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Perceiving Minds and Gods: How Mind Perception Enables, Constrains, and Is Triggered by Belief in Gods

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Abstract
Most people believe in the existence of empirically unverifiable gods. Despite apparent heterogeneity, people's conceptions of their gods center on predictable themes. Gods are overwhelmingly represented as intentional agents with (more or less) humanlike mental lives. This article reviews converging evidence suggesting that this regularity in god concepts exists in part because the ability to represent gods emerges as a cognitive by-product of the human capability to perceive minds. Basic human mind-perception abilities both facilitate and constrain belief in gods, with profound implications for individual differences in religious beliefs, implicit representations of supernatural agents, and the varieties of nonreligious experience. Furthermore, people react similarly to both reminders of gods and cues of social surveillance (e.g., audiences or video cameras), leading to interesting consequences in the domains of prosocial behavior, socially desirable responding, and self-awareness. Converging evidence indicates that mind perception is both cause and consequence of many religious beliefs.

Keywords
mind perception, religious beliefs, prosocial behavior, theory of mind, self-awareness, religious disbelief

Most people living today—and the vast majority of people who have ever lived—believe in the existence of unobservable entities that control and regulate human life. These entities are seen as fundamental to the human experience. They are integral components involved in guiding decisions and shaping preferences. These entities are called minds. However, people cannot directly sense other minds, and therefore must rely only on indirect perceptions of their presence. Mind perception is one of the hallmarks of our species, and as such is a central object of study for social, developmental, and cognitive psychologists. Decades of research have unearthed much about the cognitive processes underlying mind perception.

At the same time, most people living today—and the vast majority of people who have ever lived—believe in the existence of myriad other unobservable entities that control and regulate human life. People call these entities gods, spirits, ghosts, djinn, and countless other names. Belief in supernatural agents is another hallmark of our species, and has long been seen as somewhat of a scientific mystery. By exploring the natural cognitive foundations of supernatural beliefs, however, researchers from diverse disciplines have helped transform the mystery of belief in supernatural agents into a tractable scientific problem.

The central claim of this article is that belief in gods is not, at a psychological level, fundamentally different from belief in other human minds. Indeed, gods and minds are perceived in predictably similar ways and processed by the same neural mechanisms. Furthermore, thinking of gods and thinking of other human minds engenders many of the same psychological and behavioral consequences. This framework helps ground the cognitive study of religion securely within established fields of psychological inquiry. Furthermore, it helps to illuminate the broad cultural consequences of inferring the existence of other minds—both human and divine.

This article progresses in five major sections. First, I briefly review the state of the literature on mind perception. Second, I outline recent conceptual approaches to

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the scientific study of religion that converge on the notion that mind perception may be fundamental to supernatural agent beliefs. Third, I highlight evidence suggesting that the everyday human capacity to perceive minds both facilitates and constrains supernatural agent beliefs. Fourth, I review recent evidence suggesting that, for believers, thinking of gods triggers the same consequences of mind perception triggered when people feel like they are being watched. Finally, I offer some tentative conclusions regarding the framework reviewed throughout this article.

What Is Mind Perception?

Without the ability to perceive and read other minds, people would be unable to correctly gauge the intentions of others (is that street-side watch merchant trustworthy, or a huckster?), to correctly identify what others know (is this person a reliable source of information on that topic?), or to decode the underlying meanings of verbal communication (does she really want me to make her a cup of coffee in my apartment at this late hour?). To most adult humans, it feels practically effortless and automatic to assume that people act the way they do because they are guided by a variety of mental states—attitudes, desires, motivations, knowledge, and preferences. Although people have introspective access to (some of) their own mental states, they have only indirect evidence and testimony to suggest that other people have similar mental states. Even once people realize that others do, presumably, have mental states, it is an altogether more challenging task to decipher their precise contents. Although a comprehensive review of mind perception is beyond the scope of the present article (interested readers should instead consult Epley & Waytz, 2009; Malle & Hodges, 2005; Waytz, Gray, Epley, & Wegner, 2010), some introductions are clearly in order. How do people acquire the ability to perceive other minds?

