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(Article begins on next page)

The Development of Reasoning about Beliefs: Fact, Preference, and Ideology

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Word count: 4,962

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Abstract

The beliefs people hold about the social and physical world are central to self-definition and social interaction. The current research analyzes reasoning about three kinds of beliefs: those that concern matters of *fact* (e.g., dinosaurs are extinct), *preference* (e.g., green is the prettiest color), and *ideology* (e.g., there is only one God). The domain of ideology is of unique interest because it is hypothesized to contain elements of both facts and preferences. If adults' distinct reasoning about ideological beliefs is the result of prolonged experience with the physical and social world, children and adults should reveal distinct patterns of differentiating kinds of beliefs, and this difference should be particularly pronounced with respect to ideological beliefs. On the other hand, if adults' reasoning about beliefs is a basic component of social cognition, children and adults should demonstrate similar belief representations and patterns of belief differentiation. Two experiments demonstrate that 5-10 year old children and adults similarly judged religious beliefs to be intermediate between factual beliefs (where two disagreeing people cannot both be right) and preferences (where they can). From the age of 5 years and continuing into adulthood, individuals distinguished ideological beliefs from other types of mental states and demonstrated limited tolerance for belief-based disagreements.

Keywords: beliefs, ideology, religion, social cognition, social cognitive development

The Development of Reasoning about Beliefs: Fact, Preference, and Ideology

Beliefs are invisible yet potent drivers of behavior and decision-making. Religious beliefs appear particularly influential. In the 1960s, a Catholic president was a hotly debated issue; in 2008, a candidate had to explicitly disavow possible connections to Islam; and in 2012, another candidate's Mormon faith was often mentioned as a dimension in voters' decision-making.

To understand ideological beliefs such as these, we analyze two other kinds of beliefs— facts and preferences—that are commonly found in adult minds. Do adults view ideologies to be more fact-like, more preference-like, or mixtures of the two? The content of most beliefs is acquired through experience, but is the manner in which the mind treats beliefs so fundamental to social cognition that even young children are able to treat them the way adults do? If children and adults demonstrate similar responses even to structurally and socially complex beliefs, such as religious ideologies, such evidence would suggest that vast amounts of social learning are unnecessary for the ability to distinguish beliefs to emerge. On the other hand, if adults and children view these three kinds of beliefs to be distinct, the manner in which they differ could provide clues to the cognitive and social experiences needed for belief-based reasoning to develop.

The term "belief" has many meanings that vary across disciplines of inquiry. However, among the most common is the noncontroversial definition that a belief is a mental state in which a person regards particular propositions as true (Schwitzgebel, 2011). We enumerate three types of beliefs that vary in the degree to which the truth of the proposition is commonly understood to be based on *fact* or *preference*, with special interest in the category of ideology, which contains elements of both.

Factual beliefs. We use a standard definition of a fact, i.e., that "a fact is a state of affairs that is the case" (Wetzel, 2008). We extend this definition to the psychological notion of a fact by asserting that a fact refers to knowledge that is assumed to be true is some objective sense, independent of ordinary variations in perspective and preference.

Preference-based beliefs. Historically, social psychologists have viewed preferences as evaluative attitudes coupled with beliefs. For example, Fishbein and Ajzen (1972, p. 488) wrote that "[a] person learns or forms beliefs about an object. These beliefs influence his attitude toward the object. . ." We incorporate this perspective by examining the beliefs associated with particular attitudes or preferences. For example, we treat the statement "green is the prettiest color" as a preference-based belief because it incorporates a cognitive appraisal. Unlike factual beliefs, preference-based beliefs are idiosyncratic, varying across individuals and contexts.

Ideology-based beliefs. Ideological beliefs contain elements of both fact and preference, a property clearly seen in religious beliefs. For example, different religions disagree about matters of faith, suggesting that religious beliefs reflect preferences. Because different individuals espouse different religious beliefs, individuals may conclude that such beliefs provide information about particular people's preferences and differentiate one person from another. However, religious individuals often regard their beliefs as absolute. For example, half of White, evangelical Protestants believe that theirs is the one true faith, and 47% of individuals affiliated with an evangelical church believe there is only one way to interpret Christian teachings (Pew Research Center, 2008). Thus, individuals may reason that religious beliefs, like facts, reveal objectively correct information about the world.

Religious identities are also particularly important to individuals worldwide (Atran, 2002; Boyer, 2001; Ysseldyk, Matheson, & Anisman, 2010). Around the world, the majority of people

are theists (Lynn, Harvey, & Nyborg, 2009), and religion influences numerous aspects of life,

including health and longevity (McCullough, Friedman, Enders, & Martin, 2009), pro-social

behavior (Norenzayan & Shariff, 2008), and intergroup prejudice (Batson, Floyd, Meyer, &

Winner, 1999).

