

Minds, Bodies, Spirits, and Gods: Does Widespread Belief in Disembodied Beings Imply That We Are Inherent Dualists?

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Belief in beings without physical bodies is prevalent in present and past religions, from all-powerful gods to demonic spirits to guardian angels to immortal souls. Many scholars have explained this prevalence by a quirk in how we conceptualize persons, intuitively representing their minds as separable from their bodies. Infants have both a folk psychology (for representing the mental states of intentional agents) and a folk physics (for representing the properties of objects) but are said to apply only folk psychology to persons. The two modes of construal become integrated with development, but their functional specialization and initial independence purportedly make it natural for people of all ages to entertain beliefs in disembodied minds. We critically evaluate this thesis. We integrate studies of both children and adults on representations of intentional agents, both natural and supernatural, beliefs about the afterlife and souls, mind transfer, body duplication, and body transplantation. We show that representations of minds and bodies are integrated from the start, that conceptions of religious beings as disembodied are not evident in early ages but develop slowly, and that early-acquired conceptions of religious beings as embodied are not revised by theological conceptions of such beings as disembodied. We argue that belief in disembodied beings requires cultural learning—a learned dualism. We conclude by suggesting that disembodied beings may be prevalent not because we are developmentally predisposed to entertain them but because they are counterintuitive and thus have a social transmission advantage.

Keywords: religious cognition, conceptual development, disembodied beings, Cartesian dualism, counterintuitiveness

Beliefs in disembodied beings like gods and spirits, minds that leave bodies, and the survival of the mind after bodily death are widespread in present and past societies. Christian theology describes a divine being that is incorporeal and omnipresent; many small-scale societies explain illness and misfortune as caused by ancestors or spirits that must be pacified by ritual specialists (Boyer, 2020; Singh, 2018); Candomblé, a syncretic Afro-Brazilian religion, is focused on ritualized interactions with spirits (*entidades* or “entities”) that can possess human bodies, often speaking and acting through them (Cohen, 2007); Amazonian societies such as the Achuar and Kichwa believe that shamans can use spirit blowguns to summon spirit darts (*yana supai*, literally “black spirit” or “black demon”) to kill important people; North American New-Age spiritual movements valorize out-of-body experiences where the mind is believed to leave the body and see the world from an external vantage point (Kinsella, 2017). What explains the ubiquity of beliefs in beings without physical bodies, spirit possession, out-of-body experiences, ancestors, immortal souls, and the afterlife?

The most prominent explanation was advanced by Bloom (2005). Bloom builds on cognitive-developmental findings showing that humans have functionally specialized cognitive mechanisms for representing two features of the world: the mental states of intentional agents (i.e., persons; “folk psychology”) and the spatio-temporality and mechanics of objects (“folk physics”). Folk psychology and folk physics reliably develop early in life. Infants understand that objects are cohesive, bounded wholes that neither separate nor join together; that objects trace continuous paths through space and time; and that objects move on contact, and only on contact, with other objects (Baillargeon, 2004; Spelke et al., 1992). Infants also understand that a subset of physical entities—intentional agents—have goals and behave in accordance with those goals. Intentional agents seek out the objects they like or prefer and avoid the objects they dislike, and they use information about their surroundings to achieve their goals efficiently (Csibra et al., 1999; Woodward, 1998).

Bloom (2005, 2007) suggested that, as a byproduct of this two-part cognitive architecture, although persons can be conceptualized as physical beings, they are also easily conceptualized as disembodied minds. The earliest evidence for this provocative thesis comes from a suggestion that representations of person mental states (“minds”) are initially not integrated with representations of their physical bodies (Kuhlmeier et al., 2004). We might use bodily states (e.g., raised eyebrows and a dropped jaw) to infer mental states (e.g., surprise), and mental states (e.g., attention, as revealed by direction of gaze) to infer bodily states (e.g., where a person will walk), but we must learn to do so. Although, it is argued, folk psychology and folk physics become integrated with development, their functional specialization and initial independence make it easy for people of all ages to entertain the notion that minds can exist without bodies. Bloom loosely likens this intuition to Cartesian dualism, following the

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17th-century philosophy of Rene Descartes, and suggests that this intuition is at the foundation of more elaborated beliefs in disembodied beings. On this proposal, beliefs in beings without physical bodies are culturally ubiquitous because they are natural.

“Intuitive dualism” has since permeated the literature on religious cognition, applied to belief in God (Nyhof & Johnson, 2017; Willard & Norenzayan, 2013), deceased persons and the afterlife (Bering, 2002, 2006; Bering & Bjorklund, 2004; Bering et al., 2005), the soul (Preston et al., 2013), spirit possession (Cohen & Barrett, 2008a, 2008b), and mind transfer (Chudek et al., 2018). Intuitive dualism has also permeated the literature on how people reason about physical bodies, including the functioning of the brain (Hook & Farah, 2013), physical health (Forstmann et al., 2012), vegetative states (Gray, Knickman, et al., 2011), sexuality (Gray, Knobe, et al., 2011), and consciousness (Carruthers, 2019; Demertzi et al., 2009).

The cognitive-developmental literature indeed supports the view that folk psychology and folk physics are functionally specialized representational systems (e.g., Carey, 2009; Leslie, 1994; Leslie et al., 2004). For instance, individuals with autism spectrum disorders show neurotypical folk physical reasoning but specific deficits in folk psychological reasoning (Baron-Cohen, 1997; Baron-Cohen et al., 1985; Senju et al., 2009). However, functional specialization does not necessarily yield intuitive dualism—cognitive systems can be functionally specialized but still integrated. Our eyes, for instance, can operate independently of our sense of touch, but even in infancy, these perceptual modalities contribute to an integrated a-modal object representation (Streri & Spelke, 1988).

An alternative proposal is that folk psychology and folk physics contribute to an integrated but hierarchically structured person representation, with a mentalistic layer painted on top of a physical layer (e.g., Leslie, 1994; Leslie et al., 2004).¹ Although it may be intuitive to think of persons as having mental states that are not reducible to their physical bodies (i.e., to explain and predict their behavior in terms of unseen mental states), this way of thinking about persons does not require that their minds exist outside of their bodies or be readily separable from their bodies. Instead, we propose that folk psychology and folk physics must be pulled apart to construct concepts of disembodied beings—a learned dualism. In this proposal, the ubiquity of disembodied being beliefs is explained, at least in part, not by their accordance with intuitions about minds and bodies but by their violation of such intuitions (Boyer, 1994, 2001). See Figure 1.

Boyer (1994, 2001) observes that many religious concepts violate reliably developing folk psychological, biological, and physical intuitions (e.g., Carey, 2009; Shtulman, 2017; Spelke & Kinzler, 2007). A statue that listens to prayers is one such counterintuitive concept, built out of an artifact template with the requisite folk physical inferences, but with violations of folk psychological capacities; weeping or bleeding sculptures are artifacts conceptualized with violations of folk biological capacities. Compared to similar concepts that do not violate intuitions, counterintuitive concepts are preferentially attended to, remembered, and socially transmitted (Banerjee et al., 2013; Boyer & Ramble, 2001). The ubiquity of belief in disembodied beings may therefore stem, at least in part, from their counterintuitive physical capacities and consequent social transmission advantage.

Previous criticisms of intuitive dualism exist, such as the early and influential roadmap provided by Hodge (2008). We agree with much of this criticism and elaborate on it here. However, we depart from Hodge in one important respect. Hodge points out that, with the exception of theological conceptions of beings like the Christian God, it cannot be

Figure 1

Summary of the Key Differences Between Intuitive Dualism and Learned Dualism

	Learned Dualism	Intuitive Dualism
When do folk psychological and folk physical inferences become functionally integrated in conceptions of persons?	Early in infancy	Late in infancy
What is the origin of conceptions of minds as existing outside of bodies?	Cultural learning	Intuition
Beliefs in disembodied beings are culturally widespread because they are...	Counter-intuitive	A natural by-product

argued that beliefs in disembodied beings are culturally widespread. Hodge points out that a being cannot be disembodied but also interact with the physical world, as purportedly disembodied beings are generally described as doing. Hodge remarks that “Cartesian [philosophers] have had enough problems trying to explain how a disembodied mind interacts with its own body . . . but when the body is disposed of completely the problems are multiplied” (pp. 399–400). We wholeheartedly agree with this point but take a different (and compatible) approach here. The ethnographic record is replete with descriptions of beings that violate folk physical intuitions such as spirits that inhabit the natural world, ancestors that survive bodily death, demons that possess human bodies, and deities that monitor human behavior. Throughout, such violations are commonly explained—by ethnographers and their informants alike—by saying that such beings have no physical bodies (or are invisible or both). Our challenge here is to explain this wealth of ethnographic observations. We do so by considering plausible competing models: that it is natural for people to expect intentional agents to violate folk physical intuitions or alternatively that beliefs in disembodied beings are counterintuitive but can be culturally learned.²

¹ The person concept draws from many additional inferential systems. For example, the Theory of Bodies (ToBy) mechanism is thought to use morphological and motion cues to differentiate animate agents from inanimate objects (Leslie, 1994; Leslie & Keeble, 1987). ToBy does this by attributing an internal and unseen “force” to such agents (Leslie, 1994), which, like the mental states attributed to intentional agents by the Theory of Mind (ToM) mechanism, is integrated with the physical bodies of these agents but is not reducible to them.

² Hodge (2008) additionally understands Bloom (2005) as suggesting that people are substance dualists in the philosophical sense. He writes: “The tables have turned. Rather than Cartesian substance dualism being the sophisticated and informed position of the reflective and well-studied academic, the position is now considered the default position of the common, everyday, ordinary folk” (p. 399). Here, we view Bloom (2005) drawing a parallel with the philosophy of René Descartes as merely a literary device. We understand the proposal that people are intuitive mind–body dualists as an argument about the naturalness of a wide range of beliefs documented across cultures. Additionally, as we discuss in detail, research on representational co-existence (e.g., Barlev et al., 2017; Shtulman & Lombrozo, 2016) shows that people routinely hold incompatible beliefs (e.g., a spirit that is described as disembodied and that at the same time interacts with the physical world). Regardless, even the more moderate proposal we focus on here, grounded in a broader conception of disembodiment, is incompatible with extant evidence; such evidence, we argue here, suggests that belief in disembodied beings is a developmental achievement rather than a developmental starting point.

Here, we revisit evidence for intuitive dualism, from studies of how infants conceptualize people to studies of how children and adults conceptualize religious beings. In Section 2, we review evidence suggesting that infants represent minds and bodies as integrated from the start. In Section 3, we review studies on how children and adults conceptualize gods, showing that embodied conceptions are explicitly endorsed by children and implicitly endorsed by adults. Section 4 reviews the experimental, ethnographic, and historical literature on afterlife beliefs, suggesting that deceased persons are regularly attributed bodies. Section 5 explores the concept of the soul and whether the distinction between bodies and souls is an outgrowth of the distinction between bodies and minds. In Section 6, we turn to belief in spirit possession and the separability of bodies and minds in experiments on mind transfer, and in Section 7 we turn to belief in metamorphosis and experiments on body duplication. We argue that such beliefs are made possible by the conceptual distinction between folk psychology and folk physics but do not rely on these systems being intuitively separable. Finally, in Section 8, we more fully consider alternative explanations for the ubiquity of disembodied being beliefs, including the possibility that the counterintuitiveness of such beings gives them a social transmission advantage. We argue, from this diverse range of considerations, that the representation of minds as existing outside of bodies is not a developmental starting point but a developmental achievement, requiring conceptual change and cultural learning.