The development of mind perception

The ability to mentally represent other minds and their contents—termed theory of mind (Premack & Woodruff, 1978) or mentalizing (Frith & Frith, 2003)—follows a regular developmental trajectory during the first several years of most children's lives. After only a few months, infants preferentially focus on people and animate objects—that is, on objects in the environment that could have minds (e.g., Bertenthal, Proffitt, & Cutting, 1984; Legerstee, 1991). Not long after, children begin to appreciate goal-directed behavior (e.g., Gergely, Csibra, Nádasdy, & Bíró, 1995; Woodward, 1998) and to distinguish between intentional and accidental actions (Hamlin, Hallinan, & Woodward, 2008; Meltzoff, 1995). By roughly 2 years of age, children begin to describe others' actions in terms of mental states (he walked into the kitchen because he *wanted* food) and realize that people become frustrated if their desires are thwarted (e.g., Bartsch & Wellman, 1995). These latter tasks require a child to hold a mental representation of another person's mental states (I *know* that she *wants* the toy).

A more complicated feat involves understanding that others may have different mental states than oneself. By about 4 or 5 years old, children perform well on a variety of explicit tasks measuring this ability, including appearance-reality tasks (Flavell, 1986) and false-belief tasks (e.g., Dennett, 1978; Wimmer & Perner, 1983). These tasks require children to recognize that other individuals can hold mental representations that do not map onto the real world (although the box contains rocks, she *thinks* that it contains candy) or that others can hold mental representations that differ from one's own (although I *know* that Ann moved the doll, Sally *believes* it is where she left it). Although children continue to gain a more nuanced appreciation of other minds (as well as their own minds) for years, false belief representation is generally viewed as a critical milestone in the development of mind perception.

Individual differences in advanced mind perception

Most of the tasks used to investigate theory of mind are designed to gain a nuanced understanding of the developmental trajectory of children's mentalizing abilities. As a result, they are typically incredibly easy for most adults, causing researchers to perhaps underappreciate individual differences in advanced mind perception among adults.

The best-understood case of individual differences in mentalizing comes from the study of autism, which involves substantial mentalizing impairments (e.g., Baron-Cohen, 1997; Frith, 2001). Autistic children have considerable difficulty with tasks that require the representation of others' mental states (Baron-Cohen, Leslie, & Frith, 1985). These mentalizing deficits persist into adulthood. For example, when watching short film clips that routinely engage mentalizing among neurotypical adults, adults with autism and Asperger's syndrome show reduced activation in brain regions known to underpin mentalizing (Castelli, Frith, Happé, & Frith, 2002).

In addition to individual differences in mentalizing that are associated with autism, there is also a reliable gender difference: women, relative to men, tend to score higher on advanced tests of adult theory of mind (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Stiller & Dunbar, 2007), and related tasks (e.g., Baron-Cohen &

Wheelwright, 2004; Eisenberg & Lennon, 1983; Hall, 1978). The measurement of individual differences in advanced mentalizing, however, remains difficult. Tasks used to measure these differences include the ability to judge a person's mental state from a picture of his or her eyes (Baron-Cohen, Wheelwright, Hill, et al., 2001), self-report scales (Baron-Cohen & Wheelwright, 2004), and tasks that assess the degree to which individuals can represent multiple levels of intentionality (five levels, for example: I *know* that she *wants* him to *think* that her boss *wishes* he had never *desired* to give Frank the promotion; e.g., Stiller & Dunbar, 2007).

Consequences of mind perception

The consequences of mind perception have been the purview of social psychology for more than a century. From early studies in social facilitation (e.g., Triplett, 1898; Zajonc, 1965) to the present day, social psychologists have focused their attention on the myriad ways that the presence of other minds affects cognition and behavior. Classic research reveals, for example, that people are less likely to offer help when there are other potential helpers nearby (Darley & Latane, 1968) and tend to exert less individual effort when working on group tasks than when working alone (Ingrahm, Levinger, Graves, & Peckham, 1974; Jackson & Williams, 1985). Although many of these classic findings can be viewed as coming from distinct social psychological literatures, all fundamentally focus on how people alter their cognition and behavior when they perceive the presence of other minds (e.g., minds who may offer help or pick up the slack during group work, respectively).

