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## Confronting, Representing, and Believing Counterintuitive Concepts: Navigating the Natural and the Supernatural

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### Abstract

Recent research shows that even preschoolers are skeptical; they frequently reject claims from other people when the claims conflict with their own perceptions and concepts. Yet, despite their skepticism, both children and adults come to believe in a variety of phenomena that defy their first-hand perceptions and intuitive conceptions of the world. In this review, we explore how children and adults acquire such concepts. We describe how a similar developmental process underlies mental representation of both the natural and the supernatural world, and we detail this process for two prominent supernatural counterintuitive ideas—God and the afterlife. In doing so, we highlight the fact that conceptual development does not always move in the direction of greater empirical truth, as described within naturalistic domains. We consider factors that likely help overcome skepticism, and in doing so promote belief in counterintuitive phenomena. These factors include qualities of the learners, aspects of the context, qualities of the informants, and qualities of the information.

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A paradox has emerged in the psychological literature, the solution to which is critical to understanding the nature of conceptual development broadly. On the one hand, recent research has revealed that children are not as credulous as they were once thought. Rather than simply accepting everything that they are told (Gilbert, 1991; Millikan, 1998; Reid, 1764/1997), even young children compare new information to their own perceptions and conceptions of the world and if the new information conflicts, they often reject it (Clément, Koenig, & Harris, 2004; Jaswal, 2004; Lane, Harris, Gelman, & Wellman, in press; Ma & Ganea, 2010; Robinson, Mitchell, & Nye, 1995). On the other hand, both children and adults believe in a variety of entities and processes that defy their intuitive conceptions and first-hand perceptions of the world. These include scientific concepts of invisible germs and oxygen, heliocentrism, and a spherical Earth, as well as religious concepts of deities who are all-knowing and all-powerful, Heaven, and souls that continue to exist even after the mind and body have died (Braswell, Rosengren, & Berenbaum, 2012; Guerrero, Enesco, & Harris, 2010; Pew, 2008; Shtulman, 2013; Siegal, Nobes, & Panagiotaki, 2011; Spilka, Armatas, & Nussbaum, 1964).

In this paper we analyze this paradox. More specifically we ask: If children are so particular about the information they accept as true, how do counterintuitive ideas ever take hold? We use “counterintuitive” to refer to events and ideas that conflict with intuitions that are grounded in lay theories about different domains (Gopnik & Meltzoff, 1997; Wellman & Gelman, 1998). For example, our theory of *mind* (Gopnik & Wellman, 1992; Wellman, 2011) guides our intuitions about mental states so that we can *explain* and *predict* how people will behave, think, and feel. Likewise, our theory of *biology* (Carey, 1985; Inagaki & Hatano, 2006) helps us make sense of non-intentional bodily processes and functions, such

as hunger, reproduction, and death. And our theory of *physics* (Smith, Carey, & Wiser, 1985; Spelke, Breinlinger, Macomber, & Jacobson, 1992) helps us explain and predict how inanimate, physical objects move and interact. Information that conflicts with expectations stemming from those theories may be considered “counterintuitive.” This is the definition of counterintuitive most commonly used by cognitive scientists (e.g., Atran & Norenzayan, 2004; Boyer, 1994; Boyer & Walker, 2000). For the purposes of this review, we also discuss mental representation of, and belief in, counter-perceptual entities and improbable events that adults might believe to be real and possible, but which young children often judge to be not real and impossible (see Woolley & Ghossainy, 2013).

Counterintuitive ideas and events often inspire “how” and “why” questions, and because they do not accord with intuition, invite skepticism (at least initially). By “counterintuitive” we are not referring to just anything that is unexpected. Consider a situation where someone is driving down a rural road in the Northern U.S., when a deer runs in front of the car. Although surprising, that event likely does not defy the driver’s theories of biology, physics, or psychology—sometimes wild animals run across roads because they are unaware that cars are approaching. Thus, although surprised, the driver is not left wondering, “*how* could that have happened?” Moreover, this event is also not improbable to her; indeed, it may happen often in regions populated with such animals. Had this animal been an elephant, had it transformed into another animal, or passed through her car unscathed, the driver might stop to figure out what happened—all these events would be counterintuitive. Moreover, had someone told you that they experienced any of these events, you would likely be skeptical. Thus, prior intuitions influence our reactions to first-hand encounters as well as to the testimony of other people.

Many intuitions (and thus counter-intuitions) will be shared by most people because of stable features of the environment; for example, we all live on a planet with gravity, so most of us would be shocked to suddenly see cars, houses, and water floating in mid-air. However, the set of counterintuitive concepts is not fixed; because individuals’ intuitions are derived in part from their interactions with, and observations of, a particular environment, what constitutes the *counter*-intuitive will depend upon an individual’s particular experiences. Thus, we would expect to find that what constitutes the counterintuitive will vary between groups of individuals, depending upon their typical daily experiences. As we argue later, the counter-intuitiveness of any given idea is also related to how we mentally represent it, which changes across development. Thus, different concepts will be counterintuitive at different points in individual development, depending upon personal experiences and the development of various cognitive capacities.

In the following sections, we analyze the processing of counterintuitive information. We begin by discussing ways in which children and adults initially encounter counterintuitive information. Next, we describe the process by which they subsequently come to cognitively represent counterintuitive phenomena. We describe how similar developmental processes underlie the representation of both natural and supernatural counterintuitive ideas. Because less work has focused on the precise developmental unfolding of supernatural counterintuitive ideas, we take the opportunity here to review recent research on children’s developing representations of widespread supernatural ideas. Finally, we consider several factors that likely influence *belief* in counterintuitive phenomena.