Religion's influence begins early in development. Five-year-old children categorize

individuals based on religious cues (Diesendruck & HaLevi, 2006), and children in elementary

school apply theistic reasoning to explanations concerning the natural world (Kelemen, 2004)

and the afterlife (Bering, Blasi, & Bjorklund, 2005). Children of this age also demonstrate group-

based preferences based on religion (Heiphetz, Spelke, & Banaji, in press), appeal to religion to

explain morality (Nucci & Turiel, 1993), and use religious ideas to help them understand

themselves, their families, and other people (Coles, 1991). The current research investigates

whether children, as well as adults, also differentiate religious beliefs from other types of mental

states.

A Developmental Approach to Understanding Beliefs

If the human mind is built to differentiate between various beliefs—even without much

socio-cultural input—the ability to do so may appear even in young children who do not have

much experience understanding and reasoning about their own beliefs and those of others.

However, because children have less experience with belief-based disagreements than adults,

they may represent different types of beliefs as similar to one another. To distinguish between

these alternatives, the present research examines children and adults.

Several potential outcomes may results. Children may be more absolutist than adults,

reasoning that only one person can be right for any type of disagreement, perhaps due to

children's lesser experience with multiple viewpoints. Alternatively, children may be more

relativist than adults, perhaps because they have held their own beliefs for a shorter period of time and may therefore be more open to disagreement.

A third possibility is that children and adults respond similarly. Such a result would support the idea that fact, preference, and ideology are sufficiently distinct that even young children understand that difference in the same way as adults. If this pattern emerges, it would suggest that decades of experience with others' beliefs are not necessary to understand the subtle differences between types of beliefs. Rather, such judgments are formed early in life and remain stable despite increasing exposure to others' beliefs.

If only adults were queried, the extent to which their reasoning relies on extensive social experience would remain unclear. To address this issue, the current experiments tested both children and adults.

Children's Knowledge of Beliefs

Most previous work on children's belief-based reasoning falls within a theory of mind framework—an approach that examines children's ability to understand various mental states. For example, in a classic theory-of-mind paradigm (Wimmer & Perner, 1983), children learn about a boy who places chocolate in a room and leaves. While he is gone, his mother moves the chocolate. Children older than four typically respond that the boy will subsequently search for the chocolate where he falsely believes it to be located (i.e., in its original location). This basic finding has been replicated numerous times (Wellman, Cross, & Watson, 2001) and indicates that children older than four can understand the implications of others' beliefs even when those beliefs differ from the child's.

Children obtain factual knowledge in a number of ways. Much of children's early factual knowledge comes from others, and children use a number of cues to determine which statements

to believe. For example, preschool-aged children accept new information more readily from informants who have previously made correct statements (Corriveau, Packard, & Harris, 2011; Jaswal & Neely, 2006; Koenig, Clement, & Harris, 2004; Tenney, Small, Konrad, Jaswal, & Spellman, 2011) and accept factual information more readily from informants who speak with certainty (Jaswal & Malone, 2007; Tenney et al., 2011) and from informants perceived to have expertise (Koenig & Jaswal, 2011; VanderBorght & Jaswal, 2009). Children also learn by discovering facts themselves. For example, children in preschool can determine the truth value of a statement like "there are crayons on the table" if they can see the table (Kuhn, 2011), and older children explore the world in ways that combine play and scientific investigation (Bonawitz, van Schijndel, Friel, & Schulz, 2012).

Though children in preschool are able to recognize indeterminacy—a state of affairs in which more than one answer might be correct and the correct alternative is unknown—it is not until adolescence that most children begin to reason about science as a way of obtaining knowledge rather than as a series of determinate facts (Fay & Klahr, 1996; Kuhn, 2011; Kuhn & Pearsall, 2000). On the other hand, children perceive preferences as idiosyncratic early in development, realizing that others may not share their preferences (Flavell, Flavell, Green, & Moses, 1990).

Like adults, children are quite good at distinguishing between factual and preference-based beliefs. For example, children report that individuals are more likely to disagree about preferences than about factual beliefs and that preference-based disagreements are more acceptable. However, it is unclear whether this ability emerges before children enter elementary school (Flavell et al., 1990; Wainryb, Shaw, Langley, Cottam, & Lewis, 2004) or later during the

elementary school years (Banerjee et al., 2007). Additionally, previous work has not examined children's reasoning about ideological beliefs.

Overview of Current Experiments

The current work compares the development of reasoning about factual, preference-based, and ideology-based beliefs. Because religious ideology contains elements of both fact and preference, this domain provides a particularly compelling case study in belief-based reasoning. To investigate the origins of adults' cognition, we tested participants from a wide age range. In two experiments, we asked whether individuals holding conflicting beliefs could both be right or if only one could be right and found that participants of all ages distinguished ideologies from both facts and preferences.