Do Infants Represent Minds and Bodies as Independent?

The developmental foundation of intuitive dualism is the proposal that infants enter the world expecting it to be populated with objects and intentional agents but must integrate these representational systems before they can comprehend physical entities that are also intentional agents, namely, people. Empirical support for this proposal comes from a study by Kuhlmeier et al. (2004), where they tested whether 5-month-old infants expect people to trace continuous paths through space as they expect of objects (Spelke et al., 1995).

In their first experiment, Kuhlmeier and colleagues habituated 5-month-old infants to video displays of a box moving across a stage, passing behind two large screens along the way. In one condition (the “continuous motion” condition), the box moved behind the first screen and then continued through the space between the two screens to move behind the second. In another condition (the “discontinuous motion” condition), the box moved behind the first screen but did not continue through the space between the screens; it appeared from behind the second screen instead, giving the illusion that it had disappeared behind the first screen and reappeared behind the second or that a second box had appeared from behind the second screen. Following habituation to one of these displays, all infants watched two test videos that resembled the habituation videos except that the screens had been removed from the stage. One video showed a single box moving continuously across the stage, and the other showed two boxes, one that moved from the edge of the stage to where the first screen had been, followed by the other, moving from where the second screen had been to the opposite edge of the stage.

Kuhlmeier and colleagues found that infants who had been habituated to the continuous-motion video looked longer at the test video with two boxes, whereas infants who had been habituated

to the discontinuous-motion video looked longer at the test video with just one box. Infants had formed expectations about the box in the habituation video based on whether it moved through the space between the screens. If it had, they inferred they were watching a single box cross the stage, but if it had not, they inferred there existed a second box, initially hidden from view behind the second screen.

Next, Kuhlmeier and colleagues repeated this procedure but used videos of a person moving across the stage rather than a box. Half the infants were habituated to a video in which a person walked continuously across the stage, passing through the space between the two screens that temporarily hid her from view. The other half watched a video in which a person disappeared behind the first screen and reappeared behind the second without having passed through the intermediate space (accomplished with the help of identical twins). Under these conditions, infants seem to have had no expectations about the number of people on stage: infants habituated to the continuous-motion video looked equally long at test videos featuring one person or two persons, as did infants habituated to the discontinuous-motion video. Kuhlmeier and colleagues concluded from these data that 5-month-old infants do not apply the principle of spatio-temporal continuity to people; or, as summarized by Saxe et al. (2006), “for young infants, categorization as an intentional agent implies ‘all bets are off’ with respect to the principles that characterize core knowledge of naïve physics” (p. B2).

Kuhlmeier and colleagues’ finding fueled the argument that dualism is a natural disposition. But there are several problems with their study. First, the claim that “5-month-old infants apply the constraint of continuous motion to inanimate blocks but not to people” is based on a null result, which may have been due to a lack of statistical power. Kuhlmeier and colleagues tested 20 infants in a 2×2 mixed design, so the target interaction would have to be very large to detect (Lakens, 2013). We reanalyzed Kuhlmeier et al.’s data and found that their study may indeed have been underpowered (see Appendix for details).

Second, people are more complicated stimuli than boxes, and the pattern of attention in Kuhlmeier and colleagues’ second experiment could alternatively be explained by multiple aspects of the stimuli they used. Rakison and Cicchino (2004) point out that infants have difficulty attending to and processing both dynamic local cues and global cues at the same time, and propose that infants in Kuhlmeier and colleagues’ second experiment might have attended to the former (moving arms and legs) rather than the latter (continuous vs. discontinuous paths of motion). Additionally, Saxe et al. (2006) point out that persons often take circuitous paths, leaving a room through one door but returning through another, and infants could quickly learn that people who disappear from one location may reappear somewhere else.

Moreover, focusing on the property of solidity rather than continuity, Saxe et al. (2006) found evidence that 5-month-old infants do represent persons as physical entities. Saxe and colleagues familiarized infants with two rectangular blocks, one large and one small. When placed on a stage, the large block separated the left half of the stage from the right, but the small block did not protrude that far. After one of the blocks was placed on the stage, a screen was raised so infants could no longer see the bottom of the block. Infants then watched an arm reach across the stage, behind the screen and past the block. When the block was small, the arm appeared to pass in front of it, but when the block was large, the arm appeared to pass through it. Saxe and colleagues found that infants looked longer at

the latter—a violation of solidity—than the former, and this difference in looking times was as large for a human arm as it was for a toy train. By using an arm rather than a whole body Saxe and colleagues satisfied Rakison and Cicchino's requirement of minimizing dynamic local cues, and because arms are regularly used as stimuli in infant studies of intentional agency (e.g., Woodward, 1998), Saxe and colleagues could be sure that infants viewed the arm as belonging to an intentional agent rather than as an object. Thus, when viewing arms rather than whole bodies, infants do seem to apply the principles of folk physics to people.

Further evidence that infants are already aware of the relation between bodies and minds comes from the wealth of data showing that infants use information about a person's body and behavior to make sophisticated mental state inferences. For example, preverbal infants can infer a person's goals from where she looks, where she moves, what she reaches for, and from her facial expressions (Baillargeon et al., 2016), and infants expect a person's behavior (e.g., reaching for a toy) to be guided by her beliefs (e.g., about the location of the toy) (Onishi & Baillargeon, 2005; Surian et al., 2007). Inferences about mental states from the body become more sophisticated with age (Jara-Ettinger et al., 2016). For instance, 2-year-olds attend to how efficiently different agents complete a goal and use that information to determine which agent should help another agent with the same goal (Jara-Ettinger et al., 2015). As a whole these data imply that, from early in development, representations of minds rely heavily on representations of bodies and their actions.

In sum, the proposal that folk physical and folk psychological inferences are initially independent is at the foundations of intuitive dualism. However, converging lines of evidence suggest that preverbal infants already have an integrated representation of persons as both physical entities and intentional agents.

Do Children and Adults Mentally Represent Gods as Disembodied?

The intuitive dualism model predicts that conceptions of divine beings should be disembodied from the start; in contrast, a cultural learning model predicts that disembodied conceptions should emerge in later ages. We review evidence suggesting that, compatible with the cultural learning model, children attribute more physical properties to religious beings than adults do (Shtulman, 2008). When asked explicitly, adults do not attribute most physical properties to God, though they still attribute some (Shtulman & Lindeman, 2016; Shtulman & Rattner, 2018). But on implicit tasks, adults show evidence of harboring fully embodied conceptions of God, suggesting that later-acquired conceptions of a disembodied God coexist alongside (and do not revise) those early-acquired conceptions (Barlev et al., 2017, 2018, 2019; Barrett & Keil, 1996; Barrett, 1998).

Shtulman (2008) asked 5-year-old children and their parents to describe in their own words religious beings (God and angels) and fictional beings (ghosts and fairies). Although children and adults were equally likely to describe fictional beings with person-relevant properties, children also tended to describe religious beings this way. In fact, children's descriptions of religious beings included as many person-relevant properties as their descriptions of fictional beings, implying that they do not differentiate the two. Children and their parents were also asked directly whether these beings had certain psychological properties (thinks, talks, dreams), biological

properties (grows, eats, sneezes), and physical properties (jumps, sits, stretches) that people have. Shtulman found that adults were more likely to attribute psychological properties to religious beings than biological or physical properties. Children, on the other hand, attributed as many psychological properties to religious beings as their parents did but significantly more biological and physical properties; in fact, children were equally likely to attribute all types of properties to religious beings.

Compatible with these findings, Richert and colleagues found that children anthropomorphize God more than their parents do (Richert et al., 2016). Three- to 7-year-old children and their parents were asked whether God possesses each of several person-relevant properties. Although participants' inclination to attribute such properties to God varied by religion, with Protestants showing more inclination than Catholics and Catholics showing more inclination than Muslims, children from all religions attributed more person-relevant properties to God than their parents did.

Although adults are reluctant to attribute physical properties to God, they do show substantial variation. Shtulman and Lindeman (2016) asked adults from the U.S., Finland, and India whether each of 48 properties could or could not be attributed to God. Half the properties were mind-dependent and included beliefs, desires, intentions, emotions, and perceptions, and half were body-dependent and included biological processes such as growth and reproduction, physical attributes such as height and weight, and physical abilities such as the ability to exert force or the ability to move objects (generally understood as involving contact causality). Participants from the U.S. and Finland were mainly Christian, whereas participants from India were mainly Hindu; because Hinduism is polytheistic, Hindu participants were instructed to base their responses on the deity that was most personally significant to them. Participants from all countries attributed more mind-dependent properties to God than body-dependent ones, but attributions varied by a number of factors, including their religion and the property under consideration.

The overall frequency of body-dependent attributions was 22% for the Finnish participants, 35% for the U.S. participants, and 60% for the Indian participants—all significantly above zero. Hindu participants attributed the most body-dependent properties, most likely because Hindu deities are theologically represented as having bodies. Indeed, research with Hindu children indicates that conceptions of Hindu deities like Ganesha and Krishna remain embodied throughout development: Hindu elementary schoolers attribute body-dependent properties to Hindu deities nearly as frequently as they attribute mind-dependent properties, and the same holds for Hindu adolescents (Shtulman et al., 2019).

On explicit tasks, most adults show embodied conceptions of God, but implicit tasks tell a more nuanced story. Barrett and Keil (1996) used an implicit story recall task to provide some of the earliest evidence that disembodied conceptions coexist alongside, and do not revise, earlier-acquired embodied conceptions. First, Barrett and Keil asked participants about God's supernatural properties using an explicit questionnaire. Nearly all participants gave theologically correct descriptions of God's psychology, such as "knows everything" and "does not need to be near an event in order to see or hear it." Next, Barrett and Keil gave participants stories about God and, after a delay, asked them to paraphrase those stories in their own words. Although the stories described an omniscient God, most participants inserted language that attributed to God an ordinary person psychology. For instance, in one story God was

described as listening to two birds at an airport at the same time that a jet landed. The story made no mention of one sound (the jet) disturbing God's perception of the other (the birds singing), but participants tended to insert that interpretation, as in "the noise was so loud God couldn't hear the birds." Barrett and Keil suggested that people hold two conceptions of God: A theological conception that coexists alongside and conflicts with a "theologically incorrect" person-based conception (also see Barrett, 1998, 1999).

Barlev et al. (2017, 2018) provided similar evidence for the coexistence of early- and later-acquired conceptions of God using a more controlled sentence evaluation task. Barlev and colleagues presented participants who were Christian religious adherents with various statements about God, which participants classified as "true" or "false." The statements were designed to be consistent either with both a theological conception of God and a person-based conception ("consistent" statements) or with one conception but not the other ("inconsistent" statements). For example, the statement "God has true beliefs" is true both from a theological perspective and a person-based perspective, but the statement "All God's beliefs are true" is true only from a theological perspective. Conversely, the statement "All God's beliefs are false" is false from both a theological perspective and a person-based perspective, but the statement "God has false beliefs" is false only from a theological perspective. (See e.g., Onishi & Baillargeon, 2005, and Surian et al., 2007, for evidence that infants infer that people have false beliefs.) If conceptions of God are formed by co-opting a person template, then person-based inferences may coexist alongside acquired Christian theology and potentially interfere with it when the two conflict—that is, when classifying the inconsistent statements.