## Encountering Counterintuitive Ideas

Even infants are captivated by unusual events. By 6 months, they look longer at a scene in which one moving object passes through another stationary object—an event that violates their intuitions about object solidity—than at a scene in which the stationary object blocks

the moving object (Baillargeon, 1986); and they look longer at an object that floats in mid-air—an event that violates their intuitions about gravity—than at an object that sits on the ground (Needham & Baillargeon, 1993). By 12-months, infants look longer when a person reaches indirectly, rather than directly, for an object that is right in front of her—an event that violates infants' intuitions about goal-directed action (Phillips & Wellman, 2005). Presenting children with unusual events in these *violation-of-expectation* studies is one way in which researchers learn about infants' conceptual development; the idea is that infants look longer when their intuitions about the world have been violated. Thus, even infants find counterintuitive events attention-grabbing and may be trying to figure out what they just saw. Indeed, when preschoolers are faced with situations in which their prior intuitions are violated—for example, when they see one apparent solid (butter) sink into another solid (hot toast), or when they watch a video where someone turns off a light with her foot—they frequently ask adults questions to understand what they observed (Frazier, Gelman, & Wellman, 2009; Harris, 2000, 2012; Isaacs, 1930). Preschoolers are also more likely to generate their own explanations for events that are inconsistent with their prior intuitions (Legare, Gelman, & Wellman, 2010). Children and adults find counterintuitive phenomena so interesting that they often *seek* experiences where they will be exposed to such phenomena. We listen to stories and watch movies that portray people with extraordinary physical or mental capacities or time-traveling devices; and we may attend magic shows where people are sawed in half or levitate. In sum, children and adults preferentially attend to counterintuitive phenomena, seek them out, and try to make sense of them by asking questions or generating their own explanations.

Some counterintuitive phenomena are observed first-hand. Indeed, such unexpected encounters have long been regarded as a major engine for cognitive development (Carey, 1985; Gopnik & Meltzoff, 1997; Piaget, 1983; Wellman & Gelman, 1998). However, other counterintuitive phenomena are not observed first-hand, but are encountered second-hand, through others' spoken and written messages (Bergstrom, Moehlmann, & Boyer, 2006; Harris & Koenig, 2006; Harris, 2007, 2012; Sperber, 1990). This sort of culturally transmitted counterintuitive information is the focus of this paper. Note that such counterintuitive phenomena are found in the domains of both science and religion. For example, children are taught in school about scientific phenomena like germs, oxygen, biological evolution, and a spherical Earth, yet they do not ordinarily observe any of these things in their daily interactions with the world. Similarly, parents and religious teachers introduce children to ideas about God's omniscience, omnipotence, and omnipresence, the soul, and the afterlife, yet children (and their teachers, for that matter) do not ordinarily perceive any of these things first-hand. Such counterintuitive testimony poses a challenge to the learner. The testimony does not fit with the learner's existing conceptual structure, and the learner may lack the expertise or resources to seek verification. Moreover, some of these phenomena, such as evolutionary change, oxygen, omniscience, and the soul are difficult to depict visually, arguably making the task of conceptualizing those phenomena especially challenging. Next, we consider how children come to mentally represent counterintuitive phenomena.

## Mental Representation of Counterintuitive Phenomena

Children can mentally represent a variety of counterintuitive, natural phenomena. For example, young school-age children gradually override their intuition—derived from their first hand visual perceptions and proprioception—that the Earth is flat, and mentally represent the Earth as a sphere (Siegal et al., 2011; Vosniadou & Brewer, 1992). Even though they cannot perceive evolutionary change first-hand, school-age children can override their essentialist intuitions about the inalienable differences between species as well as their teleological intuitions about individual change (Evans, 2000, 2001; Kelemen, 2004)

as they come to understand natural selection (Evans, Lane, & Weiss, in preparation; Kelemen, Ganea, Seston, 2011; Legare, Lane, & Evans, 2013).

Children's acquisition of these concepts is not immediate and straightforward; for example, a young child will not understand biological evolution simply because he or she is told about the processes of natural selection and differential reproduction (Evans, 2008; Evans, Rosengren, Lane, & Price, 2012). Developments in certain general cognitive competencies support children's interpretation and representation of counterintuitive information. Executive functions, in particular, likely play a major role in evaluating counterintuitive information—learners must hold the counterintuitive information in mind (which may be particularly taxing when they are taught about things that cannot be visually depicted), and they must mentally *shift* between representations of how things appear to be and representations of how they are alleged to be. Researchers have argued that executive functions are critical in science education, especially as learners evaluate information that conflicts with their intuitions (Gropen, Clark-Chiarelli, Hoisington & Ehrlich, 2011). Reflective and abstract reasoning skills—often called “System 2 processing”—likely play critical roles in suppressing cognitive biases and revising intuitions, which allow learners to entertain both natural and supernatural counterintuitive notions (Evans & Lane, 2011; Pyysiäinen, 2004). Relatedly, children's understanding of the appearance-reality distinction (Flavell et al., 1986)—which benefits from the development of executive functions (Bialystok & Senman, 2004)—likely supports their representation of certain counterintuitive (or at least counter-perceptual) ideas (Lane, et al., in press).

Over and above the development of these domain-general cognitive capacities, developing counterintuitive representations is an extended, iterative process within various domains. Children's intuitive theories of the world—their naïve psychology, biology, and physics—support as well as constrain conceptual change (Gopnik & Wellman, 1994, 2012; Gopnik & Meltzoff, 1997; Vosniadou, 1994; Wellman & Gelman, 1998). When new information (e.g., counterintuitive testimony) is inconsistent with the learner's existing theories, the learner may integrate the new contradictory information with his or her current understanding of the world, either by reinterpreting the information or through conceptual change (Piaget, 1983; Vosniadou, 1994; Wellman & Gelman, 1998). Long-held concepts are not completely overturned and replaced in one fell swoop. Rather, new concepts are often hybrid products of the new information and preexisting concepts (Vosniadou, 1994). These hybrid concepts and theories in turn serve to constrain and support later conceptual development.

Thus far, research on conceptual change in children has focused predominantly on their understanding of the natural world (for reviews, see Carey, 1985; Carey, 2000; Gopnik & Meltzoff, 1997; Gopnik & Wellman, 2012; Wellman & Gelman, 1998). For example, conceptual change has been articulated in detail with regard to the shape of the Earth and the evolution of species. It has also been analyzed with respect to the day/night cycle (Plummer & Krajcik, 2010; Vosniadou & Brewer, 1994), as well as heat and force (Vosniadou, 1994). Yet children and adults also represent many supernatural counterintuitive phenomena (Bering, 2006; Rottman & Kelemen, 2012; Wellman & Johnson, 2008). We argue that a similar type of developmental analysis can be extended to understanding the supernatural (see also Pnevmatikos & Makris, 2011; Wellman & Johnson, 2008). In both cases, children's naïve theories—of mind, biology, and physics—provide the foundation for and also constrain conceptual development. More specifically, if we apply principles from the study of children's scientific concepts to the study of children's supernatural concepts, we would expect that: (a) the appreciation of certain supernatural ideas will be a gradual developmental process that extends well beyond early childhood; and (b) existing concepts will both support and constrain the acquisition of new concepts; thus children's foundational

theories of nature will shape their understanding of the supernatural. Conceptual change will proceed by progressively revising intuitions based upon those foundational theories.