There is ample evidence that the mere presence of other minds can drastically affect human behavior. However, other minds are capable of much more than simply existing—they can focus their attention on us, and perceived social surveillance produces a variety of specific consequences. For example, when people feel that other minds are directed at them, they tend to cast themselves in a positive light. One simple way to do this is to actually improve one's behavior. Indeed, feeling one is the target of social surveillance leads to increased prosocial behavior (i.e., helping another at a cost to oneself). Although many would cheat the system anonymously, few do so when being openly judged by their peers, and even subtle reminders that one is being watched can reduce cheating. In one study, participants were less likely to cheat on a computer task when there were stylized cartoon eyes on the computer screen (Haley & Fessler, 2005). Likewise, outside the lab people are more likely to pay for coffee using an honor box when posters nearby depict watchful human eyes, rather than flowers (Bateson, Nettle, & Roberts, 2006). Of course, actual prosocial behavior is only one way to project a positive image of oneself to other attentive minds. If someone is less inclined to produce good works, he or she can instead merely tell others of his or her good deeds. As a result, people engage in more socially desirable responding when they feel observed, even in situations in which no such observation is actually occurring (Sproull, Subramani, Kiesler, Walker, & Waters, 1996).

Beyond self-presentation, people become self-conscious when they feel that they are targets of another mind's attention (e.g., Duval & Wicklund, 1972). In this state of public self-awareness, people are worried about how others perceive them. This apprehension, in turn, can produce arousal that can interfere with performance on a variety of tasks (e.g., math: Beilock & Carr, 2005; giving a speech: Savitsky & Gilovich, 2003). Crucially, this effect is moderated by the degree to which the observer is seen as having a mind capable of judging behavior: The presence of a friend, but not a dog, leads participants to experience more arousal and thus perform more poorly on challenging tasks (Allen, Blascovich, Tomaka, & Kelsey, 1991).

Summary

Mind perception is fundamental for navigating human social life. It allows people to predict the behavior of others, which is necessary for coordination and cooperation in social groups. Furthermore, there are a number of well-understood psychological consequences of perceiving other attentive minds. However, all of the evidence reviewed so far has focused on the ways that humans perceive the minds of other humans. The same abilities that allow people to represent and reason about each other's minds may also allow people to represent and reason about supernatural minds.

The Minds of Gods

Based upon research from developmental, social, and cognitive psychology, there is an emerging consensus that many core features of religion emerge from the everyday workings of reliably developing core cognitive mechanisms[1] that are primarily designed for other specific tasks (e.g., Atran, 2002; Atran & Norenzayan, 2004; Barrett, 2004; Bloom, 2007; Boyer, 2001; Guthrie, 1993; McCauley, 2000; Pyysiäinen, 2001). In this view, the capacity to form many religious concepts emerges as a by-product of more general psychological processes and not from a set of cognitive mechanisms specific to religious cognition, per se. Although the details of any given religious tradition must be learned (e.g., what day to attend services, the details of a deity's skill set, whether or not that deity can be depicted in artwork), the core

faculties that enable people to form mental representations of supernatural agents emerge reliably and independently. Humans do not have a mind for religion; rather, successful religious concepts are particularly good fits for the minds humans have. Indeed, humans possess a host of cognitive mechanisms that make religious concepts plausible, emotionally evocative, and memorable. And, despite much apparent heterogeneity in the contents of religious beliefs across traditions, there are some common core features of religion that are readily apparent.