Barlev and colleagues found, as expected, that participants made more errors and were slower at evaluating inconsistent statements as compared to consistent ones. These data confirm that people hold two representations of God, one that is consistent with Christian theology and one that is consistent with our intuitive understanding of people. If God concepts were formed solely from theology, then performance on consistent and inconsistent statements should have been the same. But the observed differences, in both response accuracy and speed, suggest that an early acquired person-based representation is not revised by a later-acquired theological one.

Barlev et al. (2019) expanded on these findings by targeting God's physicality in addition to God's psychology. If theological representations of God as disembodied coexist alongside an embodied person template, then participants were predicted to show the behavioral signatures of representational coexistence and interference on statements targeting God's physicality in addition to God's psychology. Barlev and colleagues found just this. Christian adults showed worse performance (more errors and slower responses) on statements about God that conflicted with person psychology as well as those that conflicted with person physicality. The same pattern was found for two other extraordinary beings (the Holy Spirit and Jesus) but not for an ordinary being (priest). The ordinary being experiment controlled for the possibility that performance differences between the consistent and inconsistent statements were due to low-level biases in the structure of the statements.

On the whole, the studies reviewed here suggest that embodied conceptions of religious beings are the default. Children represent supernatural beings as embodied persons, though they can learn to distinguish mind-dependent properties from body-dependent properties if those distinctions are culturally prescribed (Shtulman, 2008).

Christian theology details in length God's psychology, primarily God's thoughts, desires, intentions, and moral convictions, but not God's physicality and biology, with the exception of God's existence and God's ability to act on the physical world. Accordingly, most—thought not all—Christian adults represent God as disembodied (Shtulman & Lindeman, 2016). Hindu theology, in contrast, details both the psychological and physiological properties of the Hindu gods—the elephant head of Ganesha, for instance, or the four arms of Brahma—so this theology does not require an extensive reinterpretation of the initial embodied-person conception of the gods (Shtulman et al., 2019; Shtulman & Lindeman, 2016). However, as revealed by comparing explicit and implicit tasks, even Christian adults who have acquired a conception of God as disembodied continue to represent God as embodied; the early-acquired conception coexists alongside and is not revised by this later-acquired theological conception.

The representational coexistence studies reviewed here (Barlev et al., 2017, 2018, 2019; Barrett, 1998; Barrett & Keil, 1996) shed light on the discrepancies in ethnographic descriptions of religious beings (e.g., Sperber, 1985, 1996) and between formal and informal or "on-the-ground" religious beliefs and practices (Slone, 2004). The earliest religious beings may have been animistic deities (Peoples et al., 2016). Although sometimes such deities are described as disembodied beings inhabiting objects in the natural world, like trees, rocks, and rivers (e.g., Tylor, 1871/1958), sometimes they are described as those objects themselves (e.g., the mountain, the forest, the sun, or the moon) and therefore as embodied. For example, the Hadza hunter-foragers of Tanzania consider the sun and moon to be gods named *Haine* (the male sun) or *Ishoko* (the female sun) and *Seta* (Apicella, 2018). However, among Hadza who believe these gods exist, beliefs about what these gods are like (e.g., whether they see what people are doing or know what people are thinking and feeling), whether they are moralizing (e.g., whether they reward people who are good or punish people who are bad), and whether they play a role in creation stories, are all highly variable (Apicella, 2018). Indeed, such variability is the norm, rather than the exception, in anthropological studies of religion in small-scale societies, especially societies with no literate religious specialists or a religious doctrine (Boyer, 2020).

"On-the-ground" conceptions of religious beings as embodied coexist alongside theological conceptions (Barrett, 1999; Slone, 2004), supporting thoughts and practices that are contextually cohesive but globally irreconcilable. Consider the food and drink offerings made to religious beings: Practitioners of the Afro-Brazilian religion Candomblé leave cigarettes and alcohol for possessing spirits; Japanese Shintos leave offerings of food and wine for animistic spirits in special shrines; the Malagasy of Africa sacrifice cattle for their ancestors; the Jewish practice of "taking challah" involves removing a portion of bread and burning it as an offering to God. Do people actually believe that spirits require sustenance, or expect the spirits to smoke the cigarettes or eat the food or drink the wine? If asked, they almost certainly will say no. People may say that burning offerings bring the smoke up to God or the ancestors, but laugh at the proposal that God is literally sitting in Heaven sniffing the smoke with his nose; people may eat the sacrificed cattle themselves and say that ancestors feast on the gesture, or that they do so through the bodies of the eagles who feast on the carcass. However, such discrepancies, and the well-known difficulties of ethnographers in resolving them to describe

what people believe (Sperber, 1985, 1996) or what the religion of a given society is (Boyer, 2020), are clarified when one considers that behind people's utterances are many mutually incompatible representations—representations that cannot be reconciled either by the ethnographers or the religious believers themselves.³

Are Deceased Persons Represented as Disembodied Minds?

A ubiquitous feature of religion is belief in the continued existence of deceased persons, often in an altered form and in an altered place. If death is seen as the survival of a nonphysical mind after bodily death, then afterlife beliefs may be compatible with intuitive dualism. Early support for a dualistic interpretation of afterlife beliefs comes from studies by Bering and colleagues (e.g., Bering, 2002; Bering & Bjorklund, 2004; Bering et al., 2005), who asked children and adults about the cessation of various processes upon death. Bering and colleagues found that participants of all ages were more likely to claim that psychological processes continued after death than to claim that biological processes did.

For instance, Bering (2002) presented adults with a vignette about a sudden death and asked them to decide whether the newly-dead person still had specific psychological states (e.g., Does Tracy still love her daughter? Does Tracy still remember what she learned last night?) and specific biological states (e.g., Will Tracy ever need to eat food again? Will Tracy ever need to go to the bathroom again?). Participants granted psychological states to the dead more often than biological states, and when they denied the continuity of a psychological state, it took them longer to do so than to deny the continuity of a biological state. This difference was found not just for participants who professed a belief in the afterlife but also for those who did not (“extinctivists”)—those who endorsed the statement “what we think of as the ‘soul,’ or conscious personality of a person, ceases permanently when the body dies.”

The dualistic interpretation of afterlife beliefs suggested by these findings (Bering, 2006) has been challenged on several grounds, however, including its incompatibility with later developmental findings (Astuti & Harris, 2008; Harris & Giménez, 2005), and the context-dependence of continuity beliefs (Astuti & Harris, 2008; Harris & Giménez, 2005; Lane et al., 2016; Watson-Jones et al., 2017). Both these challenges highlight the importance of culture in afterlife beliefs.

First, studies by Harris and colleagues show that beliefs in continuity after death increase with age, which suggests that rather than being an inherent tendency such beliefs may largely depend on cultural learning (Astuti & Harris, 2008; Harris & Giménez, 2005). Harris and Giménez (2005) asked 7- and 11-year-old Spanish children about the continuation after death of bodily processes (eyes, brain, ears, mouth, heart, and body) and associated mental processes (seeing, thinking, hearing, talking, feeling emotion, and the mind). Although all children were slightly more likely to say that bodily processes ceased functioning after death as compared to mental processes, younger children were much more likely than older children to say that both mental and bodily processes ceased functioning after death. Astuti and Harris (2008) found that among the Vevo of rural Madagascar belief in the survival of the mind after bodily death similarly became more common with age; in contrast, belief in the survival of the body was low among both adults and children, potentially because the Vevo have extensive personal

experience with both human and animal death. Further, the Vevo were more likely to attribute continued functioning after death to those mental processes that are emphasized in the afterlife beliefs of their culture, where ancestors are involved in the day-to-day lives of their descendants, rather than to mental processes in general. For example, they were more likely to say that a deceased person would know the name of his wife, remember where his house is, and miss his children, than to say that he would see things, hear when people talk, and feel hungry. Harris and colleagues (Astuti & Harris, 2008; Harris, 2011; Harris & Astuti, 2006; Harris & Giménez, 2005) suggest that, with age, people come to assimilate the afterlife beliefs of their local culture, which commonly include a conception of death as the cessation of the body but not of the mind.⁴

Second, it has been found that the context in which people are asked about the properties of the deceased changes their responses. When asked about the deceased in a secular context, where death occurs in the presence of doctors and the deceased is described as “dead and buried,” people are more likely to affirm that the deceased no longer engages in psychological or biological processes than when asked in a religious context, where death occurs in the presence of priests and the deceased is described as “with God” (Harris & Giménez, 2005). Context effects have been observed in several societies, including the U.S. (Lane et al., 2016), Spain (Harris & Giménez, 2005), rural Madagascar (Astuti & Harris, 2008), and Vanuatu (Watson-Jones et al., 2017), and in both children and adults. Although people are more likely to affirm the continuity of psychological processes relative to biological ones, both types of attributions vary by context, which implies that people do not hold rigid convictions that some aspects of the deceased survive death and others do not. Instead, people seem to have two coexisting conceptions of death: A biological conception of death as the cessation of mind and body, and a religious conception of death as the continuation of the mind to the afterlife.

A more general problem for the dualistic interpretation of afterlife beliefs comes from historical and ethnographic descriptions of deceased persons which suggest that disembodied conceptions were by no means universal (Hodge, 2008; Nikkel, 2015). As Hodge (2008) observes, when Odysseus sails to Hades, he makes a blood sacrifice for the shades of the deceased who gather to drink it. Teiresias, one such shade, is described as a blind prophet carrying a golden staff, and is recognized by Odysseus precisely because he has a visible body. Similar encounters with the dead are described in the *Epic of Gilgamesh* (a text written over 4,000 years ago), the Hebrew bible, and the Christian bible, where the deceased retain both their minds and their bodies. Hodge further points out that in many ancient religions and philosophies people were thought to have multiple parts that all continued to the afterlife: in ancient

³ We thank K. Mitch Hodge, Benjamin Grant Purzycki, and Claire White for discussions of these questions.

⁴ The developmental findings by Harris and colleague are incompatible with findings by Bering and colleagues (Bering & Bjorklund, 2004; Bering et al., 2005) wherein beliefs in continuity after death decrease rather than increase with age. Harris and Astuti (2006) suggest that this is because of a methodological difference between the two lines of research. Bering and colleagues showed children a puppet show of an alligator eating a mouse, whereas Harris and colleagues asked children about the continuity after death of persons. Harris and Astuti (2006) suggest that models of the afterlife becomes more elaborated with age, with older children being more likely than younger children to understand that persons continue to the afterlife whereas animals—including mice—do not.

Greece these were reason, spirit, and appetite (corresponding to mind, will, and bodily desires), and in ancient Egypt these were body, personality, and life force. Although some parts might have been more central than others, all parts were believed to be necessary for the afterlife.

A different manifestation of life after death is reincarnation—the deceased being reborn in new bodies. Belief in reincarnation has been documented in societies around the world (White, 2016a). Although the prevalence of reincarnation beliefs can be seen as compatible with intuitive dualism, upon closer inspection such beliefs reveal a persistent difficulty in untethering the mind from the body. We identify people by their physical bodies, and in societies where reincarnation beliefs exist, reincarnated persons are likewise identified by their physical similarity to the deceased (White, 2016a). In experimental investigations of reincarnation beliefs, White (2015, 2016b) asked participants to imagine they are the elder in a village where people believe in reincarnation. As elder, they were responsible for deciding the likelihood that each of several candidates was the reincarnation of a deceased person. The candidates each shared a feature with the deceased, such as the same name, personality trait, memory, or physical mark. White found that both in the U.S. and in India distinctive physical marks were viewed as among the strongest evidence of reincarnation. These findings converge with ethnographic observations to suggest that, although reincarnation is conceptualized as a mind reborn in a new body, people continue using the bodies of reincarnated individuals to make inferences about their identities.