As noted earlier, second-hand, socio-cultural input, in the form of others' spoken or written claims, plays a particularly important role in the acquisition of counterintuitive concepts. Thus, much like the cultural variability found for understanding and belief in, counterintuitive natural phenomena (e.g., Evans, 2001; Miller, Scott, Okamoto, 2006), we expect to find considerable cultural variability for counterintuitive supernatural concepts. We illustrate these points by presenting recent work on the development of two widely-endorsed yet initially counterintuitive sets of supernatural ideas: God's capacities and the afterlife. We use these examples to highlight the fact that conceptual development is not always in the direction of greater empirical truth as conceptualized within the naturalistic domains.

### Representing God's Capacities

A widely endorsed set of counterintuitive notions involves a god or gods that possess dramatically non-human, counterintuitive capacities, including omniscience, omnipotence, and immortality. A growing body of research is focused on how such notions develop. An initial wave of work led some researchers to conclude that very young children are cognitively prepared to understand these capacities (e.g., Barrett, Richert, & Driesenga, 2001; Richert & Barrett, 2005). However, more recent work strongly suggests that these ideas are counterintuitive for children and adults. For example, in two studies (Lane, Wellman, & Evans, 2010, 2012) secularly- and religiously-schooled U.S. preschoolers completed theory-of-mind (ToM) tasks in which they perceived an unexpected state of affairs (e.g., they looked in a crayon box and saw that there were really marbles inside, then the box was closed). They were then asked whether a variety of other agents would know the unexpected information. Agents included, among others, ordinary humans (e.g., a girl), God (about whom researchers told children nothing), and Mr. Smart, whom children were told "knows everything." Four-year-olds in both samples not only attributed inaccurate mental states to ordinary humans (a false belief that the box held crayons), but often to God as well—for these children, the idea of a *limited* mind was intuitive and they over-extended that intuition even to God. By 5-years, children reported that God, but not ordinary humans, would know the actual state of affairs. Studies with Spanish children (Giménez-Dasí, Guerrero, & Harris, 2005) and Greek children (Makris & Pnevmatikos, 2007) reveal a similar developmental pattern.

The data for Mr. Smart highlight how the broader culture can facilitate the mental representation of counterintuitive concepts. Religiously-schooled children as young as 4 years reported that Mr. Smart would know the unexpected information. These children's exposure to religious notions seems to have facilitated their understanding of extraordinary knowledge. Although it was not until 5 years that they spontaneously applied this understanding to God, by 4 years they applied this understanding to a being whose special mind they had just been told about. By contrast, it was not until 5 years that secularly-schooled children attributed such special knowledge to Mr. Smart.

At the end of these interviews, researchers asked children to, "tell me about God." Across both studies, children who described God's extraordinary abilities tended to attribute privileged knowledge to God as well as to Mr. Smart on the focal tasks. However, this was true only among children who had firmly understood that ordinary humans would lack that knowledge (typically children 4-years and older). Thus, cultural input received in early childhood—in this case, exposure to the idea of an all-knowing deity—can facilitate children's ability to represent and apply certain counterintuitive concepts. But critically, this facilitation was only evident among children who already understood complementary

concepts of natural, ordinary minds. By implication, children's acquisition of the counterintuitive notion that some beings are all-knowing departs from, but also builds upon, their prior grasp of human fallibility.

Do these findings indicate that children have a fully-fledged understanding of omniscience by 5 years? This question was addressed in a study with U.S. children and adults, who were introduced to an all-knowing being—Ms. Smart (Lane et al., under review). Ms. Smart had a large cranium, because of her “special brain”, and was described as knowing “everything about everything.” Participants were also given several examples of her extraordinary knowledge. Then they were asked about the *breadth* of her knowledge, or the types of things she knows (e.g., knowledge of the participants' thoughts and behavior, facts about the past, present, and future). They were also asked about the *depth* of her knowledge within several domains (e.g., they were asked, “Who knows more about why you get a runny nose, a Doctor or Ms. Smart?”). The knowledge of a truly omniscient agent would be extremely vast and would go beyond the knowledge of experts. This conception of omniscience was rare among preschoolers, who typically reported that Ms. Smart would lack several types of knowledge and that she would know less than experts about their domains of expertise. By 5–6 years, children attributed a broader body of knowledge to her—nearly every *type* of knowledge they were asked about. And, consistent with other findings (Lane et al., 2012), children at this age who had greater exposure to concepts of God were especially likely to grant her broad knowledge. Nevertheless, 5- to 6-year-olds, and even 7- to 11-year-olds often reported that experts would know more about their domains than would Ms. Smart. Only adults firmly understood that she would hold even more domain-specific knowledge than experts.

Does this mean that the notion of omniscience becomes fully intuitive in adulthood? Probably not. In several studies, U.S. adults, most of whom identified as Christian, were told hypothetical stories about God (Barrett & Keil, 1996). One story told of two people who simultaneously prayed to God for help, and God responded to their prayers; however, no information was provided about when or how God responded. When asked to retell the story, participants—most of whom had reported that they believe God to be all-knowing on an earlier questionnaire—explained that God became aware of and attended to the prayers sequentially rather than simultaneously. Thus, rather than attributing omniscience and omnipotence to God in their re-telling, these adults attributed extraordinary yet limited powers to God, even though, in the course of the earlier, more reflective questionnaire, they had affirmed their belief in God's unlimited powers as described biblically. In summary, understanding omniscience is a protracted process. Initially, preschoolers deny most special knowledge to extraordinary beings, thinking of them as constrained like other mortals. Nevertheless, armed with a firm grasp of human fallibility and especially when prompted by relevant socio-cultural input, young children do come to more fully conceptualize the uniqueness and breadth of omniscience. Subsequently, they slowly come to conceptualize the full depth of that knowledge. Yet even when they have attained that understanding, they may still lapse into more intuitive attributions of limited knowledge during ordinary everyday processing.