<div align="center">

Experiment 1

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Method

Participants. The sample included 107 children (M_{age}=7;9, range=5-10 years; 66 girls) and 59 adults (M_{age}=27;2, range=17-60 years; 41 women). Five-year-old children reliably distinguish their own mental states from others' (Wellman et al., 2001) and thus served as the youngest participants. We employed a relatively wide age range, including an adult comparison group, to investigate a broad range of potential developmental shifts or consistencies.

We recruited children through a departmental database and in a museum in the northeastern United States. The sample was 68% White. Children's religious affiliation was determined by parental responses to the question, "How would you identify the religious affiliation of your child?" on a demographic questionnaire completed during the experiment. The sample was 60% Christian, 8% Jewish, 2% Muslim, and 15% atheist or agnostic; 15% of the children were classified as members of some other, unlisted, religion. Adults were recruited

through the psychology department's subject pool (including students and non-student community members) and received $5 or course credit. These participants self-identified their religion on a demographic questionnaire at the end of the experiment. This sample was 51% White and 46% Christian, 5% Jewish, 5% Muslim, and 32% atheist or agnostic; 12% identified their religion as "other."

Procedure. Children named their favorite color, song, game, and fruit. During each subsequent trial, the experimenter displayed images of two White children matched in gender, approximate age, and attractiveness, as determined by adults' earlier ratings. The experimenter attributed a belief to each child and asked whether only one or both of the characters could be right. For example, during one trial, the experimenter pointed to one character and said, "This child thinks that germs are very big." She then pointed to the other character and said, "This child thinks that germs are very small." The experimenter then asked, "Can only one of these children be right, or can both be right?" To account for the possibility that participants may have disagreed with both characters, we asked whether only one or both characters *could be* right instead of asking whether only one or both characters *were* right. This phrasing allowed participants to reflect on whether it was possible for both statements to be correct even if the participant did not endorse either statement.

All items belonged to one of five categories: (1) matters of religious doctrine (both of the children were portrayed as theists who disagreed about particular matters of doctrine, e.g., how many gods there are), (2) matters of religious faith (only one child was portrayed as a theist; e.g., one believed that God hears verbal prayer and the other believed that only other people hear verbal prayer), (3) facts, (4) familiar preferences, and (5) unfamiliar preferences. Reasoning that participants may think differently about disagreements that are relatively more severe, we

distinguished between narrower matters of doctrine (which include one important underlying

agreement; namely, each character believes in God) and broader matters of faith, which

incorporate a starker difference of perspective. Similarly, we included some preference trials

where items endorsed by both characters were familiar to participants and other trials where only

one favorite object was familiar (Appendix A).

The procedure for adults was similar except for the following changes: 1) Adults

completed the experiment via a self-paced computer task; 2) 29 adults viewed pictures of child

faces (i.e., the same stimuli viewed by children) while 30 viewed pictures of adult faces taken

from Minear and Park (2004; like children, adults in this condition viewed pictures of peers). For

both children and adults, we counterbalanced question order ("Can only one of these children be

right, or can both be right?" vs. "Can both of these children be right, or can only one be right?"),

item order, order of the photograph pairs, item/photograph pairing, and the side of the screen on

which each photograph appeared.

Results and Discussion

The proportion of trials on which participants stated that only one character could be right

(denoted as "one right" below) served as the dependent measure.

Primary analyses. Preliminary *t*-tests did not reveal a significant effect of participant

religion, location of experiment, or age of target faces seen by adults; therefore, we subsequently

collapsed across these variables. We conducted a 4 (belief type: doctrine vs. faith vs. fact vs.

preference) X 4 (age: 5-6 year olds vs. 7-8 year olds vs. 9-10 year olds vs. adults) mixed-model

ANOVA with repeated measures on the first factor. The analysis revealed a main effect of belief

type: participants were most likely to respond "one right" when asked about factual beliefs and

least likely to give this answer when reasoning about preference-based beliefs, with religious

beliefs falling between these two extremes (F (2.78, 436.26)[1]=202.90, p<.001, partial η^2=.56).

Additionally, we observed a main effect of age: younger participants were more likely than older

participants to provide the "one right" answer (F (3, 157)=16.20, p<.001, partial η^2=.24).

To examine age-related difference in children's reasoning, we conducted two planned

simple contrasts using 9-10 year old children (N=26) as the comparison group because we

expected them to be most similar to adults. They differed significantly from 5-6 year old children

(N=44), p<.001, but not from 7-8 year old children (N=37). When subsequently examining age

differences across condition, we collapsed across the two older ages. Additionally, we conducted

four linear regressions to examine the effect of adults' age on responses. In each analysis, we

entered age (measured in years) as the predictor variable and one type of belief as the dependent

variable. No regression reached significance.