Finally, near-death experiences are another manifestation of afterlife beliefs, with people who have had such experiences commonly reporting feeling as if their mind or soul had temporarily left their physical body and traveled toward the afterlife, commonly through a tunnel of white light. However, even reports of such experiences are not straightforwardly compatible with disembodiment. Kinsella and colleagues (Barlev et al., 2015; Kinsella, 2017) found that although many experiencers report seeing their physical body from an outside perspective (suggesting that their minds or souls separated from their physical bodies), many also report traveling to the afterlife in a spirit body or “astral body.” The spirit body is commonly described as a ball of light itself seen from an outside perspective or as a perimeter of light around the traveling body seen from a first-person perspective; some experiencers even report having seen a cord by which their spirit body is tethered to their physical body. Although the dissociation between the perceiver from what is perceived implies the separateness of the mind or soul from the physical body, a closer look at near-death and out-of-body experiences reveals an embodied, rather than a disembodied, conception of personal identity.

In sum, how we think about deceased persons may be owed to cultural learning rather than an inherent dualistic tendency, and historical as well as ethnographic observations reveal an embodied, rather than a disembodied, afterlife. That said, people’s psychological traits, particularly their moral traits (Strohlinger & Nichols, 2014), do typically play a larger role than their physical traits in how we reason about them after their death. The argument that mind and body are not intuitively separable does not mean that both have to be represented as equally salient or applied to the same degree. Our reasoning about people in general is more mentalistic than physical (Gray, Knobe, et al., 2011), so it is intriguing but not surprising that

our reasoning about the deceased is similarly biased toward certain traits over others.

Is Belief in Souls a Reification of the Mind Side of the Mind-Body Divide?

Afterlife beliefs are in many religious traditions predicated on the belief that some component of personal identity—commonly labeled the “soul”—continues to exist after death. The concept of the soul is widespread (Astuti & Harris, 2008; Richert & Harris, 2006, 2008; Roazzi et al., 2013; Lindeman et al., 2015), and intuitive dualism has been advanced as an explanation for this (Bloom, 2005; Forstmann & Burgmer, 2015; Preston et al., 2013). The dualistic account of souls is that they are a reification of the mind side of the mind–body divide.

Compatible with this account, people appear to think of souls as different from bodies. Preston et al. (2013) explored this differentiation by pitting the explanatory power of souls against the explanatory power of brains—the bodily organ regularly associated with mental phenomena (Johnson & Wellman, 1982). They presented adults with psychological descriptions of love and morality, with some receiving descriptions that included neuroscientific explanations of these phenomena, and others receiving descriptions without such information. Participants were then presented with a hypothetical scenario that pitted bodies against souls, where they decided whether they would rather save their body at the expense of their soul or save their soul at the expense of their body. Participants who had read the neuroscientific explanations exhibited an increased preference for saving their body at the expense of their soul.

In a follow-up experiment, Preston and colleagues asked participants if they were willing to sell their soul for cash. Participants who had read a neuroscientific explanation of psychological phenomena were more willing to do so than those who had not. They were also willing to sell their soul for less money. These findings imply that brains and souls are seen as competing explanations of mental phenomena, and when the explanatory utility of brains increases, that of souls decreases.

Although these findings are compatible with intuitive dualism, participants in Preston and colleagues’ study may have interpreted “soul” in ways that do not clearly map onto the mind–body divide; “soul” is a culturally learned construct that could stand in for any number of nonobvious qualities, including mind, self, consciousness, personality, or life force. Indeed, religions parse the components of personal identity in a myriad of ways, commonly distinguishing not only bodies (or brains) from souls but also minds from souls. If the concept of a soul is a byproduct of the initial independence of folk psychology and folk physics, why do people further distinguish souls from minds? The purpose of folk psychology is to explain and predict the behavior of intentional agents using unseen mental states, like beliefs, desires, and intentions; souls are not required to make sense of behavior nor are they typically used in everyday mentalistic reasoning.

Richert and Harris (2006) explored whether Christian children are aware of the distinction between minds and souls, and if so, where they draw the line between them. Richert and Harris told elementary-school-aged children, recruited from Lutheran Sunday Schools, about a baby that is baptized, and asked whether the baptism changed the baby’s brain, mind, or soul. The majority of children (83%) said that the baby’s soul was different, but only 45% said her mind was different and only 25% said her brain was different. Richert and

Harris also asked children about the properties of brains, minds, and souls. Children said that the brain and the mind changed across development and were responsible for cognitive functions, such as thinking and remembering, but that the soul remained the same across development and was responsible for spiritual functions, such as knowing God or going to Heaven. Children might be expected to conflate minds and souls, if both derive from innate intuitions about intentional agents, but the distinction between them appears readily learnable, at least for children receiving religious instruction.

The distinction between minds and souls is further elaborated with age. Adults view the mind as connected to the human life cycle—emerging at birth, developing with age, and terminating at death (though intuitions can vary for specific mental states; e.g., Bering, 2002)—whereas they view the soul as existing before birth and continuing after death (Richert & Harris, 2008; see also Emmons & Kelemen, 2014). Adults also view the soul, not the mind, as the reason why stem cell research, euthanasia, and human cloning are potentially questionable practices (Richert & Harris, 2008). Although some adults reject the notion of a soul, attributing all cognitive and behavioral functions to the mind (or brain), others carve up mental life in idiosyncratic ways, attributing some functions to the mind, some functions to the soul, and some functions to both (Lindeman et al., 2015; see also Cohen et al., 2011).

Thus, the distinction between bodies, minds, and souls may reflect the ambiguity of carving up personal identity. Christian theology and philosophy have long debated how personal identity should be divided. Christian theology commonly describes humans as tripartite, distinguishing body, soul, and spirit—a view that originates from Genesis 2:7 and from distinct uses of soul and spirit throughout the Hebrew Bible; however, the Christian Bible also refers to mind (as in “the mind of Christ”; Corinthians 2:16) thereby potentially implying a fourth part. Compatible with this view, many languages contain distinct words for mind, soul, and spirit, and adults can readily differentiate the three if asked about their functions (Roazzi et al., 2013). Christian philosophy, in contrast, at times describes humans as bipartite, suggesting that the soul and spirit are equivalent. Jewish mystics take the differentiation of personal identity further still, writing of five distinct levels of transcendence beyond the body: Nefesh (soul), Ruach (spirit), Neshama, Chaya, and Yechida. The many ways that religions have carved up aspects of personhood—and that these theological and philosophical debates are ongoing—suggest that no one way is privileged and highlights the importance of cultural learning to the development of these conceptions.

In sum, the proposal that “soul” is a universal label for the mind side of the mind–body divide is undermined by the findings reviewed here. First, people draw many distinctions when carving up personal identity, including differentiating minds from souls. Second, the soul, rather than the mind, is associated with spiritual functions and the afterlife. Last, the concept of a soul may be a cultural construction that builds on the differentiation between folk psychological and folk physical intuitions (or as Richert & Harris, 2006, 2008, have suggested, folk biological and folk physical intuitions), but it does not require that representations of minds and bodies be readily separable.

Do Beliefs in Spirit Possession and Mind Transfer Imply That People Are Intuitive Dualists?

If minds are conceptualized as readily separable from bodies, then it should be easy to imagine that disembodied spirits could enter

human bodies or that a mind could migrate from one body to another. Indeed, spirit possession has been documented in societies around the world (Bourguignon, 1968), from indigenous African religions, to the mystical traditions of Judaism, Christianity, and Islam, to Shintoism, the traditional religion of Japan, where spirits (*kami*) can possess persons or objects like samurai swords. The possessed exhibit marked changes in personality and behavior and report an altered sense of agency and awareness (Cohen, 2007). Do lay explanations of spirit possession reveal an inherent predisposition toward dualism?

Cohen and Barrett (2008a) provide experimental evidence that people interpret mind transfer dualistically, as the transfer of mental traits from one individual to another but not bodily traits. They instructed participants to imagine that a mind transfer has occurred between two individuals and asked them to predict the behavior of those individuals following the transfer. Although some behaviors were predicated on mental abilities or predispositions, such as doing well on a math test or crying during a sad film, others were predicated on bodily abilities or predispositions, such as running fast or smoking cigarettes. Cohen and Barrett found that behaviors linked to mental states were deemed more transferable than behaviors linked to bodily states. They also found that mind transfer was typically viewed as an all-or-nothing process such that mind-recipients adopt the behaviors of the mind-donors entirely or not at all. The latter finding implies that people understand spirit possession as one mind displacing another rather than as two minds fusing (Cohen & Barrett, 2008b), which additionally supports the idea that minds are seen as holistic entities, potentially dissociable from the bodies they inhabit.

Cohen and Barrett’s studies indicate that mind transfer is interpreted dualistically when such a transfer has been stipulated to occur, but they do not speak to the question of whether these interpretations emerge from an inherent tendency to view minds as separable from bodies or are culturally learned. After all, participants from cultures that generally do not believe in mind transfer or spirit possession, such as the British participants in Cohen and Barrett’s studies, are still exposed to popular depictions of spirit possession in stories and films (e.g., *The Exorcist*).

Further experimental evidence for the naturalness of mind-transfer beliefs comes from Chudek et al. (2018), who explored whether children from two diverse cultures—Canada and Fiji—spontaneously infer that a mind has been transferred from one body to another. Chudek and colleagues showed children videos of a pentagon with eyes named “Penny,” who always tries to get cake. In three introductory videos, Penny is shown moving toward a cake on the opposite side of the screen, skirting obstacles along the way. In the test video, Penny is separated from the cake by a barrier with a small gap. Penny is too large to fit through the gap, but a nearby triangle is small enough to do so. Penny moves toward the triangle and stops. Her eyes disappear and then seemingly reappear on the triangle. The triangle then moves through the gap and toward the cake. After watching the test video, participants are asked to point to Penny. Chudek and colleagues found that both Canadian children and Fijian children were more likely to point to the triangle than to the pentagon. They conclude that the readiness with which participants reassign Penny’s identity from one body to another is evidence for inherent dualism.

Although these findings show that children can adopt a mind transfer interpretation of a specific event, they fall short of

demonstrating that children expect minds to transfer in general. If the video were stopped prior to Penny transferring bodies and children were asked what Penny could do to get the cake, we doubt that any child would spontaneously suggest she transfer her mind into the triangle's body. We also doubt that children actually believe that minds can switch bodies. Chudek and colleague's study is akin to stage magic, where the audience can follow a series of impossible events without believing the impossible has actually occurred. A magician might levitate, make his assistants disappear and reappear, or acquire secret information that was known only to an assistant. Although audience members will concede that the magician appeared to do the impossible, few if any will say that he actually did.

The findings by Chudek and colleagues do leave some interesting questions unanswered: Why do we entertain impossible explanations, and at times even prioritize them over possible ones? This quirk of human psychology has been known for a long time. Aristotle advises writers of fiction that readers "prefer a probable impossibility to an unconvincing possibility." As [Schulz \(2017\)](#) puts it: "Better for Odysseus to return safely to Ithaca with the aid of ghosts, gods, sea nymphs, and a leather bag containing the wind than for his wife, Penelope, to get bored with waiting for him, grow interested in metalworking, and abandon domestic life for a career as a blacksmith." We speculate that impossible explanations might function as placeholders with greater predictive power than other candidate explanations, such that holding them provisionally in mind is more useful than weaving tangled alternatives.