What about God's other properties? When asked about God's life cycle, Spanish 5-year-olds attributed fewer anthropomorphic, mortal qualities (youth, old age, death) to God than did 4-year-olds (Giménez-Dasí et al., 2005). Nevertheless, even religiously raised 5-year-olds still attributed several of these mortal qualities to God. Similarly, when asked about God's location and biological capacities, Greek 8-year-olds often endorsed a moderately counterintuitive, but still relatively anthropomorphic notion of God—a God that lives in the sky, sleeps, and eats (spiritual) food, but who also possesses extraordinary abilities to communicate with people and to help them (Pnevmatikos, 2002; Pnevmatikos & Makris,

2011). By 14 years, Greek children often endorsed more extraordinary, counterintuitive notions of God—one who is omnipresent or can move anywhere, who neither gets tired nor feels hungry. In short, research on God’s other extraordinary properties reinforces the picture that has emerged for omniscience; very young children are prone to think of the Judeo-Christian God as subject to similar limitations as human beings. Gradually, children grasp the full range of counterintuitive powers attributed to God by adults in their environment.

### Representing the Afterlife

A similar developmental progression is apparent in children’s understanding of the afterlife. Children first grasp the ordinary and mundane before entertaining the extraordinary and supernatural. By the late preschool years, children from many different cultural backgrounds realize that the mind and body cease to function at death—dead people cannot think, dream, breathe, or eat (e.g., Barrett & Behne, 2005; Brent, Speece, Lin, Dong, & Yang, 1996; Lane, Liqi, Nagrotsky, Zavitz, Evans, & Wellman, 2011). By 5 to 7 years, children understand that the mind and body no longer work because the necessary biological underpinnings have ceased to function (Harris & Giménez, 2005; Slaughter & Lyons, 2003). However, shortly thereafter, children begin to entertain supernatural concepts of the afterlife. When explaining what happens to people after they die, at around 7 years, children, especially those from Judeo-Christian upbringings, invoke concepts such as the soul, God, and Heaven, and they do this increasingly as they grow older (Harris & Giménez, 2005; Poling & Evans, 2004; but see Bering, 2006).

Children’s and adults’ reasoning about the afterlife is influenced by the context in which death is discussed. In one study, Spanish 7- to 11-year-olds were read scenarios in which a grandparent became ill and died in either a religious context—where a priest told a bereaved family member that the deceased was with God—or a medical context—where a physician told a bereaved family member that the deceased was dead (Harris & Giménez, 2005). Overall, older children more often generated and endorsed the idea that capacities, especially psychological capacities, persist after death; they also offered more metaphysical explanations involving God, Heaven, or a soul. Such religious ideas about the afterlife were more often invoked in the religious as compared to the medical contexts. A similar context effect was found with children and adults from Madagascar (Astuti & Harris, 2008). Harris and Giménez theorize that: “As children come to understand that death implies an inevitable and irrecoverable loss of function for everyone, including themselves, the continuity of function implied by the religious conception of death becomes more meaningful and more persuasive” (p. 159).

Research on children’s and adults’ understanding of the afterlife also reveals cultural variability, especially among older children and adults (Bering, Blasi, & Bjorklund, 2005; Brent et al., 1996). For example, in one study, U.S. and Chinese children and adults were told or read two types of narratives about death (Lane et al., 2011). Half of the narratives had a medical context (a person goes to the hospital, dies, and is buried), and the others had a culturally appropriate, religious context (e.g., for U.S. participants, a person dies and is buried at church, where her children pray to God). For each narrative, participants were asked whether the deceased could eat, breathe, think, and dream. The U.S. findings largely parallel the findings from Spain and Madagascar—religious contexts increased children’s reasoning that the deceased’s psychological and biological capacities will persist. By contrast, Chinese participants were unaffected by context, typically reporting that no capacities persist. Later in the interview, when asked the open-ended question, “What happens to a person after they die?” there was an age-graded increase in both countries in participants’ reference to religious ritual and the supernatural—including reference to the soul, God, and heaven (see also Brent et al., 1996; Harris & Giménez, 2005). However,

Chinese participants provided such reasoning less than U.S. participants, and more often explained that all capacities would *cease*. These findings likely reflect cultural differences in religious expression and tolerance. In the U.S., for centuries, organized religion has been widely practiced and explicitly supported by the U.S. Constitution. In contrast, through the 1960s and 1970s, when China experienced the Cultural Revolution, the government restricted religious practice. Even today, religious expression is regulated, though to a lesser extent (Potter, 2003; Yao, Stout, & Liu, 2011).

In summary, the development of counterintuitive concepts is an extended, incremental process; a product of more general cognitive developments, founded on children's existing naïve theories, and shaped by experience and cultural input. This extended process is not confined to children's understanding of natural phenomena, such as earth's shape or the day-night cycle. It also extends to understanding supernatural phenomena such as the capacities of God and the nature of the afterlife. Thus, our view on the development of counterintuitive notions of supernatural phenomena is consistent with Hatano's (1994) view on the development of counterintuitive notions of natural phenomena: "although understanding is a social process, it also involves much processing by an active individual mind" (p. 195). Moreover, as these examples highlight, conceptual development does not always proceed towards greater empirical truth (Harris, 2012); it can also yield ideas that increasingly depart from scientifically verified knowledge. In the next section, we consider a further question. Once children are able to represent counterintuitive ideas, how much do they actually *believe* them?

## Believing Counterintuitive Claims

Traditional models of belief formation start with the learner representing the information—mentally encoding the claim in some visual or propositional format. Two prominent models are those of Descartes and Spinoza (for review, see Gilbert, 1991). Descartes surmised that individuals first mentally represent a claim, subsequently assess it, and only then reject or accept it as true. In contrast, Spinoza proposed that upon representing a claim individuals *simultaneously* accept it as true, and only upon further consideration either certify their initial intuition or reject the claim. Spinoza's model has gained greater empirical validation; it appears that individuals do have a bias to initially believe claims, however briefly, when they first represent them (Gilbert, 1991). Yet, because both models begin with the learner successfully representing the information, they fail to account for how individuals evaluate claims that they have *difficulty* in representing. This is an important issue to address when considering how individuals, especially young children, evaluate claims that include counterintuitive concepts. Because counterintuitive concepts may be difficult or impossible to cognitively represent, learners may reject such ideas from the outset. Thus, rather than exhibiting a bias to believe, the young learner may exhibit a bias to disbelieve certain counterintuitive notions (for a similar argument, see Woolley & Ghossainy, 2013). We first examine evidence for children's skepticism and then ask how that skepticism is overcome.