First, religious beliefs center on beliefs about intentional supernatural agents. These agents may have some unique abilities—flight or omnipotence, for example—and some unique physical characteristics—they might be invisible, or wholly incorporeal—but despite this remarkable diversity, they share a critical underlying similarity. Across cultures, supernatural agents are described and represented as having minds: They have beliefs and desires, and people interact with them in the hopes of mastering their existential concerns (e.g., Atran & Norenzayan, 2004). In addition, although they may be explicitly described as having categorically unhuman minds (they may, for instance, be described as emotionally uninvolved and omniscient), supernatural agents are far more often described in anthropomorphic terms (e.g., Guthrie, 1993). God can get *angry* when His followers do not act in accordance with His *desires*. Ancestor spirits will be *pleased* when they receive the proper signals of fealty and allegiance. Zeus has *plans* for humans that often *upset* his wife Hera.

At their cores, religions focus on intentional supernatural agents represented as having minds. Therefore, mind perception is absolutely basic to religious cognition. This straightforward observation leads to a number of specific predictions. These predictions develop along two distinct trajectories. First, if the same cognitive processes underlie both everyday human-human interaction and people's believed interactions with their gods, then mind-perception abilities should both facilitate and constrain beliefs about supernatural agents. Second, if thinking about gods, ghosts, spirits, and djinn triggers the same mind-perception processes triggered by awareness of other humans, then reminders of supernatural agents should engender the same suite of consequences that researchers already know are triggered by awareness of other human minds.

The remainder of this article develops these two themes in more detail. First, I consider the implications of mind perception as a cause of religious cognition. This includes an investigation of the brain regions activated when thinking about humans and gods, the intuitive constraints mind perception places on religious cognition, and mind perception as one source of individual differences in supernatural beliefs. Next, I investigate how thinking about gods may influence human behavior, specifically considering the question of whether or not people feel themselves to be targets of another mind's attention when they think about their gods. Across these sections, the logic of mind perception is applied to various facets of religious belief. This perspective produces a number of novel and surprising predictions. I evaluate these predictions by both synthesizing extant evidence and also suggesting opportunities for future research.

Mind Perception Enables Religious Belief

Recent cognitive-evolutionary theories posit that the capacity for religion emerges largely as an evolutionary by-product[2] of a host of cognitive abilities that originally evolved for other functions (e.g., Atran & Norenzayan, 2004; Boyer, 2001). Chief among these predispositions is the ability to conceptualize and understand other human minds (e.g., Barrett, 2000; Bering, 2002, 2011; Bloom, 2007; Boyer, 2003). In particular, mind perception broadly—and mentalizing in particular—may allow people to represent and reason about the disembodied supernatural agents so prevalent in world religions.

Developmental psychologists have demonstrated a number of cognitive processes and biases linking mind perception to religious belief. According to Bloom (2004, 2007), an intuitive mind-body dualism is one cognitive bias that predisposes people toward religion. Bloom argues that people are inescapably dualists because they have two independently evolved systems for reasoning about the world: one for the physical world and one for the social world. As a result, dualistic intuitions emerge early in development (Chudek, Birch, Henrich, & Bloom, 2012), and appear in diverse cultural and historical contexts (e.g., Slingerland & Chudek, 2011). People see others as composed of both a physical body and an incorporeal mind that are independent and dissociable. Although the physical stuff ends with death, the belief that minds persist after death may be intuitively compelling (e.g., Bering, 2006; Bering & Bjorklund, 2004). Thus it seems a small step from intuitive dualism to believing in souls and spirits that exist without bodies, and perhaps an even smaller step from belief in disembodied spirits to belief in wholly incorporeal deities.

In addition to intuitions of dualism, children's intuitions about purpose in the world make the existence of supernatural agents seem plausible. Children generally prefer teleological explanations to mechanical explanations for things in the world (Kelemen, 2004). When viewing a pointy rock, they might say that it is pointy *so that* animals can scratch their backs. When viewing clouds, children might say that the cloud is *for* raining,

rather than that the cloud simply rains. Promiscuous teleology persists into adulthood (Kelemen & Rosset, 2009) and may predispose people to become intuitive theists, very likely to infer the presence of a mindful agent behind all the apparent purpose in the world. That said, direct empirical evidence linking promiscuous teleology to supernatural agent beliefs is lacking, and the link between teleology and religion represents an area with great potential for future research.

