measures; therefore, we dropped these variables from subsequent analyses.<sup>3</sup> Nevertheless, it is possible that differences between theists and non-theists would emerge if a larger sample of non-theist children were tested, and this remains an important avenue for future research.

We analyzed responses to questions concerning how much participants had learned using a 4 (Belief Category: correct fact vs. incorrect fact vs. religion vs. opinion)  $\times$  2 (Question Category: person vs. world) repeated-measures ANOVA. Main effects of Belief Category,  $F(3, 237) = 61.37, p < .001$ , and Question Category,  $F(1, 79) = 11.62, p = .001$ , were qualified by a Belief Category  $\times$  Question Category interaction,  $F(2.32, 183.56) = 120.65, p < .001$ . This interaction is illustrated in Fig. 1 (right panel).

Participants indicated that characters told them more about the world after stating correct factual beliefs ( $M = 3.23, SD = .56$ ) than after stating religious beliefs ( $M = 2.56, SD = .54, p < .001$ ) and more after stating religious beliefs than after stating opinion-based beliefs ( $M = 1.70, SD = .72, p < .001$ ), which did not differ from incorrect factual beliefs ( $M = 1.81, SD = .68$ ). At the individual level, this pattern

<sup>3</sup> One significant contrast emerged: Children whose parents reported raising their child in any religious tradition stated that they learned more about the world in general after hearing someone's opinion than did children from atheistic backgrounds ( $M_{\text{theist}} = 1.76, SD_{\text{theist}} = .73, M_{\text{non-theist}} = 1.33, SD_{\text{non-theist}} = .29, t(43.53) = 3.43, p = .001$ ). Because all other comparisons were non-significant and because this difference was unexpected, we collapsed across religious background in subsequent analyses.

(statements of religious belief occupying an intermediate position between statements of correct factual belief and statements of opinion) occurred among 75% of participants.

Participants also indicated that characters told them more about themselves after stating their opinion-based beliefs ( $M=2.72$ ,  $SD=1.00$ ) than after stating their religious beliefs ( $M=1.92$ ,  $SD=.68$ ,  $p<.001$ ) and more after stating their religious beliefs than after stating their correct factual beliefs ( $M=1.73$ ,  $SD=.73$ ,  $p=.001$ ); statements of correct and incorrect factual belief did not differ from each other ( $M_{\text{incorrect}}=1.73$ ,  $SD_{\text{incorrect}}=.84$ ). However, only 44% of children showed this pattern (placing statements of religious belief in an intermediate position between statements of correct fact and statements of opinion). Because the overall mean for statements of religious belief was relatively close to the overall mean for statements of correct factual belief, we conducted this analysis again to include individual children who judged that they learned the same amount about individuals after hearing statements of religious belief and statements of correct factual belief. This analysis revealed that 63% of children either placed statements of religious belief between statements of correct factual belief and statements of opinion or responded that statements of opinion revealed the highest amount of information about individuals and that statements of religious belief and correct factual belief revealed equivalent, lower amounts of information.

Finally, participants indicated that characters told them more about the world than about themselves after hearing statements of correct factual belief and religious belief, but more about themselves than the world after hearing statements of opinion-based belief (all  $ps<.001$ ). Participants reported that statements of incorrect factual belief told them little about either the world or the person holding the belief.

To directly compare children's and adults' responses, we analyzed the data from Experiments 1A and 2 together by conducting a 4 (Belief Category: correct fact vs. incorrect fact vs. religion vs. opinion)  $\times$  2 (Question Category: person vs. world)  $\times$  2 (Experiment: 1A vs. 2) mixed-model ANOVA with repeated measures on the first two factors. Each of the variables exerted a main effect (Belief Category:  $F(2.81, 332.04)=30.47$ ,  $p<.001$ ; Question Category:  $F(1, 118)=9.48$ ,  $p<.01$ ; Experiment:  $F(1, 118)=12.73$ ,  $p=.001$ ). These main effects were qualified by three two-way interactions: Belief Category  $\times$  Question Category ( $F(2.52, 297.59)=154.41$ ,  $p<.001$ ), Question Category  $\times$  Experiment ( $F(1, 118)=57.46$ ,  $p<.001$ ), and Belief Category  $\times$  Experiment ( $F(2.81, 332.04)=35.12$ ,  $p<.001$ ). These two-way interactions were qualified by a Belief Category  $\times$  Question Category  $\times$  Experiment interaction,  $F(2.52, 297.59)=14.05$ ,  $p<.001$ .