## Young Children's Skepticism

Young children often favor their own first-hand perceptions of the world over others' conflicting assertions (e.g., Jaswal, 2004; Ma & Ganea, 2010; Robinson et al., 1995). Indeed, infants and toddlers deny and correct adults' mistaken utterances and actions; for example, when adults mislabel common objects or search in the wrong location for a desired object, they correct them (Knudsen & Liszkowski, 2012; Koenig & Echols, 2003; Pea, 1982). Preschoolers also reject claims that defy their first-hand perceptions, even when informants have been reliable in the past. In one study, children saw an object before it was placed in a box, then two informants—one who had previously provided reliable information, the other who had previously provided unreliable information—looked in the

box and reported that the object was a color different from its actual color (Clément et al., 2004). When asked the color of the object, 3- and 4-year-olds rejected the contradictory testimony they had received from *both* informants, and reported that the object was the color they had perceived.

Thus, although young children are sometimes gullible in the face of deliberately misleading testimony about an invisible state of affairs, such as the location of a concealed object (Jaswal, Croft, Setia, & Cole, 2010; Mascaro & Sperber, 2009; Vanderbilt et al., 2011), they are skeptical toward testimony that conflicts with their first-hand perceptions and intuitions. This early skepticism serves an important function as children learn about their world. Not all linguistic input is reliable—informants may provide the wrong information unintentionally, because of their ignorance, misperceptions or slips of the tongue, or intentionally because of playfulness or deceptive intent. If children were to believe everything that everyone ever said, “their knowledge base would become alarmingly unstable” (Perner, 1988, p. 145).

Though young children’s skepticism may help them maintain a stable knowledge base and may protect them from being misled, when it comes to learning about the counterintuitive, such skepticism can be a hindrance. Preschoolers, more than older children and adults, doubt that extraordinary or improbable phenomena that they have not observed can actually happen. A series of recent studies revealed children’s conservatism about what can possibly happen (Shtulman, 2009; Shtulman & Carey, 2007). Children and adults were asked whether various improbable phenomena—like someone painting polka dots on an airplane or finding an alligator under the bed—could really occur. Four-year-olds typically reported that these events could not happen, and 6- and 8-year-olds reported that only about half of these events could really happen. Only adults consistently reported that these events were indeed possible. A similar developmental pattern was found whether children reasoned about improbable physical, biological, or psychological phenomena (Shtulman, 2009). Granted children’s early skepticism, what factors lead children (and adults) to accept counterintuitive claims?

## Overcoming Skepticism

**Representing the information**—Research demonstrates a connection between the ability to visualize or imagine a phenomenon and belief. This ability changes across development, we argue, making certain counterintuitive ideas increasingly believable with development; as well, even among adults concepts vary in how easy they are to imagine. When adults are asked to imagine plausible events (including ones that have not actually occurred) they become more certain that those events have occurred or will occur (Garry, Manning, Loftus, & Sherman, 1996; Koehler, 1991). However, when adults are asked to imagine events or entities that are difficult to imagine, they become more doubtful of their occurrence or existence (Koehler, 1991). Difficulties in entertaining certain mental representations also hinder belief in supernatural entities. For example, adults who exhibit deficits in their theory-of-mind (who have difficulty in conceptualizing others’ minds) are less likely to believe in a sentient, personal God (Norenzayan, Gervais, & Trzesniewski, 2012).

Thus, consistent with this literature, we expect that developmental differences in representational capacities, notably the ability to imagine or conceptualize a phenomenon, as well as differences in the tendency to apply those capacities will influence belief in the counterintuitive. This interpretation would help to account for why, with development, children increasingly accept the possibility of improbable phenomena—their developing ability to imagine circumstances that would support those phenomena (or their tendency to engage in such imagination) makes those phenomena more believable (Shtulman, 2009).

This interpretation would also help to account for how children come to grant credibility to initially counterintuitive ideas. For example, when shown a ball dropped into the opening of one of three diagonal, vertical tubes, 3-year-olds expect (incorrectly) that the ball will emerge immediately underneath the opening—their intuition is that the trajectory of the ball is dependent entirely upon gravity and will fall in a straight line (Hood, 1995). By 4-years, children appreciate that the ball will emerge at the end of the tube, not beneath the opening. However, when explicitly asked to *imagine* the ball rolling down the tube, 3-year-olds also correctly anticipate that the ball will emerge at the end of the tube (Joh, Jaswal, & Keen, 2011). Thus, the imagination of 3-year-olds clearly helps them to arrive at conclusions that they initially regard as counterintuitive. Indeed, a plausible developmental hypothesis is that 4-year-olds spontaneously engage in this process of imagining (without prompting), which helps them to arrive at correct inferences.

A recent study directly examined how children's ability to mentally represent information influences their acceptance of unexpected claims about object identities (Lane et al., in press). Three- to 6-year-olds watched videos in which adults told them that common, ordinary objects were different from what they really were. For example, children were told that an ordinary-looking rock was actually soap. They were then asked about the object's identity (e.g., "What do you think this is really?") and its function (e.g., for the rock, "Could someone wash their hands with this?"). Children were also given classic appearance-reality (AR) tasks (similar to those used by Flavell et al., 1986) in which they manipulated deceptive objects (e.g., a magnet that looked exactly like a real cookie) and had to report both what the objects looked like and what they really were. Children's performance on AR tasks can be considered a measure of their ability to conceptualize how realities may conflict with appearances. Generally, children were skeptical towards the claims. However, children who performed at ceiling on the AR tasks—who firmly understood that objects may indeed be very different from what they appear—were more receptive to informants' claims that the ordinary objects had non-obvious identities. A plausible interpretation of these findings is that children's ability to mentally represent the informants' counterintuitive claims supports children's receptivity to such claims.

Thus, the development and application of representational capacities play important roles as learners negotiate counterintuitive information. Importantly, we do not argue that a full and accurate mental representation is necessary for belief; indeed, adults endorse many phenomena that they do not entirely comprehend (e.g., evolutionary theory, Shtulman, 2006). Rather, we contend that mental representation can support belief by being taken as evidence for the existence or possibility of certain phenomena. In the following sections, we review research on three additional factors that may influence learners' trust in counterintuitive messages: (i) the context, (ii) informants' knowledge, and (iii) qualities of the information itself. We also identify avenues of research that will contribute to a more complete account of how children reason about counterintuitive claims.

**Influence of the context**—Children and adults often hear about extraordinary beings or events, without necessarily accepting that they are real; mere exposure to information does not make the ideas credible. Young preschoolers may think that magic is a viable force that can produce extraordinary phenomena, but by 5 years children typically attribute "magical" happenings to trickery or parlor magic as opposed to genuine sorcery (Rosengren & Hickling, 1994). Although children enjoy hearing about fantastical beings like fairies, monsters, and witches, by 7 years they appreciate that these beings are not real (Guerrero, et al., 2010; Harris, Pasquini, Duke, Asscher, & Pons, 2006). However, children and adults believe that other natural *and supernatural* counterintuitive entities are real, including ones that are not visible to the naked eye, like germs, oxygen, God, and a soul. This is due, in

part, to the contexts in which those phenomena are presented (Gervais & Henrich, 2010; Woolley & Cornelius, 2013).