The common thread across these accounts is the notion that everyday abilities to recognize and infer the mental states of other humans and to represent goals and intentions also allows people to represent, reason about, and in turn believe in a variety of supernatural agents. That is, mind perception may be the cognitive basis of belief in gods. Viewing religious beliefs through the lens of mind perception brings a number of more detailed hypotheses into sharp focus. Specifically, the next six subsections discuss evidence suggesting that mind perception and god "perception" share common (a) neural underpinnings, (b) situational triggers, and (c) biases and cognitive constraints. Furthermore, the link between mind perception and god perception has interesting implications for (d) religiosity across clinical subpopulations, (e) gender differences in religiosity, and (f) the various cognitive and cultural origins of religious disbelief.

Neural correlates of mind perception and god perception

If belief in supernatural agents emerges as a by-product of more general cognitive processes for reasoning about mindful human agents, then the ability to reason about supernatural agents should piggyback upon already established cognitive processes that regulate reasoning about human minds, and thinking about supernatural minds should activate the same regions of the brain that are active when people think about other human minds. Early research provides some converging evidence to support this prediction.

Among Danish Christians, praying to God produces activation in the temporoparietal junction, the temporopolar region, the anteromedial prefrontal cortex, and the precuneus (Schjødt, Stødkilde-Jørgensen, Geertz, & Roepstorff, 2009), all regions traditionally identified with mind perception (see, e.g., Castelli, Happe, Frith, & Frith, 2000). Given these results, Schjødt et al. (2009, p. 205) concluded that "praying to God is an intersubjective experience comparable to 'normal' interpersonal interaction." Furthermore, when believers think about God's mental states (specifically anger), brain regions underlying mind perception are again activated (Kapogiannis et al., 2009). Combined, these studies illustrate that the very same brain regions that are active during mind-perception tasks are also active when believers pray to, and think about, their gods. That said, this does not imply that mind perception regions are the only regions recruited by religious cognition (see, e.g., Schjødt, Stødkilde-Jørgensen, Geertz, & Roepstorff, 2008).

Seeking minds, finding gods

If mind perception underpins belief in gods, then the same situations that lead people to seek minds in the world should also lead them to seek out gods. A fundamental need for affiliation and companionship (Baumeister & Leary, 1995) makes people acutely sensitive to loneliness and social ostracism (see, e.g., Williams, 2007). To overcome social pain, people seek out other minds in the world, in the form of new social contacts (Maner, DeWall, Baumeister, & Schaller, 2007) and imagined social relationships (Twenge, Catanese, & Baumeister, 2003).

One additional consequence of this search for minds is that people are significantly more likely to report belief in supernatural agents when they are either lonely or feeling especially high in need to belong (e.g., Burris, Batson, Altstaedten, & Stephens, 1994; Epley, Akalis, Waytz, & Cacioppo, 2008; Gebauer & Maio, 2012; Rokach & Brock, 1998). Seeking out belief in supernatural agents might even be an effective coping strategy in the face of loneliness and ostracism. Many people view their deities as potential attachment figures (Kirkpatrick, 1999), and subtly primed religious concepts buffer religious participants against the negative consequences of laboratory-induced social isolation (Aydin, Fischer, & Frey, 2010).

People also seek out minds in the world to explain the unexplainable. For example, people are especially prone to attribute mental states to a computer when the computer is behaving erratically (Waytz et al., 2010). For many unpredictable negative events, gods make convenient targets for this search for minds, and people readily ascribe responsibility to their gods for life's often negative and unpredictable turns (Gray & Wegner, 2010). In addition, belief in a controlling god is one way to compensate for perceived loss of control in the world (e.g., Kay, Gaucher, McGregor, & Nash, 2010; Kay, Shepherd, Blatz, Chua, & Galinsky, 2010).