The two main effects were qualified by a Belief Type X Age interaction (F (8.34,

436.26)[1]=5.02, p<.001, partial η^2=.09). To examine this interaction, we first asked whether each

age group distinguished religious beliefs from both factual and preference-based beliefs. When

averaging across faith and doctrine items, participants of all ages were more likely to respond

"one right" when asked about factual rather than religious beliefs (5-6 year olds: M_{fact}=.92,

SD_{fact}=.17; $M_{religion}$=.72, $SD_{religion}$=.27, F (1, 41)=26.35, p<.001; 7-10 year olds: M_{fact}=.88,

SD_{fact}=.19; $M_{religion}$=.47, $SD_{religion}$=.34, F (1, 62)=95.96, p<.001; adults: M_{fact}=.80, SD_{fact}=.23;

$M_{religion}$=.34, $SD_{religion}$=.31, F (1, 56)=101.26, p<.001). Additionally, participants of all ages were

more likely to respond "one right" when asked about religious beliefs rather than preferences (5-

6 year olds: $M_{preference}$=.44, $SD_{preference}$=.39, F (1, 41)=36.61, p<.001; 7-10 year olds:

$M_{preference}$=.10, $SD_{preference}$=.25, F (1, 62)=77.45, p<.001; adults: $M_{preference}$=.10, $SD_{preference}$=.24, F

(1, 56)=31.64, $p<.001$). All age groups situated religious beliefs between factual and preference-based beliefs.

However, age influenced participants' perceptions of the two types of religious beliefs. Children's evaluations of faith-based and doctrinal disagreements did not differ (5-6 year olds: $M_{faith}=.70$, $SD_{faith}=.32$; $M_{doctrine}=.75$, $SD_{doctrine}=.30$, $F(1, 41)=2.18$, ns; 7-10 year olds: $M_{faith}=.48$, $SD_{faith}=.36$; $M_{doctrine}=.46$, $SD_{doctrine}=.38$, $F(1, 62)=.32$, ns). However, adults were more likely to respond "both right" when judging matters of faith rather than doctrine ($M_{faith}=.41$, $SD_{faith}=.40$, $M_{doctrine}=.26$, $SD_{doctrine}=.30$, $F(1, 57)=13.60$, $p=.001$).

Additionally, 5-6 year olds were more likely than 7-10 year olds to respond "one right" to doctrinal beliefs ($F(1, 103)=17.81$, $p<.001$), faith-based beliefs ($F(1, 105)=10.87$, $p=.001$), and preference-based beliefs ($F(1, 104)=32.07$, $p<.001$), but not factual beliefs ($F(1, 104)=1.06$, ns). 7-10 year olds were more likely than adults to respond "one right" to doctrinal beliefs ($F(1, 119)=10.17$, $p<.01$). After controlling for multiple comparisons, older children did not differ from adults on any other dependent measure. All age groups situated religious beliefs between fact-based and preference-based beliefs, with the differentiation among these three categories being somewhat sharper among older participants (Figure 1).

We also used one-sample t-tests to compare the mean responses in each age group to chance (.50). Five- and six-year-old children were more likely than chance to respond "one right" to disagreements concerning doctrine ($t(41)=5.36$, $p<.001$), faith ($t(43)=4.16$, $p<.001$), and fact ($t(42)=16.13$, $p<.001$); however, they responded at chance levels to disagreements concerning preference ($t(42)=-.89$, ns). 7-10 year old children responded "one right" more often than chance to factual disagreements ($t(62)=15.51$, $p<.001$), less often than chance to preference-based disagreements ($t(62)=-12.77$, $p<.001$), and at chance to disagreements

concerning doctrine (t (62)=-.92, *ns*) and faith (t (62)=-.52, *ns*). Like older children, adults

responded "one right" more often than chance to factual disagreements (t (56)=9.72, *p*<.001) and

less often than chance to preference-based disagreements (t (56)=-12.37, *p*<.001). Additionally,

adults were less likely than chance to respond "one right" to disagreements concerning doctrine

(t (57)=-6.21, *p*<.001) and marginally less likely than chance to respond "one right" to

disagreements concerning faith (t (58)=-1.79, *p*=.078). The fact that the youngest children's

responses to the religion items differed reliably from chance suggests that children were not

responding randomly to these items due to confusion. Older children's responses to religious

items may not have differed from chance due to the transitional time period covered by these

ages; 7-10 year old children may have been shifting from perceiving religious beliefs as matters

with only one correct viewpoint to perceiving such beliefs as matters with more than one

possible viewpoint.

      Alternative interpretations. Beliefs concerning matters of faith and matters of doctrine

may have emerged in mid-position between factual and preference-based beliefs because they

truly occupy an intermediate position or because the sample consisted of two extreme groups

(i.e., some participants always responded "one right" whereas others always responded "both

right"). However, few participants provided the same answer to all items within a belief

category, showing that the data truly reflect participants' conception of religion as situated

between factual and preference-based beliefs (Table 1).