We focus on two types of contextual variation: (1) the immediate context in which information is presented, especially the type of discourse in which concepts are embedded, and (2) the broader cultural context, including a culture's attitude towards a particular counterintuitive concept, be it scientific or supernatural. These two types of context are, of course, related—the former can be seen as embedded within the latter (Bronfenbrenner & Morris, 2006). Both types of contextual variation can facilitate or impede belief.

With respect to the immediate context, children are more likely to believe that novel entities or beings are real when they are introduced in a realistic, everyday context rather than a fantastical context. For example, children as young as 4-years more often judge novel entities (e.g., “surnits”) as real when they are told, “scientists like to try to catch them... scientists collect surnits” as opposed to when they are told that “dragons like to try to catch them...dragons collect surnits” (Woolley & Reet, 2006). Likewise, preschoolers can sensibly use the surrounding narrative (either historically realistic or fantastical) to determine whether protagonists are real or fictional (Corriveau, Kim, Schwalen, & Harris, 2009).

Qualities of the broader cultural context—including how widely particular counterintuitive concepts are endorsed and how strongly they are endorsed—can also influence credulity and skepticism toward such ideas (Gervais & Henrich, 2010; Gervais, Willard, Norenzayan, & Henrich, 2011). In cultures where adults assert their belief in a religious doctrine (or where the doctrine is taken for granted), children are more credulous towards certain ordinarily impossible events. For example, after hearing stories about familiar biblical miracles (e.g., the parting of the Red Sea), religiously-raised 4- to 6-year-olds often judged that the protagonists were real people (Vaden & Woolley, 2011). By contrast, children with no exposure to religion via church attendance or school dismissed the protagonists as make believe and cited the impossibility of the miracle to justify their assessment (Corriveau, Chen, & Harris, in press).

Children raised in fundamentalist Christian households also show greater *disbelief* in certain counterintuitive *scientific* ideas—such as the idea that humans evolved from earlier species—than their non-fundamentalist Christian age mates (Evans, 2001; Miller et al., 2006). The counterintuitive nature of biological evolution, when combined with skepticism in the broader community, perpetuates widespread skepticism (Evans, 2001; Evans et al., 2012). Thus, the patterns of endorsement and denial that surround counterintuitive concepts can have a profound influence on children's and adults' acceptance of such concepts.

**Influence of informants' knowledge**—When determining the veracity of claims, even young children consider the quality of the source (for reviews, see Gelman, 2009; Harris, 2007; Harris, 2012). Preschoolers are more receptive to informants who have recently demonstrated greater accuracy (Koenig, Clément, & Harris, 2004; Pasquini, Corriveau, Koenig & Harris, 2007) or intelligence (Lane, Wellman, & Gelman, 2013). They are also less willing to believe the testimony of someone who has not seen relevant information (Robinson, Champion, & Mitchell, 1999) or who has admitted ignorance (Koenig & Harris, 2005; Sabbagh & Baldwin, 2001).

However, in most studies children learn information that does not defy their intuitions about the world—they learn the names of novel objects or the contents of novel boxes. Being presented with information that is counterintuitive poses a greater challenge: because children *do* have conflicting assumptions they may conclude that such testimony is a

reflection on the informant—he or she is confused or ignorant. Thus, when making counterintuitive claims, it may be important that informants indicate their knowledge and competence by signaling that they are aware of discrepancies between appearances and their testimony. Indeed, when informants fail to acknowledge the counterintuitive nature of their claims (e.g., when they do not acknowledge the discrepancy between their testimony and the apparent truth) children are less willing to believe them (Jaswal, 2004; Lane et al., in press).

Informants' body of knowledge within a specific domain—their expertise—is also important to learners as they consider the veracity of new information. For adults, an appreciation for expertise—or the “division of cognitive labor”—plays an important role in knowledge acquisition; we attend classes taught by PhDs, have accountants work on our taxes, and go to physicians when we are sick. Preschoolers have an initial understanding of expertise—for example, they understand that mechanics know more than doctors about cars (Lutz & Keil, 2002)—and they take informants' expertise into account when learning from them. For instance, they prefer to direct questions about toys to other children, presumably because children have more expertise about toys, but direct questions about new food to adults (Nguyen, 2011; VanderBorghet & Jaswal, 2009). Similarly, when learning the names for novel objects, 4-year-olds selectively endorse names provided by people who know more about the functions and insides of those particular types of objects (Sobel & Corriveau, 2010).

These studies demonstrate that children prefer informants who know about specific objects or object classes. But traditionally, expertise has been conceptualized as extensive knowledge and understanding of principles within a domain, such as medicine, mechanics, or psychology. Do children weigh this sort of expertise, especially when experts make counterintuitive claims? In a study examining this issue 3- to 8-year-olds were introduced to two types of experts: animal/biology experts knowing all about animals, and artifact/physics experts knowing all about cars, computers, and toys (Lane & Harris, 2013). Children watched videos in which one expert offered a claim about an obscure animal or artifact with a capacity that most adults would either consider intuitively plausible (e.g., a small animal picking up flowers; a metal object sitting on a table) or counterintuitive (e.g., a small animal picking up a large tree; a metal object floating above a table). Claims were either within the expert's domain (e.g., an artifact expert talking about artifacts) or outside it (e.g., an artifact expert talking about animals). Whether presented with intuitively plausible or counterintuitive claims, children across the entire age range were more trusting of claims provided by experts with relevant (as opposed to irrelevant) expertise.

**Qualities of the information**—The credibility of counterintuitive claims appears to vary depending on their degree of counterintuitiveness, their emotional appeal, and their explanatory value. We consider each of these factors in turn.