Mind perception constrains religious cognition

Supernatural agents are described as having a wide variety of extraordinary mental abilities and attributes. However, if people's representations of supernatural agents derive from ordinary, everyday mind perception, then people should hold implicit mental representations

of their gods as having essentially human minds. Explicitly omniscient gods should be implicitly represented as having limited, and un-godlike, mental abilities.

The Judeo-Christian God is a paradigmatic example of a supernatural agent who is described as omniscient, representing a stark deviation from humans' limited cognitive capacities. How do people mentally represent a supernatural agent with such an unconstrained mind? In one study, Barrett and Keil (1996) had student participants of different academic and religious backgrounds read a story in which God was not described in anthropomorphic terms. He could perceive objects without needing direct perceptual access. He could perform multiple mental activities simultaneously. His mind was clearly not a typical human mind. Participants were then asked to reconstruct the story. The participants recast the omniscient God as having human-like mental limitations. They imposed a timeline on the story, such that God could perform one action, and only then move on to the next task. They described God as needing perceptual access to know about events unfolding (e.g., he needed to see and hear things to know about them). Thus, even when given an explicitly nonanthropomorphic description of God's mental abilities, participants readily recast God as having an essentially human mind.

Implicit anthropomorphism of gods may emerge early in development, tracking the development of children's more general mind-perception abilities. In a version of one classic theory of mind task (Perner, Leekam, & Wimmer, 1987), children are shown a crayon box that actually holds marbles and asked what somebody else would think is in the box. Typically, very young children report that somebody else would think that there were marbles in the box, demonstrating a reality bias. Older children recognize that other individuals, lacking any way to know that the box held marbles, would think that the box contained crayons.

What do children with Judeo-Christian backgrounds think that an omniscient God would think is in the box? Do they readily ascribe omnipotence to God, or do they think of God's mental abilities in the same way they think of human mental abilities? American children in the age range in which they first begin to explicitly attribute false beliefs to other humans (52.5–58.9 months) also tend to attribute false beliefs to God, and only older children reliably give a "theologically correct" answer that an omniscient God would know what the box actually contained (Lane, Wellman, & Evans, 2010). This evidence is consistent with the idea that children initially and intuitively mentally represent gods as having basically human minds and only later gain, through enculturation, the ability to reflectively override this intuition. This interpretation gains support from a follow-up experiment finding that religious instruction predicts young children's abilities to reason about the mental states of extraordinary agents such as God (Lane, Wellman, & Evans, 2012).

If people initially and intuitively represent gods as having anthropomorphic mental limitations, then adults' conceptions of their gods' unconstrained mental abilities should covary with the degree to which they can devote cognitive capacities to overriding their automatic anthropomorphic conceptions of other minds. Adults who explicitly report belief in an omniscient god might attribute humanlike mental errors to said god when under time pressure or when under heavy cognitive load.

If the capability to perceive other human minds shapes the ways that people mentally represent gods, then the same biases present in human mind perception should also be present when people are thinking about their gods. For example, people have an egocentric bias when inferring the contents of other minds (e.g., Krueger & Clement, 1994). That is, people tend to use their own beliefs and desires as a coarse template for what other minds are likely to think. This coarse template can then be elaborated with distinguishing information about the specific mind in question. Egocentric biases in mind perception color their impressions not only of how other people think; there is also a powerful egocentric bias in Christians' beliefs about God's beliefs (Epley, Converse, Delbosc, Monteleone, & Cacioppo, 2009). People who take an antiabortion stance, for instance, tend to also report that God is against abortion. Further, experimental manipulations of peoples' beliefs also change their beliefs about God's position on various issues. Finally, patterns of brain activation do not differ significantly between when people think about their own beliefs and when they think about God's beliefs. Combined, these results suggest, strikingly, that participants' representations of God's beliefs are even more egocentrically biased than are their representations of other humans' beliefs.

Around the world, gods are described as having a variety of fantastic mental abilities. However, because basic mind-perception processes underlie the mental representation of gods, explicitly fantastic supernatural minds are at least implicitly represented as basically human, and the same biases that affect the way humans reason about each other's minds also color people's perceptions of gods' mind.