      Another question concerns the nature of the items used. It is possible that half the

religion items always produced a "one right" answer whereas the other half always produced a

"both right" answer. Again, deeper analysis of the data by item revealed that this was not the

case. Proportions of "one right" responses varied from .33 to .59 across all religion items,

demonstrating that these items did not induce polarization. Similarly, neither the factual items

(*M*s from .75 to .95) nor the preference-based items (*M*s from .14 to .25) produced polarization.

Thus, the intermediate position of religious beliefs is not due to half of the participants

responding "one right" to all beliefs in a particular category whereas the other half always

responded "both right," nor is it due to participants unanimously responding "one right" to half

of the beliefs in a particular category while responding "both right" to the other half. Rather, the

intermediate position of beliefs concerning faith and beliefs concerning doctrine appears to

reflect a truly unique mode of reasoning about the category of religion.

Experiment 2

Because Experiment 1 is the first to demonstrate that even young children differentiate

religious beliefs from factual and preference-based beliefs, we conducted Experiment 2 to

determine whether the effects would replicate and to explore a potential boundary condition.

Participants may have used their confidence in their own pertinent beliefs, coupled with their

past experiences of variability in beliefs expressed across people, to inform their responses. For

example, being confident that germs are not very big, children may have readily judged that only

one child could be right when the disagreement concerned the size of germs. If this process

accounted for Experiment 1's results, it would be impossible to know whether children make

qualitative distinctions between different categories of beliefs or whether children can only

distinguish between specific beliefs with which they are familiar. The latter possibility would

imply that young children have not yet developed a representation of ideological beliefs as

distinct from factual and preference-based beliefs. To address this alternative hypothesis,

Experiment 2 removed relevant background knowledge.

Method

Participants. The sample included 100 children (M_{age}=7;7, range=5-10 years; 50 girls) and 37 adults (M_{age}=26;8, range=17-65 years; 24 women). Children were recruited as in Experiment 1. The child sample was 86% White and 57% Christian, 18% Jewish, 16% atheist or agnostic, and 9% members of some other, unlisted, religion. Adults were recruited through the psychology department's subject pool and completed the experiment online; they received course credit or the opportunity to win a $25 gift certificate. This sample was 60% White and, on a demographic questionnaire completed at the end of the study, participants self-identified as Christian (54%), Jewish (3%), Muslim (11%) atheist or agnostic (24%), or "other" (8%).

Procedure. The experimental procedure for children was similar to Experiment 1 with one notable exception: We altered the stimuli to eliminate any relevant background knowledge participants might possess. We asked participants to respond to others' religious, factual, and preference-based beliefs concerning a fictional planet, Tamsena. Experiment 2 stimuli did not distinguish between beliefs concerning matters of doctrine and faith because this distinction would be difficult to create for novel religious beliefs. Preference-based items included vocabulary unfamiliar to most participants to eliminate any potential effects of participants' own preferences (Appendix B). Because no differences were observed between adults viewing adult or child faces in Experiment 1, all adults in Experiment 2 viewed child faces.

Results and Discussion

Replicating Experiment 1, preliminary analyses did not reveal significant effects of test location or participant religion; thus, these variables were dropped from subsequent analyses. We conducted a 3 (belief type: religion vs. fact vs. preference) X 4 (age: 5-6 year olds vs. 7-8 year olds vs. 9-10 year olds vs. adults) mixed-model ANOVA with repeated measures on the first factor. The analysis revealed two main effects (Figure 2). First, participants were most likely to

respond "one right" when asked about factual beliefs and least likely to give this answer when reasoning about preference-based beliefs, with religious beliefs falling between these two extremes (F (1.88, 243.00)[1]=142.78, p<.001, partial η^2=.53). Second, younger participants were more likely than older participants to provide the "one right" answer (F (3, 129)=5.91, p=.001, partial η^2=.12). The Belief Type X Age interaction did not reach significance (F (5.65, 243.00)[1]=1.40, p>.20). Across age groups, participants were more likely to say that only one character could be right when responding to disagreements about factual rather than religious beliefs (M_{fact}=.75, SD_{fact}=.28, $M_{religion}$=.52, $SD_{religion}$=.36, F (1, 133)=65.79, p<.001) and when responding to disagreements about religious rather than preference-based beliefs ($M_{preference}$=.20, $SD_{preference}$=.33, F (1, 133)=79.17, p<.001).