**Counterintuitiveness:** To believe a claim, one must remember it. Research with children and adults demonstrates that whether ideas are memorable depends on just *how counterintuitive* they are (e.g., Banerjee, Haque, & Spelke, 2013; Barrett & Nyhof, 2001; Boyer & Ramble, 2001; Norenzayan, Atran, Faulkner, & Schaller, 2006). Ideas that are completely ordinary are not as attention-grabbing, and thus not as memorable, as ideas that contain counterintuitive elements. More critical to our case, *minimally-counterintuitive* ideas—which are largely intuitive but contain some counterintuitive elements—are more memorable than *maximally counterintuitive* ideas—which violate many intuitions or are composed primarily of counterintuitive elements. Minimally-counterintuitive ideas grab our attention, but are intuitive enough for us to easily mentally represent and remember (Slone, Gonce, Upal, Edwards, & Tweney, 2007), which may account for the overrepresentation of

such ideas in folklore and religion (Atran & Norenzayan, 2004; Boyer, 1994; Boyer & Walker, 2000).

Recent experiments provide evidence that the *extent* to which claims are counterintuitive influences the beliefs of children as well as adults. As discussed earlier, toddlers and preschoolers typically reject claims that completely defy their first-hand perceptions—for example, when an adult calls a shoe a “ball” (Koenig & Echols, 2003; Lane et al., in press; Pea, 1982). Yet when claims are only somewhat unexpected—e.g., when shown a novel fish-like animal with wings and told that it is a bird—2- and 3-year-olds revise their initial judgments (e.g., that the animal is a fish) to accept the new, unexpected claims (e.g., that the animal is actually a bird) (Jaswal, 2004; Jaswal & Markman, 2007). Another study directly compared children’s trust in claims that contradicted their tentative intuitions or their firm intuitions (Chan & Tardif, 2013). Preschoolers saw pictures of ambiguous or prototypical objects, and informants made claims that contradicted children’s assumptions about the objects. For example, children were either told that an ambiguous round object—which they had guessed was a button—was a wheel, or that a prototypical button was a wheel. Children were more accepting of informants’ claims about the ambiguous objects than about the prototypical objects.

The study on children’s consideration of informants’ expertise, discussed earlier (Lane & Harris, 2013), revealed differences in the developmental trajectory of belief in intuitive versus counterintuitive claims. Across the entire age range, children were more likely to believe the intuitive claims (e.g., that an object can sit on a table) than the counterintuitive claims (e.g., that an object can float above a table), and this differentiation became more marked with age as children developed firmer intuitions about what could and could not happen in real life. In summary, children’s willingness to trust testimony depends on how consistent that information is with their current intuitions, and such intuitions change across development.

**Emotional appeal:** People may believe certain counterintuitive notions because of their emotional appeal—their ability to quell existential angst, provide meaning, or a sense of control. Indeed, emotions can elicit certain beliefs, create beliefs, and amplify existing beliefs (Clare & Gasper, 2000; Frijda, Manstead, & Bem, 2000; Memon & Treuer, 2010). Moreover, emotions can impede belief change, “When it comes to issues of emotional importance, convincing someone to change his or her existing beliefs appears to be a virtually hopeless undertaking” (Frijda et al., 2000, p. 3). Indeed, in some cases, people’s initial beliefs might strengthen after being presented counter-evidence, in an effort to reduce cognitive dissonance (Festinger, 1957).

Consider several of the counterintuitive notions that we have already discussed. When we come to realize that we, like all living beings, will one day die, many of us may take comfort in the idea of life after death, where we can join loved ones or where we can live without the discomforts that we experience in our mortal form (Bering, 2006). Likewise, the idea of a quasi-omniscient God who is aware of our pains and prayers, and who has a “mysterious” plan that we are fulfilling can be comforting, especially in times of distress (Atran & Norenzayan, 2004; Norenzayan & Gervais, in press). In both of these cases, the emotional appeal of the ideas may steer many toward belief. Other counterintuitive ideas elicit negative emotions and thus may direct many toward disbelief. For example, when evolutionary theory is presented as an alternative to creationism, it challenges those comforting ideas that often accompany belief in God; this partly accounts for why large segments of some populations reject the theory of evolution (Evans & Lane, 2011).

Thus, as children develop a more consolidated understanding of the ordinary and begin to face existential questions, comforting supernatural accounts may become increasingly attractive. This may help to explain why supernatural accounts of phenomena increase developmentally (Evans et al., 2011; Legare et al., 2012). The influence of emotion upon belief is evident even in early childhood. For example, preschoolers believe that negative events (e.g., ones that they find frightening) are less likely to occur in real life than are positive or neutral events (Carrick & Quas, 2006; Samuels & Taylor, 1994). Examining when and how emotion influences belief in the counterintuitive across development is an important avenue for future research.

**Explanatory value:** Explanations are important, even to young children (Wellman, 2011). They actively seek explanations for phenomena, as shown by their frequent “how” and “why” questions (Callanan & Oakes, 1992; Chouinard, 2007; Tizard & Hughes, 1984). Children are especially likely to ask questions when they witness unusual phenomena (Frazier, Gelman, & Wellman, 2009; Isaacs, 1930) or hear unusual claims (Harris, 2000). Explanations may increase acceptance of the counterintuitive in two ways: (1) belief in informants’ counterintuitive claims may increase if those claims are accompanied by quality explanations, and (2) counterintuitive phenomena may *serve* as explanations to account for observable phenomena. Drawing upon research on children’s reactions to adults’ explanations as well as research on adults’ consideration of informants’ explanations, we can examine how explanations might increase the acceptance of counterintuitive claims.

The first step in evaluating explanations is identifying what is and what is not an explanation. Generally, explanations provide information about the causal/mechanical, functional, or intentional underpinnings of phenomena (Brewer, Chinn, & Samarapungavan, 1998); claims that fail to provide such an account can be considered non-explanations. Young children can differentiate explanations from non-explanations. Consider a preschooler who sees a crayon box containing only red crayons, and she asks an adult why. If the child is offered a causal explanation (e.g., “I’ll bet it’s because the factory messed up”), she is likely to agree or ask a follow-up question but if she is provided a non-explanation (e.g., “You’re right, they are all red”) she is likely to reiterate her question (Frazier et al., 2009).

Granted the ability to differentiate explanations from non-explanations, what types of explanations do children find most satisfying? Adults evaluate explanations based on their consistency with existing beliefs, their ability to account for observable evidence, and their internal consistency (Brewer et al., 1998; Keil, 2006; Lombrozo, 2006). Some limited work has examined children’s evaluation of explanations along these dimensions. In one study, elementary-school children were given competing explanations for natural phenomena (Samarapungavan, 1992). For example, children saw a demonstration in which two objects fell to the ground when dropped, and a balloon that floated. After each demonstration, children heard a pair of explanations differing in one of three dimensions: (i) the range of phenomena accounted for, (ii) consistency with additional evidence presented after the demonstrations, or (iii) internal logical consistency. Children in first, third, and fifth grades preferred explanations that were superior in each of these dimensions. Thus, attunement to the quality of explanations emerges early in development. Conceivably, children might evaluate explanations along these dimensions not just when learning about natural phenomena (as in Samarapungavan, 1992) but also when learning about supernatural phenomena.