Religious differences in clinical subpopulations

Mind perception is a necessary condition for the mental representation of gods (who are described as intentional agents), implying that individuals with impairments in mind perception (i.e., mind blindness) may have reduced capabilities to mentally represent gods, leading to reduced belief in the very existence of such agents. In

other words, mind blindness may be an obstacle to religious belief, suggesting that the autistic spectrum would be inversely related to religious belief.

There are provocative demographic patterns that support the potential existence of an autism-atheism link. Men are disproportionately affected by autism spectrum disorders (Baron-Cohen, Knickmeyer, & Belmonte, 2005; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001), overrepresented among committed atheists, and generally have lower levels of religious belief (Argyle & Beit-Hallahmi, 1975; Lenski, 1953; Miller & Hoffman, 1995).

Although far from conclusive, these different observations converge to suggest a potential relationship between autism and religious disbelief. Recent empirical evidence provides direct support for an autism-atheism link as well. In one study, autistic adolescents in Florida were only 11% as likely as control participants to strongly endorse belief in God (Norenzayan, Gervais, & Trzesniewski, 2012, Study 1). Furthermore, studies in both Canada and the United States find a modest but reliable inverse association between the autistic spectrum and belief in God that is fully mediated by measures of mentalizing, but not by other measures known to covary with the autistic spectrum or religious belief (Norenzayan et al., 2012, Studies 2–4).

If autistic people are less religious because their mind-perception impairments render the mental representation of gods difficult, then might other clinical populations have increased religiosity because of overactive mind perception? Crespi and Badcock (2008) argue that autism and schizophrenia can be seen as two poles on a spectrum that ranges from inactive mind perception on the autistic end to hyperactive mind perception on the schizophrenic end. If this is the case, then the present framework suggests that schizophrenics should be especially religious. Although little research addresses this possibility directly, and the relationship between schizophrenia and religion is not yet well understood, it is perhaps telling that patients with schizophrenia tend to report greater belief in God and the Devil than do patients with other severe clinical diagnoses (Kroll & Sheehan, 1989). Furthermore, patients with schizophrenia often exhibit religious delusions, and patients who do exhibit religious ideation are typically more severely affected by other symptoms of schizophrenia (Siddle, Haddock, Tarrier, & Farragher, 2002). The possible association between schizophrenia and a heightened belief in gods is ripe for future investigation.

Gender differences in religious belief

Women tend to be more religious than men (e.g., Argyle & Beit-Hallahmi, 1975; Lenski, 1953; Miller & Hoffman, 1995). Sociological explanations that point to socialization for traditional gender roles fail to account for this gender difference (Miller & Stark, 2002). Despite a recent profusion of scientific interest in the cognitive origins of religion (e.g., Barrett, 2000; Boyer, 2003), psychological explanations of the gender difference in religiosity have been curiously lacking. However, the present framework predicts that gender differences in mind-perception abilities may underlie gender differences in religious beliefs.

There is a reliable gender difference in advanced mentalizing: women score higher than men on tests of advanced mentalizing abilities and other related tasks (e.g., Baron-Cohen, 2002; Baron-Cohen et al., 2005). If mentalizing is fundamental to religious belief and women are more adept at mentalizing, then gender differences in mentalizing might explain the gender gap in religious belief. Consistent with this possibility, across multiple samples in the United States and Canada, gender differences in belief in God were fully mediated by individual differences in advanced mentalizing abilities (Norenzayan et al., 2012). Mind perception enables the mental representation of gods, and women seem to be more religious in part because, on average, they are more adept at mind perception. Future research should explore the cognitive origins of gender differences in religiosity in more detail.

The relationship between mentalizing and religiosity may help explain another interesting pattern in the transmission of religious beliefs. Religiosity is partially heritable (Bouchard, McGue, Lykken, & Tellegen, 1999)—a relationship not attributable to IQ (Waller, Kojetin, Bouchard, Lykken, & Tellegen, 1990). However, the ability to mentalize is also partially heritable (Hughes & Cutting, 1999), and it is conceivable that inherited individual differences in mentalizing proficiency may be one factor that mediates the heritability of religious belief.