As in Experiment 1, three linear regressions did not demonstrate a significant effect of adults' age on responses to disagreements. Additionally, two planned simple contrasts conducted on the children's data showed that 9-10 year olds (N=25) differed significantly from 5-6 year olds (N=41), p<.01 but not from 7-8 year olds (N=34). Although the Belief Type X Age interaction did not reach significance, we conducted post-hoc pairwise comparisons to determine whether children demonstrated the same developmental milestones as in Experiment 1. Older children were more likely than younger children to say that both characters could be right in response to religious disagreements (M_{older}=.49, SD_{older}=.36, $M_{younger}$=.66, $SD_{younger}$=.32, F (1, 95)=5.22, p<.05) and preference-based disagreements (M_{older}=.18, SD_{older}=.31, $M_{younger}$=.35, $SD_{younger}$=.40, F (1, 95)=5.33, p<.05). However, these effects were weaker than those observed in Experiment 1; after correcting for multiple comparisons, both dropped to non-significance. Additionally, 7-10 year old children did not respond differently than adults to any dependent measure. Again, participants provided inconsistent responses to religious items (Table 1);

furthermore, participants did not respond in a polarized fashion to different items within any belief category (*M*s ranging from .44 to .57 for religious beliefs, .67 to .85 for factual beliefs, and .18 to .23 for preference-based beliefs).

As in Experiment 1, we also compared the mean responses in each age group to chance (.50). Replicating Experiment 1, 5-6 year old children were more likely than chance to respond "one right" to disagreements concerning religion (*t* (38)=3.03, *p*<.01) and fact (*t* (38)=8.42, *p*<.001). Additionally, 5-6 year old children tended to respond that both characters could be right when the disagreement concerned preference; however, this result did not reach significance after performing a Bonferroni correction (*t* (37)=-2.35, *p*=.024). As in Experiment 1, 7-10 year old children responded "one right" more often than chance to factual disagreements (*t* (58)=6.78, *p*<.001) and less often than chance to preference-based disagreements (*t* (58)=-7.85, *p*<.001); 7-10 year old children's responses to religious disagreements did not differ from chance (*t* (57)=-.18, *ns*). Like older children, adults responded "one right" more often than chance to factual disagreements (*t* (36)=3.73, *p*=.001), less often than chance to preference-based disagreements (*t* (36)=-13.08, *p*<.001), and at chance to religious disagreements (*t* (36)=-1.29, *ns*). Participants' greater propensity to respond at chance levels to fictional religious beliefs (Experiment 2) rather than familiar religious beliefs (Experiment 1) may reflect their uncertainty when faced with novel religious views concerning an unfamiliar planet. The relatively more reliable responses provided by the youngest children may reflect these participants' greater facility with imaginary worlds (i.e., the youngest children may spend more time thinking about fictional places).

Even when reasoning about previously unfamiliar beliefs, children and adults continued to differentiate religious beliefs from both factual and preference-based beliefs. These results

show that the differentiation between different types of beliefs does not depend on prior

familiarity with the beliefs in question.

General Discussion

Two experiments demonstrated that children and adults distinguished religious ideologies

from factual and preference-based beliefs, even when participants were unfamiliar with the

particular beliefs tested. Even the youngest participants responded reliably to religious

disagreements, and children, like adults, judged religion to occupy an intermediate position

between facts and preferences.

Previous findings show that young children can reason about factual beliefs (Wellman et

al., 2001) and preferences (Banerjee et al., 2007; Flavell et al., 1990; Repacholi & Gopnik,

1997). The current research shows that children can differentiate between these types of beliefs

even before reaching elementary school. Children as young as 5 years seem to represent other

minds as capable of containing conflicting beliefs. Additionally, around the age of 7 years,

children become more likely to say that two people whose preferences conflict can both be right.

This developmental shift may reflect children's increasing experience with contradictory

preferences as they begin elementary school and learn to navigate the conflicting preferences of

their peers.

Additionally, the current work is the first to demonstrate that children as young as 5 years

of age can systematically judge religious beliefs differently from both fact- and preference-based

beliefs. Even 5-6-year-olds make this differentiation, and it continues into adulthood in the same

form, suggesting that children and adults have similar conceptions of religious beliefs vis-à-vis

other types of beliefs. The fact that adult-like representations of beliefs are present in children

suggests that adults do not require many years of experience to arrive at their judgments of

conflicting beliefs. Rather, adults' distinction of ideological beliefs from both factual and preference-based beliefs appears to be the outcome of an early developmental process, and the ability to differentiate a variety of beliefs appears to be an early-emerging component of social cognition.

Though the current research sheds light on the under-studied topics of religious cognition and the development of reasoning about beliefs, it is not without its limitations. First, the samples in the current research were predominantly White and Christian. Though we did not find consistent differences between Christians and non-Christians, or between theists and non-theists, it is possible that increased representation of racial and religious minorities would highlight differences between groups. Second, it is possible that children and adults from particularly conservative or religiously homogenous cultures might respond differently to belief differences. In such societies, individuals may perceive religious and political beliefs to be more similar to facts. Indeed, future research could profitably examine the development of belief-based reasoning cross-culturally. Importantly, however, the current work suggests that children as young as 5 are cognitively capable of distinguishing religious beliefs from other types of mental states. This finding shows that children are developmentally capable of making this distinction, even if they do not do so in all cultures.