Does Belief in Bodily Transformation and Duplication Imply That People Are Inherent Dualists?

When the protagonist in Franz Kafka's "Metamorphosis" awakes to find himself in the body of an insect, he seems more troubled by reflecting on his pitiful life as a traveling salesman than by his horrific bodily transformation. Narratives about humans transforming into animals (lycanthropes) are common in the anthropological record ([Singh, 2020](#)). Does belief in such transformations, where minds remain intact across dramatic bodily changes, or belief in the possibility of bodily duplications, imply that people are intuitive dualists?

[Coriveau et al. \(2005\)](#) asked children to contemplate the continuity of personal identity after hearing about a boy whose body, but not mind, is magically transformed into the body of a horse. Five-year-olds were only slightly above chance when deciding whether the boy would retain his original mental states (e.g., "Does he think about eating grass, or about eating ice cream?," "When he remembers being little, does he remember being a little boy, or being a little horse?"). Seven-year-olds, in contrast, were substantially more likely to say the boy would retain his original mental states. These findings indicate that a dualistic conception of bodily transformation—that the mind remains the same after the body is changed—can be learned, but that it is not fully present early in life.

A related literature explores beliefs about the separability of minds and bodies using thought experiments about bodily duplication ([Parfit, 1984](#)). The premise of such thought experiments is whether, if every detail of a person's physical body is copied (e.g., using a special machine), the person's mind is copied as well. [Forstmann and Burgmer \(2015\)](#) presented this scenario to adults and found that most believed copying the body is more likely to preserve physical traits, like a scar or a limp, as compared to

mental traits, like memories of childhood friends or attitudes toward coworkers. This finding held regardless of whether the duplicated entity was an animal or a person, whether the duplicate had the same name as the original or a different name, and whether the original was destroyed in the duplication process, leaving only the duplicate.

Similar findings have been observed in children. [Hood et al. \(2012\)](#) introduced 5- and 6-year-olds to a hamster with distinctive physical properties, such as a broken tooth in the back of its mouth. Children then interacted with the hamster, telling it their name, showing it a drawing, and tickling it on the back. The purpose of these interactions was to give the hamster new memories. Children were then shown a machine consisting of two boxes with flashing lights and buzzers that seemed to duplicate the hamster (in reality, the duplicate was just a second hamster that looked like the first). Children were asked about the physical properties and the memories of the two hamsters. Across several studies, children were more likely to say the duplicate possessed the same physical properties as the original than to say it possessed the same memories.

Hood and colleagues' findings indicate that children differentiate minds from bodies, but they are ambiguous as to whether children conceptualize the mind as separable from the body. If children understood the duplicating machine as copying only the body and not both the body and the mind, then they should not have attributed any of the original hamster's memories to the duplicate, as the duplicate would have its own mind with its own memories (or no memories at all). But across the five experiments, children attributed the original hamster's memories to the duplicate hamster 45% of the time, compared to 73% for physical properties. A difference of this size is statistically reliable but smaller than expected if children are inherently predisposed to view minds as separable from bodies. Moreover, nearly half the children did not distinguish physical properties from memories at all, attributing all or none to the duplicate hamster.

The adult studies by [Forstmann and Burgmer \(2015\)](#) are similarly far from conclusive regarding the naturalness of a dualistic interpretation of body transformations. Participants in these studies rated whether the duplicate possessed the same properties as the original on a 7-point scale, ranging from "definitely no" (1) to "undecided" (4) to "definitely yes" (7). The average difference between physical attributions and mental attributions was around two points—much less than the expected six if adults intuitively conceptualized the mind as separable from the body. Moreover, the mean ratings for mental attributions were far from "definitely no," typically falling between "undecided" and "definitely yes." These ratings indicate that participants were less certain about the duplication of mental traits than physical traits, but they still believed that mental traits would duplicate.

Overall, the literature on bodily transformations and duplications reveal a nuanced pattern of findings: they do not straightforwardly support the thesis that people naturally view minds as existing separately from bodies and would not therefore change or copy when the body is changed or copied. A more modest interpretation of these data is that people are unsure of the relation between minds and bodies when it is probed explicitly. Although people may recognize that a transformed or duplicated person (or hamster) is likely to hold the same mental states as the original, they may also recognize that mental states are not the same as physical states and that the process by which the latter gives rise to the former is complicated. We can forgive children and lay adults for their

uncertainty about the exact relation between minds and brains, considering that even experts—neuroscientists and philosophers of mind—have not yet settled that debate.

Why Are Beliefs in Disembodied Beings Widespread If They Are Not Intuitive?

The intuitive dualism thesis provides one explanation for the cultural ubiquity of beliefs in beings without bodies. But intuitive dualism is not required to make sense of these beliefs, nor is it compatible with many of their particularities. What, then, might explain the prevalence of beliefs in such beings?

Boyer (1994, 2001) provides another answer: Such beliefs are prevalent not because they are intuitive but because they are counterintuitive. Beliefs in disembodied beings accord with folk intuitions about person psychology (Heiphetz et al., 2016) but violate folk intuitions about person physicality. The combination of intuitive features (e.g., ghosts can feel sad or angry just like humans can) and counterintuitive features (i.e., ghosts are invisible or can walk through walls) gives these concepts a social transmission advantage in the arena of cultural representations, such that compared to similar but ordinary concepts they better spread from one person to another and from one generation to the next. Below, we sketch the appeal of this proposal for explaining the prevalence of disembodied being concepts but also highlight its limitations for explaining the origin and function of those concepts.

At the core of the counterintuitiveness model is the suggestion by Sperber (1985, 1996, 1997, 2000; Mercier & Sperber, 2009) that information inconsistent with preexisting beliefs is quarantined as a meta-representation until the inconsistency is resolved. For example, the statement “there are millions of suns in the universe,” heard by a child who understands “sun” to be a proper name for our sun, will remain in abeyance until it can be reconciled with her pre-existing cosmological beliefs. She will need to learn the distinction between a planet and a star and that a sun is simply a star at the center of a planetary system.

But what about concepts that contradict reliably developing “core” intuitions about the psychology, biology, and physicality of persons (e.g., see Carey, 2009; Shtulman, 2017; Spelke & Kinzler, 2007)? Sperber and colleagues suggest that we can repeat such concepts to others or announce our belief in them, but we cannot fully reconcile them with our preexisting beliefs as these build on intuitions that cannot be revised. The inconsistency between such concepts and our preexisting beliefs may therefore be contemplated indefinitely. The culturally acquired concepts thus maintain their social transmission advantage—via their salience in our metarepresentational mechanism where they are sequestered, as well as our motivation to talk about them with others so as to gather additional details about them—spreading more broadly than concepts that can be reconciled with preexisting beliefs.

The proposal by Sperber and colleagues is compatible with experimental demonstrations of representational coexistence wherein Christian adults hold two representations of God—one based on the person template and one based on theology—with the later-acquired conception coexisting alongside and conflicting with the earlier-acquired conception, but without revising it (e.g., Barlev et al., 2017, 2018, 2019; Barrett, 1998, 1999; Barrett & Keil, 1996). The same tension between intuition-based and counterintuitive beliefs has been observed in math and science education

(e.g., Goldberg & Thompson-Schill, 2009; Kelemen et al., 2013; Kelemen & Rosset, 2009; Shtulman & Harrington, 2016; Shtulman & Valcarcel, 2012). Indeed, representational coexistence may be an inherent consequence of conceptual change (Shtulman & Lombrozo, 2016), and as new concepts are stored alongside older ones the tension between them may fuel the salience and cultural transmission of the new concepts.

Boyer (1994, 2001) observed that many religious concepts are counterintuitive. For example, the early-acquired God concept co-opts the person template (Lane et al., 2010, 2012, 2014), supporting inferences about God’s thoughts, desires, intentions, and actions (Shtulman & Rattner, 2018), but also violates intuitions such as about person fallibility (Barlev et al., 2017, 2018) and person physicality (Barlev et al., 2019). Boyer argued that such counterintuitive concepts are particularly attention-grabbing and memorable compared to concepts that violate no intuitions (or those that violate too many intuitions and thereby support too few inferences).

Boyer’s “minimal counterintuitiveness” model has been verified by several empirical studies (Banerjee et al., 2013; Boyer & Ramble, 2001; Upal et al., 2007; Nyhof & Barrett, 2001). Concepts that violate a few intuitions, like a lizard that can never die, are better remembered than concepts that violate no intuitions, like a lizard that eats many insects, or concepts that violate many intuitions, like a lizard that never dies, floats in midair, and turns invisible when it sleeps. These findings have been observed in several cultures (Boyer & Ramble, 2001) and in children (Banerjee et al., 2013). They have also been observed in the historical record (Barrett et al., 2009; Norenzayan et al., 2006): myths and folktales that have survived the test of time, like “Rapunzel” and “Snow White,” violate an optimal number of intuitions for their length; those that fell by the wayside, like “Bearskin” and “The Girl Without Hands,” violate too many or too few.

That said, counterintuitiveness is only the beginning of an explanation for the cultural ubiquity of beliefs in disembodied beings. Of the infinite set of counterintuitive beings that could in principle be imagined, why is it the same small set of beings that are reinvented in societies around the world—beings like moralizing gods (Johnson, 2016; Norenzayan, 2013), ancestors that cause illness and misfortune (Boyer, 2020), possessing spirits (Cohen, 2007), lycanthropes responsible for “mystical harms” (Singh, 2020), and immortal minds or souls that travel to the afterlife (Bering, 2006)? Further, of the many psychological inferences supported by these beings, why is it that only certain psychological traits are emphasized—such that these beings can perceive what we do, have feelings and thoughts about it, and may punish or reward us for it—whereas other psychological traits are rarely mentioned? That is, why are these beings so interested in our lives, particularly our social lives? Finally, how do we go from merely representing such disembodied being concepts to believing in them (e.g., Gervais et al., 2011; Gervais & Henrich, 2010; Willard et al., 2016)?

Although the counterintuitiveness model cannot answer such question—that may require understanding the social functions religious beliefs serve—it does explain why religious beings are regularly described as violating folk physical intuitions and, as such, why they are faithfully attended to, remembered, and transmitted. Other factors may increase or decrease the memorability of concepts—religious or otherwise—such as whether they are funny (Purzycki, 2010), counter-schematic (Purzycki & Willard, 2015), or threat-related (Blaine & Boyer, 2018; Boyer & Parren, 2015). In fact,

considering these other factors—in combination with counterintuitiveness—may provide a fuller answer to why religious beings look the way they do. Thus, future research at the intersection of structural and functional accounts of religion is needed to provide a more complete explanation of why disembodied being concepts are invented by individual minds, transmitted to other minds, and believed in.⁵

Conclusions

Intuitive dualism, or the thesis that we are inherently predisposed to view minds and bodies as separable and to thus readily entertain the notion of minds existing outside of bodies, is provocative. Originating in the purported finding that systems for representing intentional agents and objects only become integrated with development, it predicts that infants should have trouble using information about bodies to make inferences about minds (and vice versa); that children, like adults, should be less likely to attribute physical and biological properties to religious beings, as compared to psychological properties; that adults should easily conceptualize beings like gods and spirits as disembodied, even when queried implicitly; that the distinction between minds and bodies should be honored similarly across cultures; that minds migrating from one body to another should be a spontaneous expectation; and that thought experiments about body duplication should reveal the intuition that minds are not copied along with bodies.