To better understand the 3-way interaction, we examined the simple effect of Question Category for each of the 8 combinations of Belief Category and Experiment. Participants in both experiments judged that correct factual claims revealed more information about the world than about the individual (both  $ps<.001$ ). Conversely, participants in both experiments judged that opinion-based claims revealed more information about the individual than about the world (both  $ps<.001$ ). The results of the two experiments differed for the two remaining belief categories. In the category of religion, adults judged that they had learned more about the individual than about the world ( $p<.001$ ), whereas children judged that they had learned more about the world than about the individual ( $p<.001$ ). In the category of incorrect fact, adults also judged that they had learned more about the individual than about the world ( $p<.001$ ), whereas children's judgments of how much they had learned about the individual did not differ from their judgments of how much they had learned about the world. The most plausible explanation of the differences between adult and child performance is that adults have had more experience with the diversity of beliefs present among people. Thus, in all domains except correct fact—that is, in all domains where people may reasonably be expected to differ from one another—adults judged that they had learned more about the individual than about the world. Children may have underestimated the degree to which different people may hold different beliefs in the domains of religion and incorrect fact and therefore perceived these types of beliefs as less informative about individuals.

### 8.3. Discussion

Like the adults in Experiments 1A and 1B, children judged that statements of religious belief revealed an intermediate amount of information about the world as compared to statements of correct

factual belief at one extreme and opinion-based belief at the other. Also, like the adults in Experiment 1B, children judged that statements of religious belief revealed an intermediate amount of information about the person as compared to statements of opinion-based belief at one extreme and correct factual belief at the other. Children perceived statements of religious belief as sharing some, but not all, of the properties associated with statements of factual belief and some, but not all, of the properties associated with statements of opinion-based belief.

Despite these continuities, children differed from the adults in both Experiments 1A and 1B in judging that statements of religious belief revealed more information about the world than about the individual holding the belief. In fact, compared with adults in Experiment 1A, children rated religious statements as providing significantly more information about the world and significantly less information about the believer. In this respect, children perceived statements of religious beliefs as more akin to statements of correct factual beliefs than did adults. As noted earlier, these differences may be due to adults' greater experience with the diversity of religious beliefs and with religious conflicts and disagreements. Thus, adults are likely to have greater knowledge of the extent to which there is a lack of consensus surrounding theological claims. Even so, it should be emphasized that children did not treat religious beliefs as equivalent to correct factual beliefs. By implication, children recognize that there is not a complete consensus regarding theological claims (see also [Coles, 1991](#); [Harris, 2012](#)).

## 9. General discussion

Previous research ([Heiphetz, Spelke, Harris, et al., 2013](#)) showed that children as well as adults distinguish statements of ideological belief, such as religious belief, from statements of both factual and opinion-based belief. In that research, participants across age groups were most likely to say that only one of two disagreeing characters could be right when the disagreement concerned a factual belief and least likely to provide this response when the disagreement concerned an opinion-based belief. Their replies concerning religious beliefs fell between these extremes, suggesting that participants conceptually linked statements of religious belief to some degree with statements of factual belief and to some degree with statements of opinion-based belief. By employing a different dependent measure (asking participants how much characters revealed or intended to reveal about themselves and about the world, rather than asking whether two people who disagreed could both be right), the present work sought to further examine how children conceptualize statements of religious belief and to investigate the role that development plays in such epistemological understanding.

The experiments reveal three noteworthy findings. First, children and adults differed in one important respect. Unlike adults, children judged that statements of religious belief provide more information about the world than about individuals. Indeed, unlike adults, children judged that statements of religious belief provide quite limited information about the individual making those claims, even though they agreed with adults that such statements provide more information about the individual than do correct factual claims. This difference may reflect an important role for experience. In religiously diverse cultures such as the United States, adults are likely to have encountered many individuals who do not share their religious beliefs—and may also disagree with each other. They are also likely to have had more experience with a variety of religious institutions. Thus, in such cultures adults are likely to be more familiar than children with the degree to which religious beliefs vary across individuals and thereby reflect aspects of an individual's background and outlook. This knowledge may have led adults in Experiments 1A and 1B to judge that statements of religious belief are quite informative about an individual, presumably because that information is likely to distinguish one individual from another. Given that they have experienced less religious diversity, children may be less inclined to think that people disagree on religious matters. Thus, young children may have been less able to recognize that statements of religious belief can provide a considerable amount of individuating information about any one person. This interpretation predicts that children of the same age will be more or less sensitive to the individuating information that is provided by statements of religious belief depending on the extent to which they grow up in a religiously diverse or homogeneous community. Testing this prediction is likely to prove a fruitful avenue for future research.