The current research opens many questions concerning individuals' trust in others' testimony. Previous work in this area has focused on children's trust in others' factual claims—a domain in which children as well as adults believe that only one person can be right. A fruitful line of research could examine responses to others' testimony concerning beliefs that are not necessarily perceived to have only one correct answer. The current research also has important implications for the formation of intergroup preferences. The current work demonstrates that

some children are willing to accept that those who disagree with them do not necessarily need to be wrong; thus, their intergroup preferences in belief domains may not be as strong as their social preferences in other areas. Exploring the implications of children's representations of mental states for intergroup preferences remains a fruitful avenue for future research.

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Appendix A: Experiment 1 Stimuli

Note: Each belief was preceded by the phrase, "This child/person thinks that. . ."

Matters of Doctrine:

1) There is only one god vs. there are many gods

2) God sent Jesus to Earth a long time ago to make the world a better place vs. God will send someone to Earth to make the world a better place, but that person hasn't come yet

3) We can only learn about God by reading the Bible vs. We can only learn about God by reading the Quran

4) After they die, some people go to heaven vs. After they die, some people come back to Earth as different creatures

Matters of Faith:

1) God can hear us when we pray out loud vs. Only other people can hear us when we pray out loud

2) After people die and are buried, some of them go to heaven vs. After people die and are buried, everyone stays here in the ground

3) God knows all of our thoughts vs. Only we can know all of our thoughts

4) God can do miracles vs. Nobody can do miracles

Factual Beliefs:

1) Germs are very small vs. Germs are very big

2) People have just one brain, and it is in their head vs. People have two brains, and there is one in each foot

3) Dinosaurs only lived a long time ago vs. There are dinosaurs alive right now

4) George Washington was the first President of the United States vs. Harry Potter was the first President of the United States

Familiar Preferences:

1) [Participant's favorite color] is the prettiest color vs. Green is the prettiest color

2) [Participant's favorite fruit] are the tastiest fruit vs. Oranges are the tastiest fruit

3) [Participant's favorite game] is the most fun game to play vs. Tag is the most fun game to play

4) [Participant's favorite song] is the best song vs. Twinkle Twinkle Little Star is the best song

Unfamiliar Preferences:

1) [Participant's favorite color] is the prettiest color vs. Chartreuse is the prettiest color

2) [Participant's favorite fruit] are the tastiest fruit vs. Santols are the tastiest fruit

3) [Participant's favorite game] is the most fun game to play vs. Mankala is the most fun game to play

4) [Participant's favorite song] is the best song vs. Ah Mon Bon Chauteau is the best song

Appendix B: Experiment 2 Stimuli

Note: Each belief was preceded by the phrase, "This child/person thinks that. . ." Before reading any of the items below, the experimenter said, "I'm going to tell you about a planet far away from here. It's called Tamsena, and it looks like this." The experimenter then pointed to a picture of an unfamiliar planet before moving on to the first experimental item.

Religious Beliefs:

1) All of the invisible spirits on Tamsena live under the ground vs. All of the invisible spirits on Tamsena live in the tops of the trees

2) The only way to get an invisible spirit on Tamsena to hear you is to talk to the spirit while standing next to a fire vs. The only way to get an invisible spirit on Tamsena to hear you is to talk to the spirit while swimming in a river

3) The only way to learn about the spirits on Tamsena is to read the blicket vs. The only way to learn about the spirits on Tamsena is to read the spoodle

4) Invisible spirits on Tamsena only protect everyone during the day vs. Invisible spirits only protect everyone on Tamsena at nighttime

Factual Beliefs:

1) Tamsena is ruled by a king. The first king of Tamsena was called Benjamin Smith vs. The first king of Tamsena was called Daniel Jones

2) There are two mountains on Tamsena vs. There is only one mountain on Tamsena

3) On Tamsena, there is a type of tree called the grinkle tree. Grinkle tree seeds are so small that no one can see them vs. Grinkle tree seeds are so big that people can trip over them

4) Animals called saramads only lived on Tamsena a long time ago vs. There are saramads alive on Tamsena right now

Preferences:

1) Au Mon Bon Chateau is the best song vs. Ils Etaient Trois Garcons is the best song

2) Mankala is the most fun game to play vs. Ubuthi is the most fun game to play

3) Santols are the tastiest fruit vs. Tanjongs are the tastiest fruit

4) Chartreuse is the prettiest color vs. Coquelicot is the prettiest color

Footnote

[1.] Due to a violation of sphericity, we report results using a Greenhouse-Geisser correction.

FIGURE CAPTIONS

Figure 1. Proportion of trials during which participants responded that only one character could be right, Experiment 1. Error bars represent standard error of the mean.