Here we showed that these predictions are not borne out. Infants show evidence of integrated representations of minds and bodies (e.g., Baillargeon et al., 2016) and apply physical constraints to human bodies (Rakison & Cicchino, 2004; Saxe et al., 2006) within the first year of life. Children attribute biological and physical properties to God nearly as often as they attribute psychological ones (Shtulman, 2008). On explicit questionnaires, many adults continue to attribute physical properties to God (Shtulman & Lindeman, 2016), and implicit tasks find that a theological conception of God as disembodied coexists alongside an earlier-acquired person-based conception (Barlev et al., 2017, 2018, 2019). Across cultures, deceased persons are thought to keep many physical and biological properties in the afterlife (e.g., Watson-Jones et al., 2017), and the historical and ethnographic records are filled with rich descriptions of the bodies of the deceased (Hodge, 2008; Nikkel, 2015). A simple dualistic differentiation between minds and bodies is not universally recognized, with some cultures distinguishing “mind” from “soul” (Richert & Harris, 2008) and others distinguishing “mind” from “soul” from “spirit” (Roazzi et al., 2013), suggesting that cultural learning is important for shaping how personal identity is carved up. Finally, studies that probe beliefs about mind transfer (Chudek et al., 2018; Cohen & Barrett, 2008a, 2008b) are plagued with demand characteristics, and thought experiments about body duplication (Forstmann & Burgmer, 2015; Hood et al., 2012) reveal that people view minds as linked to bodies, even if they are less confident about the duplicability of mental states relative to physical states.

The findings reviewed here are incompatible with the view that it is natural to conceive of minds as separate from bodies, though they are compatible with the more moderate view that minds are not reducible to bodies. This differentiation of minds and bodies underlies the “seductive allure” of neuroimaging findings that locate mental processes in the brain (Weisberg et al., 2008); of talk by cognitive

scientists of “the neural correlates of phenomenal consciousness rather than the neural nature or the neural realizer of consciousness” (Carruthers, 2019); of the appeal of the legal argument that people should not be held responsible for what their brain made them do (Gazzaniga, 2005); and the repugnance of medical conditions that destroy minds but leave bodies intact (Gray, Knickman, et al., 2011). Indeed, the central problem in philosophy of mind has been, and continues to be, the relation between mind and body (Nagel, 1974), and this distinction can be traced back to ancient texts (Slingerland & Chudek, 2011; Slingerland et al., 2017). The wealth of phenomena such as these testify to the intuition that minds are not reducible to bodies, but they do not require that minds be separate from bodies.

The findings reviewed here suggest that conceptions of disembodied beings like all-powerful gods, guardian angels, demonic spirits, and immortal souls are culturally learned—a learned dualism—not innately predetermined. The distinction between folk psychology and folk physics undoubtedly provides leverage for conceiving minds as separate from bodies, but such conceptions must be culturally invented and socially transmitted. Our “on-the-ground” beliefs and practices betray embodied conceptions of religious beings that conflict with conceptions of such beings as disembodied, whether it be the stories we tell, the art we make, or the rituals we perform (Astuti & Harris, 2008; Barrett, 1999; Hodge, 2008; Nikkel, 2015; Slone, 2004). Why people hold disembodied conceptions of religious beings, why minds are prioritized over bodies when reasoning about such beings, especially with regard to the deceased and the afterlife, and the possible functions of such conceptions in biological and cultural evolution are questions in need of further research—questions that promise to shed light not just on religious cognition but on how we reason about minds and bodies more generally.

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References

- Apicella, C. L. (2018). High levels of rule-bending in a minimally religious and largely egalitarian forager population. *Religion, Brain & Behavior*, 8(2), 133–148. <https://doi.org/10.1080/2153599X.2016.1267034>
- Astuti, R., & Harris, P. L. (2008). Understanding mortality and the life of the ancestors in rural Madagascar. *Cognitive Science*, 32(4), 713–740. <https://doi.org/10.1080/03640210802066907>
- Baillargeon, R. (2004). Infants’ physical world. *Current Directions in Psychological Science*, 13, 89–94. <https://doi.org/10.1111/j.0963-7214.2004.00281.x>
- Baillargeon, R., Scott, R. M., & Bian, L. (2016). Psychological reasoning in infancy. *Annual Review of Psychology*, 67, 159–186. <https://doi.org/10.1146/annurev-psych-010213-115033>
- Banerjee, K., Haque, O. S., & Spelke, E. S. (2013). Melting lizards and crying mailboxes: Children’s preferential recall of minimally counterintuitive concepts. *Cognitive Science*, 37, 1251–1289. <https://doi.org/10.1111/cogs.12037>
- Barlev, M., Kinsella, M., German, T., Taves, A., & Paloutzian, R. F. (2015). *Anomalous experiences and paranormal attributions in a new spiritual movement* [Paper presentation]. The Psychology of Religion and Spirituality Preconference at the Society for Personality and Social Psychology, Long Beach, CA.
- Barlev, M., Mermelstein, S., Cohen, A. S., & German, T. C. (2019). The embodied God: Core intuitions about person physicality coexist and interfere with acquired Christian beliefs about God, the Holy Spirit,

- and Jesus. *Cognitive Science*, 43(9), Article e12784. <https://doi.org/10.1111/cogs.12784>
- Barlev, M., Mermelstein, S., & German, T. C. (2017). Core intuitions about persons coexist and interfere with acquired Christian beliefs about God. *Cognitive Science*, 41(Suppl 3), 425–454. <https://doi.org/10.1111/cogs.12435>
- Barlev, M., Mermelstein, S., & German, T. C. (2018). Representational coexistence in the God concept: Core knowledge intuitions of God as a person are not revised by Christian theology despite lifelong experience. *Psychonomic Bulletin & Review*, 25, 2330–2338. <https://doi.org/10.3758/s13423-017-1421-6>
- Baron-Cohen, S. (1997). *Mindblindness: An essay on autism and theory of mind*. MIT Press. <https://doi.org/10.7551/mitpress/4635.001.0001>
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition*, 21, 37–46. [https://doi.org/10.1016/0010-0277\(85\)90022-8](https://doi.org/10.1016/0010-0277(85)90022-8)
- Barrett, J., Burdett, E. R., & Porter, T. (2009). Counterintuitiveness in folktales: Finding the cognitive optimum. *Journal of Cognition and Culture*, 9(3), 271–287. <https://doi.org/10.1163/156770909X12489459066345>
- Barrett, J. L. (1998). Cognitive constraints on Hindu concepts of the divine. *Journal for the Scientific Study of Religion*, 37(4), 608–619.
- Barrett, J. L. (1999). Theological correctness: Cognitive constraint and the study of religion. *Method & Theory in the Study of Religion*, 11, 325–339.
- Barrett, J. L., & Keil, F. C. (1996). Conceptualizing a nonnatural entity: Anthropomorphism in God concepts. *Cognitive Psychology*, 31, 219–247. <https://doi.org/10.1006/cogp.1996.0017>
- Bering, J. M. (2002). Intuitive conceptions of dead agents’ minds: The natural foundations of afterlife beliefs as phenomenological boundary. *Journal of Cognition and Culture*, 2, 263–308. <https://doi.org/10.1163/15685370260441008>
- Bering, J. M. (2006). The folk psychology of souls. *Behavioral and Brain Sciences*, 29, 453–462. <https://doi.org/10.1017/S0140525X06009101>
- Bering, J. M., & Bjorklund, D. F. (2004). The natural emergence of reasoning about the afterlife as a developmental regularity. *Developmental Psychology*, 40, 217–233. <https://doi.org/10.1037/0012-1649.40.2.217>
- Bering, J. M., Blasi, C. H., & Bjorklund, D. F. (2005). The development of afterlife beliefs in religiously and secularly schooled children. *British Journal of Developmental Psychology*, 23, 587–607. <https://doi.org/10.1348/026151005X36498>
- Blaine, T., & Boyer, P. (2018). Origins of sinister rumors: A preference for threat-related material in the supply and demand of information. *Evolution and Human Behavior*, 39(1), 67–75. <https://doi.org/10.1016/j.evolhumbehav.2017.10.001>
- Bloom, P. (2005). *Descartes’ baby: How the science of child development explains what makes us human*. Basic Books.
- Bloom, P. (2007). Religion is natural. *Developmental Science*, 10, 147–151. <https://doi.org/10.1111/j.1467-7687.2007.00577.x>
- Bourguignon, E. (1968). *A cross-cultural study of dissociational states*. Research Foundation, Ohio State University.
- Boyer, P. (1994). *The naturalness of religious ideas: A cognitive theory of religion*. University of California Press. <https://doi.org/10.1525/9780520911628>
- Boyer, P. (2001). *Religion explained: The evolutionary origins of religious thought*. Basic Books.
- Boyer, P. (2020). Informal religious activity outside hegemonic religions: Wild traditions and their relevance to evolutionary models. *Religion, Brain & Behavior*, 10(4), 459–472. <https://doi.org/10.1080/2153599X.2019.1678518>
- Boyer, P., & Parren, N. (2015). Threat-related information suggests competence: A possible factor in the spread of rumors. *PLOS ONE*, 10(6), Article e0128421. <https://doi.org/10.1371/journal.pone.0128421>
- Boyer, P., & Ramble, C. (2001). Cognitive templates for religious concepts: Cross-cultural evidence for recall of counter-intuitive representations. *Cognitive Science*, 25, 535–564. https://doi.org/10.1207/s15516709cog2504_2
- Carey, S. (2009). *The origin of concepts*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195367638.001.0001>
- Carruthers, P. (2019). *How mindreading misleads*. <http://faculty.philosophy.umd.edu/pcarruthers/Misleading%20mindreading.pdf>
- Chudek, M., McNamara, R. A., Birch, S., Bloom, P., & Henrich, J. (2018). Do minds switch bodies? Dualist interpretations across ages and societies. *Religion, Brain & Behavior*, 8, 354–368. <https://doi.org/10.1080/2153599X.2017.1377757>
- Cohen, E. (2007). *The mind possessed: The cognition of spirit possession in an Afro-Brazilian religious tradition*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195323351.001.0001>
- Cohen, E., & Barrett, J. (2008a). When minds migrate: Conceptualizing spirit possession. *Journal of Cognition and Culture*, 8, 23–48. <https://doi.org/10.1163/156770908X289198>
- Cohen, E., & Barrett, J. L. (2008b). Conceptualizing spirit possession: Ethnographic and experimental evidence. *Ethos*, 36, 246–267. <https://doi.org/10.1111/j.1548-1352.2008.00013.x>
- Cohen, E., Burdett, E., Knight, N., & Barrett, J. (2011). Cross-cultural similarities and differences in person-body reasoning: Experimental evidence from the United Kingdom and Brazilian Amazon. *Cognitive Science*, 35, 1282–1304. <https://doi.org/10.1111/j.1551-6709.2011.01172.x>
- Corriveau, K. H., Pasquini, E. S., & Harris, P. L. (2005). “If it’s in your mind, it’s in your knowledge”: Children’s developing anatomy of identity. *Cognitive Development*, 20(2), 321–340. <https://doi.org/10.1016/j.cogdev.2005.04.005>
- Csibra, G., Gergely, G., Bfó, S., Koós, O., & Brockbank, M. (1999). Goal attribution without agency cues: The perception of ‘pure reason’ in infancy. *Cognition*, 72, 237–267. [https://doi.org/10.1016/S0010-0277\(99\)00039-6](https://doi.org/10.1016/S0010-0277(99)00039-6)
- Demertzi, A., Liew, C., Ledoux, D., Bruno, M. A., Sharpe, M., Laureys, S., & Zeman, A. (2009). Dualism persists in the science of mind. *Annals of the New York Academy of Sciences*, 1157, 1–9. <https://doi.org/10.1111/j.1749-6632.2008.04117.x>
- Emmons, N. A., & Kelemen, D. (2014). The development of children’s prelife reasoning: Evidence from two cultures. *Child Development*, 85, 1617–1633. <https://doi.org/10.1111/cdev.12220>
- Forstmann, M., & Burgmer, P. (2015). Adults are intuitive mind–body dualists. *Journal of Experimental Psychology: General*, 144, 222–235. <https://doi.org/10.1037/xge0000045>
- Forstmann, M., Burgmer, P., & Mussweiler, T. (2012). “The mind is willing, but the flesh is weak”: The effects of mind–body dualism on health behavior. *Psychological Science*, 23, 1239–1245. <https://doi.org/10.1177/0956797612442392>
- Gazzaniga, M. (2005). *The ethical brain: The science of our moral dilemmas*. Dana Press.
- Gervais, W. M., & Henrich, J. (2010). The Zeus problem: Why representational content biases cannot explain faith in Gods. *Journal of Cognition and Culture*, 10(3), 383–389. <https://doi.org/10.1163/156853710X531249>
- Gervais, W. M., Willard, A. K., Norenzayan, A., & Henrich, J. (2011). The cultural transmission of faith: Why innate intuitions are necessary, but insufficient, to explain religious belief. *Religion*, 41(3), 389–410. <https://doi.org/10.1080/0048721X.2011.604510>
- Goldberg, R. F., & Thompson-Schill, S. L. (2009). Developmental “roots” in mature biological knowledge. *Psychological Science*, 20, 480–487. <https://doi.org/10.1111/j.1467-9280.2009.02320.x>
- Gray, K., Knickman, T. A., & Wegner, D. M. (2011). More dead than dead: Perceptions of persons in the persistent vegetative state. *Cognition*, 121, 275–280. <https://doi.org/10.1016/j.cognition.2011.06.014>
- Gray, K., Knobe, J., Sheskin, M., Bloom, P., & Barrett, L. F. (2011). More than a body: Mind perception and the nature of objectification. *Journal of Personality and Social Psychology*, 101, 1207–1220. <https://doi.org/10.1037/a0025883>
- Harris, P. (2011). Death in Spain, Madagascar, and beyond. In V. Talwar, P. Harris, & M. Schleifer (Eds.), *Children’s understanding of death: From biological to religious conceptions* (pp. 19–40). Cambridge University Press. <https://doi.org/10.1017/CBO9780511852077.003>