Preschoolers’ self-generated explanations might also shed light on their receptivity to counterintuitive (versus intuitive) explanations for novel, observable phenomena. When asked to explain why phenomena (both ordinary and unusual) have occurred, young children

rely on their knowledge and theories of the ordinary world; that is, they generate ordinary physical, psychological, or biological explanations, and rarely produce supernatural explanations involving violations of everyday causality (Bering & Parker, 2006; Hickling & Wellman, 2001; Huang, 1930; Mead, 1932; Rosengren & Hickling, 1994). One possibility is that preschoolers, like elementary-school children, will generally be more credulous toward explanations that are consistent with their observations and knowledge of the ordinary world. Importantly, as children and adults acquire more knowledge, explanations will need to be consistent with more information. Another possibility is that children (and adults) will be most receptive to counterintuitive supernatural explanations when they lack alternative natural explanations. Experimental research is needed to identify the conditions in which children are most receptive to counterintuitive explanations.

## Conclusions and Future Directions

A mounting body of research shows that young children are often skeptical of what they are told (Woolley & Ghossainy, 2013). They are especially skeptical of claims that defy their first-hand perceptions and existing conceptualizations of the world. If young children are skeptical, why do older children and adults worldwide eventually believe in entities and phenomena—both natural and supernatural—which defy their perceptions and intuitions? We have described how belief in these ideas depends, in part, upon qualities of the learners—developments in their lay theories of the world and their representational capacities support (and constrain) their understanding of increasingly counterintuitive ideas. Belief is additionally influenced by the qualities of informants (including their knowledge), qualities of the context (including culture), and qualities of the information (its degree of counterintuitiveness, emotional appeal, and explanatory value). Importantly, although we have discussed these factors separately, we expect them to function in a coordinated fashion. For example, information provided by knowledgeable informants in pedagogical contexts will foster belief relative to how far children can conceptualize the information they are being offered. Learners' trust in expert informants (e.g., scientists or religious leaders) will likely depend in part on whether the broader culture values their expertise.

There may not be a neat, linear developmental trajectory when it comes to belief in the counterintuitive. Developing capacities may pull learners' epistemic trust in different directions. For example, children's developing appreciation of deception (Mascaro & Sperber, 2009; Vanderbilt et al., 2011) and increasing experience and knowledge (Harris, 2013; Lane & Harris, 2013) may increase their skepticism toward some counterintuitive claims. Yet, children's developing representational abilities and tendencies—including their understanding that phenomena may appear different from their true state, their ability to imagine the unusual or improbable, and their tendency to engage in such imagination—may increase their credulity (Lane, et al., in press; Shtulman, 2009).

Although we have generally discussed the development of natural and supernatural concepts separately, development does not necessarily proceed with supernatural or natural concepts supplanting one another. Rather, these concepts may coexist in the minds of individuals. Each may be elicited by different discourse contexts or they may be employed under different cognitive demands. Moreover, in individual minds, there may not be a clear demarcation of what constitutes the "natural" vs. the "supernatural." Thus, one may believe both in evolution and in intelligent design, or one may simultaneously believe that death marks the end of all bodily functions and that people will persist in some form of afterlife. How individuals reconcile these coexisting ideas (or keep them separate) is an important topic that is gaining increased attention (Evans et al., 2011; Legare et al., 2012; Subbotsky, 2011).

Throughout our review, we have noted areas that deserve further investigation. Here we identify several more key avenues for future research. To understand how and why children believe in counterintuitive phenomena, we need to know more about how their concepts of these phenomena progressively emerge over the course of development. Several more formalized *developmental learning progressions* have been offered to account for children's developing scientific notions, including concepts of matter (Stevens, Delgado, & Krajcik, 2010) and evolution (Evans et al., 2012). Research on developmental learning progressions for supernatural concepts promises to be equally illuminating. We have described how informants' knowledge can influence learners' trust in counterintuitive claims. Other qualities of informants likely play a role in fostering belief, and thus deserve to be studied. For example, prestige (i.e., a person's reputation within a social group) influences adults' preference for figures ranging from politicians to religious leaders (Henrich, 2009; Henrich & Gil-White, 2001) whether or not it provides an epistemologically sound basis for trust. Initial research demonstrates that preschoolers prefer informants who garner social attention, signaling an early-developing sensitivity to prestige (Chudek, Heller, Birch, & Henrich, 2012). Further research is needed to examine how such qualities influence trust across development. Research is also needed to identify individual differences among learners (e.g., their general level of skepticism, openness to new ideas) that account for their receptivity to counterintuitive claims. Finally, we need more direct research on how the quality of explanations—including how completely and parsimoniously they account for data—influences learners' belief in counterintuitive natural and supernatural phenomena.

For the cognitive science of religion, it is time to consider development more systematically. If, as many theorists have proposed (e.g., Barrett, 2000; Boyer, 1994), supernatural concepts are products of ordinary cognition, we should expect them to develop in a fashion similar to "ordinary" concepts of the natural world. We have provided two examples of the development of counterintuitive religious notions. We encourage researchers in the cognitive science of religion to turn their attention to the vast literature on the development of counterintuitive scientific beliefs. Such research would serve to evaluate our hypothesis that there are major, but neglected, parallels between these two domains of development and will also shed important light on the nature of conceptual development and belief formation.

In summary, we have argued that there are parallels in how we come to cognitively represent counterintuitive natural and supernatural phenomena; both types of representation emerge as products of conceptual change and social-cultural input, and sometimes this process is protracted over the course of many years, even decades. Although children and adults are often initially skeptical of the reality of counterintuitive phenomena, they eventually believe in many such ideas in the domains of both science and religion (Harris & Corriveau, in press), motivating the question of why such ideas are believed. We contend that factors that influence individuals' belief in counterintuitive natural phenomena are also implicated in their belief in counterintuitive supernatural phenomena, and vice versa; these include individuals' representational capacities, qualities of the context, qualities of informants, and the intellectual and emotional appeal of the ideas. Thus, perhaps counter to our intuitions, there are more similarities than differences in the development of ideas about the natural and the supernatural.

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