Figure 2. Proportion of trials during which participants responded that only one character could be right, Experiment 2. Error bars represent standard error of the mean.
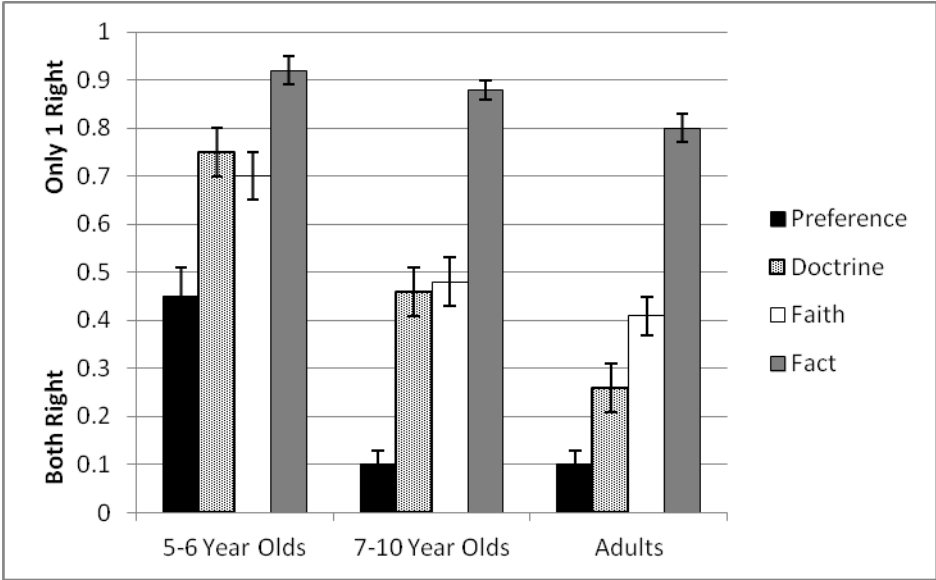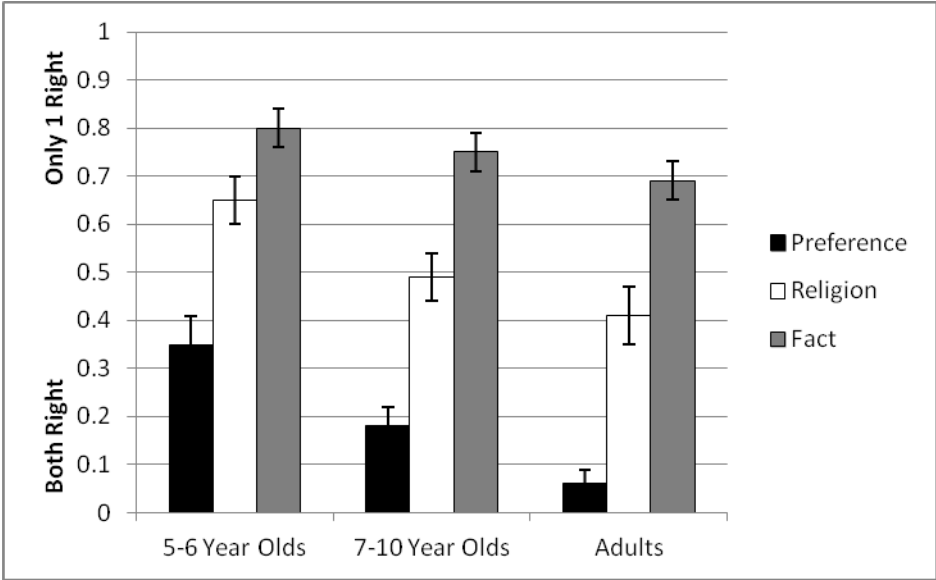
Figure 1.

Figure 2.

Table 1. Proportion of participants who provided consistent answers in Experiments 1 and 2 with standard deviation in square brackets and the proportion of all participants who consistently responded that only one character could be right in parentheses. We conducted a series of one-sample *t* tests using proportion of participants who provided consistent answers (regardless of whether they said that only one or both characters could be right) to determine whether each proportion was significantly different from 1.0 (indicating perfect consistency); * $p < .05$; ** $p = .001$; *** $p < .001$.

Belief Category			
Experiment 1			
	Preference	Doctrine	Faith	Fact
5-6 Year Olds	.44 [.50] (.16)***	.50 [.51] (.46)***	.45 [.50] (.39)***	.77 [.43] (.75)**
7-10 Year Olds	.84 [.37] (.03)**	.49 [.50] (.21)***	.43 [.50] (.18)***	.65 [.48] (.64)***
Adults	.74 [.44] (.17)***	.50 [.50] (.03)***	.59 [.50] (.20)***	.47 [.50] (.44)***
Experiment 2			
	Preference	Religion	Fact
5-6 Year Olds	.63 [.49] (.20)***	.38 [.49] (.29)***	.46 [.51] (.44)***
7-10 Year Olds	.75 [.44] (.07)***	.40 [.49] (.17)***	.49 [.50] (.42)***
Adults	.89 [.31] (.03)*	.51 [.51] (.19)***	.41 [.50] (.33)***