- Harris, P., & Giménez, M. (2005). Children's acceptance of conflicting testimony: The case of death. *Journal of Cognition and Culture*, 5, 143–164. <https://doi.org/10.1163/1568537054068606>
- Harris, P. L., & Astuti, R. (2006). Learning that there is life after death. *Behavioral and Brain Sciences*, 29, 475–476. <https://doi.org/10.1017/S0140525X063829105>
- Heiphetz, L., Lane, J. D., Waytz, A., & Young, L. L. (2016). How children and adults represent God's mind. *Cognitive Science*, 40, 121–144. <https://doi.org/10.1111/cogs.12232>
- Hodge, K. M. (2008). Descartes' mistake: How afterlife beliefs challenge the assumption that humans are intuitive Cartesian substance dualists. *Journal of Cognition and Culture*, 8, 387–415. <https://doi.org/10.1163/156853708X358236>
- Hood, B., Gjersoe, N. L., & Bloom, P. (2012). Do children think that duplicating the body also duplicates the mind? *Cognition*, 125, 466–474. <https://doi.org/10.1016/j.cognition.2012.07.005>
- Hook, C. J., & Farah, M. J. (2013). Look again: Effects of brain images and mind–brain dualism on lay evaluations of research. *Journal of Cognitive Neuroscience*, 25, 1397–1405. https://doi.org/10.1162/jocn_a_00407
- Jara-Ettinger, J., Gweon, H., Schulz, L. E., & Tenenbaum, J. B. (2016). The naïve utility calculus: Computational principles underlying commonsense psychology. *Trends in Cognitive Sciences*, 20, 589–604. <https://doi.org/10.1016/j.tics.2016.05.011>
- Jara-Ettinger, J., Tenenbaum, J. B., & Schulz, L. E. (2015). Not so innocent: Toddlers' inferences about costs and culpability. *Psychological Science*, 26, 633–640. <https://doi.org/10.1177/0956797615572806>
- Jeffreys, H. (1939/1961). *The theory of probability*. (1st/3rd Ed.). Oxford University Press.
- Johnson, C. N., & Wellman, H. M. (1982). Children's developing conceptions of the mind and brain. *Child Development*, 53, 222–234. <https://doi.org/10.2307/1129656>
- Johnson, D. (2016). *God is watching you: How the fear of God makes us human*. Oxford University Press.
- Kelemen, D., & Rosset, E. (2009). The human function compunction: Teleological explanation in adults. *Cognition*, 111(1), 138–143. <https://doi.org/10.1016/j.cognition.2009.01.001>
- Kelemen, D., Rottman, J., & Seston, R. (2013). Professional physical scientists display tenacious teleological tendencies: Purpose-based reasoning as a cognitive default. *Journal of Experimental Psychology: General*, 142, 1074–1083. <https://doi.org/10.1037/a0030399>
- Kinsella, M. (2017). Near-death experiences and networked spirituality: The emergence of an afterlife movement. *Journal of the American Academy of Religion*, 85, 168–198. <https://doi.org/10.1093/jaarel/fw037>
- Kuhlmeier, V. A., Bloom, P., & Wynn, K. (2004). Do 5-month-old infants see humans as material objects? *Cognition*, 94, 95–103. <https://doi.org/10.1016/j.cognition.2004.02.007>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for *t*-tests and ANOVAs. *Frontiers in Psychology*, 4, Article 863. <https://doi.org/10.3389/fpsyg.2013.00863>
- Lane, J. D., Wellman, H. M., & Evans, E. M. (2010). Children's understanding of ordinary and extraordinary minds. *Child Development*, 81(5), 1475–1489. <https://doi.org/10.1111/j.1467-8624.2010.01486.x>
- Lane, J. D., Wellman, H. M., & Evans, E. M. (2012). Sociocultural input facilitates children's developing understanding of extraordinary minds. *Child Development*, 83(3), 1007–1021. <https://doi.org/10.1111/j.1467-8624.2012.01741.x>
- Lane, J. D., Wellman, H. M., & Evans, E. M. (2014). Approaching an understanding of omniscience from the preschool years to early adulthood. *Developmental Psychology*, 50(10), 2380–2392. <https://doi.org/10.1037/a0037715>
- Lane, J. D., Zhu, L., Evans, E. M., & Wellman, H. M. (2016). Developing concepts of the mind, body, and afterlife: Exploring the roles of narrative context and culture. *Journal of Cognition and Culture*, 16, 50–82. <https://doi.org/10.1163/15685373-12342168>
- Leslie, A. (1994). ToMM, ToBY, and agency: Core architecture and domain specificity. In L. A. Hirschfeld & S. A. Gelman (Eds.), *Mapping the mind: Domain-specificity in culture and cognition* (pp. 119–148). Cambridge University Press. <https://doi.org/10.1017/CBO9780511752902.006>
- Leslie, A. M., Friedman, O., & German, T. P. (2004). Core mechanisms in “theory of mind.” *Trends in Cognitive Sciences*, 8, 528–533. <https://doi.org/10.1016/j.tics.2004.10.001>
- Leslie, A. M., & Keeble, S. (1987). Do six-month-old infants perceive causality? *Cognition*, 25, 265–288. [https://doi.org/10.1016/S0010-0277\(87\)80006-9](https://doi.org/10.1016/S0010-0277(87)80006-9)
- Lindeman, M., Riekkki, T., & Svedholm-Häkkinen, A. M. (2015). Individual differences in conceptions of soul, mind, and brain. *Journal of Individual Differences*, 36, 157–162. <https://doi.org/10.1027/1614-0001/a000167>
- Mercier, H., & Sperber, D. (2009). Intuitive and reflective inferences. In J. S. B. T. Evans & K. Frankish (Eds.), *In two minds: Dual processes and beyond* (pp. 149–170). Oxford University Press; <https://doi.org/10.1093/acprof:oso/9780199230167.003.0007>
- Nagel, T. (1974). What is it like to be a bat? *The Philosophical Review*, 83, 435–450. <https://doi.org/10.2307/2183914>
- Nikkel, D. H. (2015). The dualistic, discarnate picture that haunts the cognitive science of religion. *Zygon*, 50, 621–646. <https://doi.org/10.1111/zygo.12194>
- Norenzayan, A. (2013). *Big Gods: How religion transformed cooperation and conflict*. Princeton University Press.
- Norenzayan, A., Atran, S., Faulkner, J., & Schaller, M. (2006). Memory and mystery: The cultural selection of minimally counterintuitive narratives. *Cognitive Science*, 30, 531–553. https://doi.org/10.1207/s15516709cog0000_68
- Nyhof, M. A., & Barrett, J. (2001). Spreading non-natural concepts: The role of intuitive conceptual structures in memory and transmission of cultural materials. *Journal of Cognition and Culture*, 1, 69–100. <https://doi.org/10.1163/156853701300063589>
- Nyhof, M. A., & Johnson, C. N. (2017). Is God just a big person? Children's conceptions of God across cultures and religious traditions. *British Journal of Developmental Psychology*, 35, 60–75. <https://doi.org/10.1111/bjdp.12173>
- Onishi, K. H., & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science*, 308, 255–258. <https://doi.org/10.1126/science.1107621>
- Parfit, D. (1984). *Reasons and persons*. Oxford University Press.
- Peoples, H. C., Duda, P., & Marlowe, F. W. (2016). Hunter-gatherers and the origins of religion. *Human Nature*, 27(3), 261–282. <https://doi.org/10.1007/s12110-016-9260-0>
- Preston, J. L., Ritter, R. S., & Hepler, J. (2013). Neuroscience and the soul: Competing explanations for the human experience. *Cognition*, 127, 31–37. <https://doi.org/10.1016/j.cognition.2012.12.003>
- Purzycki, B. G. (2010). Cognitive Architecture, Humor and Counterintuitiveness: Retention and Recall of MCIs. *Journal of Cognition and Culture*, 10, 189–204. <https://doi.org/10.1163/156853710X497239>
- Purzycki, B. G., & Willard, A. K. (2015). MCI theory: A critical discussion. *Religion, Brain & Behavior*, 6(3), 207–248. <https://doi.org/10.1080/2153599X.2015.1024915>
- Rakison, D. H., & Cicchino, J. B. (2004). Is an infant a people person? *Cognition*, 94, 105–107. <https://doi.org/10.1016/j.cognition.2004.03.005>
- Richert, R. A., & Harris, P. L. (2006). The ghost in my body: Children's developing concept of the soul. *Journal of Cognition and Culture*, 6, 409–427. <https://doi.org/10.1163/156853706778554913>
- Richert, R. A., & Harris, P. L. (2008). Dualism revisited: Body vs. mind vs. soul. *Journal of Cognition and Culture*, 8, 99–115. <https://doi.org/10.1163/156770908X289224>
- Richert, R. A., Shaman, N. J., Saide, A. R., & Lesage, K. A. (2016). Folding your hands helps God hear you: Prayer and anthropomorphism in parents and children. *Research in the Social Scientific Study of Religion*, 27, 140–157.
- Roazzi, M., Nyhof, M., & Johnson, C. (2013). Mind, soul, and spirit: Conceptions of immaterial identity in different cultures. *The International Journal for the Psychology of Religion*, 23, 75–86. <https://doi.org/10.1080/10508619.2013.735504>