Second, even though 8–10-year-old children were more likely than adults to think of statements of religious belief as conveying information about the world, children were nonetheless similar to

adults in judging that statements of religious belief are somewhat like statements of factual belief and somewhat like statements of opinion-based belief. Children judged that statements of religious belief provide some amount of information about the world as well as about the individual holding the belief. This similarity between children and adults suggests that decades of experience are not necessary for all aspects of adult-like epistemology to emerge. Rather, some aspects of adults' cognition, notably the judgment that religious claims reveal at least some amount of information both about the external world and about the person making the claim, are present in childhood.

Third, children's judgments concerning statements of belief appear to be driven by the information that different types of statements are perceived to provide. Specifically, like adults, children judged that statements of correct factual belief provide more information about the world than about the individuals who hold the belief. The reverse was true for statements of opinion-based belief. Again like adults, children judged such statements to provide more information about the person than the world. Children perceived statements of religious belief to provide information about the world and to a lesser extent about individuals. Thus, both children and adults appeared to judge statements of religious belief as an amalgam of statements of factual belief and statements of opinion.

The finding that children and adults view statements of religious belief as somewhat akin to statements of correct factual belief and somewhat akin to statements of opinion-based belief has important implications regarding social cognition. Specifically, this result shows that even young children are beginning to view statements of religious belief as informative both about the believer and about the world. By implication, religious beliefs may be recognized as distinctive early in development. By the elementary school years, children have already established a notion of what religious beliefs are and how they are similar to and different from other types of beliefs that people may hold. Although religious beliefs are quite complex, and most adults certainly have a stronger grasp of theological nuance than do children in elementary school, even young children have an emerging representation of this category of belief.

Nevertheless, the present research also shows that children perceive statements of religious belief to be somewhat more akin to statements of factual belief than do adults. Unlike adults, children reasoned that statements of religious belief provided more information about the world than about the believer. Using Kuhn et al.'s (2000) terminology, children appear to be at a more absolutist level with regard to statements of religious belief than are adults. Children may be less able than adults to understand that statements of religious beliefs are disputed and that in religiously diverse societies, they do not reflect cultural consensus. This interpretation is in line with Perry's (1970) work showing that the transition from a more homogeneous home environment to a more diverse college environment commonly functions as an important milestone in adolescents' reasoning about beliefs and knowledge.

Thus, while children and adults appear similar in some respects (e.g., both judge that statements of religious belief provide more information about the world than do statements of opinion and that statements of religious belief provide more information about the individual who makes them than do statements of fact), important developmental differences appear. Specifically, children did not perceive statements of religious belief to be as informative about the individuals who made them as did adults. Rather, children may have overestimated the amount of consensus about statements of religious belief and therefore underestimated the amount of information such statements provide about individual people. These findings show that there is much to learn, not just about the particular religious beliefs that children hold or the ways in which those beliefs were acquired, but also about how children situate religious beliefs within a larger epistemological framework.

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## Appendix A.

### Statements of correct factual belief:

Germs are very small.

People have just one brain, and it is in their head.

Dinosaurs only lived a long time ago.

George Washington was the first president of the United States.

### Statements of incorrect factual belief:

Germs are very big.

People have two brains, and there is one in each foot.

There are dinosaurs alive right now.

Harry Potter was the first president of the United States.

*Statements of religious belief:* [Note: This category included both theistic and atheistic items. We did not find consistent differences between these categories and therefore collapsed across them.]

God knows all of our thoughts.

Only we can know all of our thoughts.

God can do miracles.

No one can do miracles.

After people die and are buried, some of them go up to heaven.

After people die and are buried, all of them stay here in the ground.

When people pray out loud, God can hear them.

When people pray out loud, only other people can hear them.

### Statements of opinion-based belief:

Oranges are the tastiest fruit of all.

Blue is the prettiest color of all.

Twinkle Twinkle Little Star is the best song of all.

Monopoly is the most fun game of all to play.

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