- Saxe, R., Tzelnic, T., & Carey, S. (2006). Five-month-old infants know humans are solid, like inanimate objects. *Cognition*, *101*, B1–B8. <https://doi.org/10.1016/j.cognition.2005.10.005>
- Schulz, K. (2017, November 6). *Fantastic beasts and how to rank them*. The New Yorker. <https://www.newyorker.com/magazine/2017/11/06/is-bigfoot-likelier-than-the-loch-ness-monster>
- Senju, A., Southgate, V., White, S., & Frith, U. (2009). Mindblind eyes: An absence of spontaneous theory of mind in Asperger syndrome. *Science*, *325*, 883–885. <https://doi.org/10.1126/science.1176170>
- Shtulman, A. (2008). Variation in the anthropomorphization of supernatural beings and its implications for cognitive theories of religion. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*(5), 1123–1138. <https://doi.org/10.1037/0278-7393.34.5.1123>
- Shtulman, A. (2017). *Scienceblind: Why our intuitive theories about the world are so often wrong*. Basic Books.
- Shtulman, A., Foushee, R., Barner, D., Dunham, Y., & Srinivasan, M. (2019). When Allah meets Ganesha: Developing supernatural concepts in a religiously diverse society. *Cognitive Development*, *52*, Article 100806. <https://doi.org/10.1016/j.cogdev.2019.100806>
- Shtulman, A., & Harrington, K. (2016). Tensions between science and intuition across the lifespan. *Topics in Cognitive Science*, *8*, 118–137. <https://doi.org/10.1111/tops.12174>
- Shtulman, A., & Lindeman, M. (2016). Attributes of God: Conceptual foundations of a foundational belief. *Cognitive Science*, *40*, 635–670. <https://doi.org/10.1111/cogs.12253>
- Shtulman, A., & Lombrozo, T. (2016). Bundles of contradiction: A coexistence view of conceptual change. In D. Barner & A. S. Baron (Eds.), *Core knowledge and conceptual change* (pp. 53–71). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780190467630.003.0004>
- Shtulman, A., & Rattner, M. (2018). Theories of God: Explanatory coherence in religious cognition. *PLOS ONE*, *13*, Article e0209758. <https://doi.org/10.1371/journal.pone.0209758>
- Shtulman, A., & Valcarcel, J. (2012). Scientific knowledge suppresses but does not supplant earlier intuitions. *Cognition*, *124*, 209–215. <https://doi.org/10.1016/j.cognition.2012.04.005>
- Singh, M. (2018). The cultural evolution of shamanism. *Behavioral and Brain Sciences*, *41*(e66), 1–83. <https://doi.org/10.1017/S0140525X17001893>
- Singh, M. (2020). Magic, explanations, and evil: On the origins and design of witches and sorcerers. *Current Anthropology*, *62*(1), 2–29. <https://doi.org/10.1086/713111>
- Slingerland, E., & Chudek, M. (2011). The prevalence of mind-body dualism in early China. *Cognitive Science*, *35*, 997–1007. <https://doi.org/10.1111/j.1551-6709.2011.01186.x>
- Slingerland, E., Nichols, R., Neilbo, K., & Logan, C. (2017). The distant reading of religious texts: A “big data” approach to mind-body concepts in early china. *Journal of the American Academy of Religion*, *85*(4), 985–1016. <https://doi.org/10.1093/jaarel/lfw090>
- Slone, D. J. (2004). *Theological incorrectness: Why religious people believe what they shouldn't*. Oxford University Press.
- Spelke, E. S., Breinlinger, K., Macomber, J., & Jacobson, K. (1992). Origins of knowledge. *Psychological Review*, *99*, 605–632. <https://doi.org/10.1037/0033-295X.99.4.605>
- Spelke, E. S., Kestenbaum, R., Simons, D. J., & Wein, D. (1995). Spatio-temporal continuity, smoothness of motion, and object identity in infancy. *British Journal of Developmental Psychology*, *13*, 113–142. <https://doi.org/10.1111/j.2044-835X.1995.tb00669.x>
- Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science*, *10*, 89–96. <https://doi.org/10.1111/j.1467-7687.2007.00569.x>
- Sperber, D. (1985). *On anthropological knowledge: Three essays*. Cambridge University Press.
- Sperber, D. (1996). *Explaining culture: A naturalistic approach*. Blackwell.
- Sperber, D. (1997). Intuitive and reflective beliefs. *Mind & Language*, *12*, 67–83. <https://doi.org/10.1111/1468-0017.00036>
- Streri, A., & Spelke, E. S. (1988). Haptic perception of objects in infancy. *Cognitive Psychology*, *20*, 1–23.
- Sperber, D. (Ed.). (2000). *Metarepresentations: A multidisciplinary perspective*. University Press.
- Strohming, N., & Nichols, S. (2014). The essential moral self. *Cognition*, *131*, 159–171. <https://doi.org/10.1016/j.cognition.2013.12.005>
- Surian, L., Caldi, S., & Sperber, D. (2007). Attribution of beliefs by 13-month-old infants. *Psychological Science*, *18*, 580–586. <https://doi.org/10.1111/j.1467-9280.2007.01943.x>
- Taylor, E. B. (1958). *Religion in primitive culture*. Harper. (Original work published 1871)
- Upal, M. A., Gonce, L. O., Tweney, R. D., & Slone, D. J. (2007). Contextualizing counterintuitiveness: how context affects comprehension and memorability of counterintuitive concepts. *Cognitive Science*, *31*(3), 415–439. <https://doi.org/10.1080/15326900701326568>
- Watson-Jones, R. E., Busch, J. T. A., Harris, P. L., & Legare, C. H. (2017). Does the body survive death? Cultural variation in beliefs about life everlasting. *Cognitive Science*, *41*(Suppl 3), 455–476. <https://doi.org/10.1111/cogs.12430>
- Weisberg, D. S., Keil, F. C., Goodstein, J., Rawson, E., & Gray, J. R. (2008). The seductive allure of neuroscience explanations. *Journal of Cognitive Neuroscience*, *20*, 470–477. <https://doi.org/10.1162/jocn.2008.20040>
- White, C. (2015). Establishing personal identity in reincarnation: Minds and bodies reconsidered. *Journal of Cognition and Culture*, *15*(3–4), 402–429. <https://doi.org/10.1163/15685373-12342158>
- White, C. (2016a). The cognitive foundations of reincarnation. *Method & Theory in the Study of Religion*, *28*, 264–286. <https://doi.org/10.1163/15700682-12341381>
- White, C. (2016b). Cross-cultural similarities in reasoning about personal continuity in reincarnation: Evidence from South India. *Religion, Brain & Behavior*, *6*(2), 130–153. <https://doi.org/10.1080/2153599X.2015.1014061>
- Willard, A. K., Henrich, J., & Norenzayan, A. (2016). Memory and belief in the transmission of counterintuitive content. *Human Nature*, *27*(3), 221–243. <https://doi.org/10.1007/s12110-016-9259-6>
- Willard, A. K., & Norenzayan, A. (2013). Cognitive biases explain religious belief, paranormal belief, and belief in life’s purpose. *Cognition*, *129*, 379–391. <https://doi.org/10.1016/j.cognition.2013.07.016>
- Woodward, A. L. (1998). Infants selectively encode the goal object of an actor’s reach. *Cognition*, *69*, 1–34. [https://doi.org/10.1016/S0010-0277\(98\)00058-4](https://doi.org/10.1016/S0010-0277(98)00058-4)

(Appendix follows)

Appendix

Kuhlmeier et al. (2004) argue that their failure to find a difference in looking times between the one person and two persons outcomes in Exp. 2 shows that infants apply the principle of continuity to boxes but not to persons. Here we reconsider the data from Kuhlmeier et al. See Table A1 for data from Exp. 1 and Exp. 2.

Kuhlmeier et al. report repeated measures ANOVAs on the looking time data and chi-squared tests on the count data (how many infants looked for longer at each of the two outcomes), but do not follow these up with paired samples *t* tests or binomial tests. We were not able to compute paired samples *t* tests on the looking time data as this requires raw data for calculating differences between matched pairs. However, we were able to analyze the count data using binomial tests.

In Exp. 2, Kuhlmeier et al. report that they cannot reject the null hypothesis (H0) that there was no difference in the number of infants looking at the one person versus two persons outcomes in the continuous versus discontinuous motion conditions. Although our analyses using Bayesian binomial tests (using JASP v. 0.8.1.2) are compatible with this interpretation, they are incompatible with the proposal implied by Kuhlmeier et al. that the alternative hypothesis (H1) is therefore rejected. The Bayes factors found here were in the inconclusive range for both the continuous and discontinuous motion conditions (five vs. five infants and $BF_{10} = 0.37$ in both conditions; see Jeffreys, 1939/1961).

Table A1

Kuhlmeier et al. (2004) Findings

Condition	Experiment 1		Experiment 2	
	One box outcome	Two boxes outcome	One person outcome	Two persons
Continuous motion condition	5.53 (3.80) <i>n</i> = 1	7.23 (4.19) <i>n</i> = 9	6.57 (6.62) <i>n</i> = 5	7.50 (5.42) <i>n</i> = 5
Discontinuous motion condition	6.40 (3.91) <i>n</i> = 6	5.61 (3.73) <i>n</i> = 4	8.62 (5.19) <i>n</i> = 5	7.58 (3.94) <i>n</i> = 5

Note. Means and *SDs* are shown in seconds. In each condition (10 subjects), *n* shows the number of infants looking for longer at each of the two outcomes (presented within-subjects).

Further, in Exp. 1, contrary to what is reported by Kuhlmeier et al. on the basis of a 2×2 chi-squared analysis with no follow-up tests, Bayesian binomial tests on the count data did not support there being a cross-over interaction. Although more infants looked longer at the two boxes outcome than at the one box outcome in the continuous motion condition (nine vs. one infants, respectively; $BF_{10} = 9.31$), it was inconclusive whether more infants looked longer at the one box outcome than at the two boxes outcome in the discontinuous motion condition (six vs. four infants; $BF_{10} = 0.44$). The findings by Spelke et al. (1995), of which the study by Kuhlmeier et al. is an extension, were therefore only partially replicated there. See similar critique by Rakison and Cicchino (2004, pp. 105–106).

Together, since the Exp. 2 findings are inconclusive, and given the failure to replicate the findings of Spelke et al. in the discontinuous motion condition of Exp. 1, it seems that the study by Kuhlmeier et al. simply cannot answer with any certainty whether infants do or do not represent the physicality of persons (in part because it may have been underpowered).

As an additional note, if representations of person psychology and physicality are not functionally integrated, what looking time pattern might we predict in Exp. 2? Kuhlmeier et al. argue that in both the continuous and discontinuous motion conditions failure to find a difference in looking times between the one person and two persons outcomes will support their view that infants do not by default represent the physicality of persons. However, if infants do not by default represent persons as physical, such that persons are able to disappear and reappear without infants finding this surprising, at a minimum, given a low-level perception bias to prefer two things over one thing, infants in both the continuous and discontinuous motion conditions should show longer looking times at the two persons outcome versus the one person outcome (indeed, in a different study by the same authors, Kuhlmeier et al., 2004, p. 110, the authors themselves note the existence of exactly such a low-level perception bias).

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