The varieties of nonreligious experience

Combined, the research reviewed thus far indicates that individual differences in mind perception are associated with individual differences in belief in gods. However, Zuckerman (2007) estimates that there are perhaps 700 million atheists worldwide, making atheists the fourth largest religious group in the world, trailing only Christians, Muslims, and Hindus; globally, atheists are 58 times more numerous than Mormons, 41 times more numerous than Jews, and twice as numerous as Buddhists. It is highly unlikely that all of these nonbelievers have mind-perception impairments. Thus, one can deduce that mind perception is necessary but not sufficient for producing religious belief. People with impaired mind perception are likely to be atheists, but there are probably many other types of atheists as well (Norenzayan & Gervais, 2013).

One possibility is that some people disbelieve in gods simply because they were not raised in a cultural milieu

that supports faith. Some (e.g., Barrett, 2008; Boyer, 2008) suggest that religious representations tickle human intuitions in an almost inescapable way—that because religious concepts are so evocative and memorable, atheism is itself unlikely. However, these accounts fail to accommodate well-established literature demonstrating that the epidemiology of cultural traits, such as religion, depends on more than just the content of ideas; cultural transmission also depends upon a variety of context biases, which may more powerfully determine which representations people actually come to believe, rather than simply remember (see, e.g., Gervais & Henrich, 2010; Gervais, Willard, Norenzayan, & Henrich, 2011; Harris & Koenig, 2006). In particular, cultural learners need to pay attention to cues that a teacher actually believes what he or she espouses (Henrich, 2009) causing people to adopt only religious beliefs that are supported by credible displays that other people actually believe in them. On the other hand, some people might become atheists simply because they did not grow up surrounded by such credibility enhancing displays of faith in gods (Henrich, 2009). For example, among a large sample of Europeans who were raised by parents who were themselves religious believers, individuals from families who did not publicly evidence their faith (through ritual attendance, tithing, or prayer in the home, for example) were significantly more likely to be atheists than were individuals from more visibly faithful families (Lanman, 2012). Cultural learning is likely to exert a profound influence on people's degrees of religious belief (Gervais et al., 2011; Harris & Koenig, 2006; Zuckerman, 2008).

In addition, other cognitive processes are likely to influence religious disbelief among individuals with intact mind-perception abilities. In particular, many authors (e.g., Dawkins, 2006) have argued that some people might abandon belief in supernatural agents because they do not find reflective, rational support for religious claims. Consistent with this, a number of researchers find converging evidence that improved analytic thinking abilities predict reduced religious belief (Gervais & Norenzayan, 2012a; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Shenhav, Rand, & Greene, 2012), and experimental manipulations known to trigger analytic thinking reduce self-reported belief in God and other supernatural agents among predominantly Christian samples in North America (Gervais & Norenzayan, 2012a; Shenhav et al., 2012). Even subtle manipulations known to trigger analytic thinking—such as presenting questions in a hard-to-read font (Alter, Oppenheimer, Epley, & Eyre, 2007)—reduce reported belief in God, angels, and the Devil (Gervais & Norenzayan, 2012a). There may be several conceptually distinct avenues to atheism (Norenzayan & Gervais, 2013), and future research should aim to disambiguate the various factors that influence religious belief and disbelief.

Summary

Presumably, human capacities for mind perception evolved in response to selective pressures favoring the ability to read and react to the mental states of other intentional agents. Beliefs in supernatural agents are one consequence of mind perception. Thinking about a god's mind and thinking about other human minds both activate the same brain regions. Motivation to seek out affiliation with other minds in the world also increases belief in gods. In addition, mind-perception processes powerfully shape the content of religious beliefs. Mind perception constrains the ways that people represent supernatural agents, leading to at least implicitly anthropomorphic notions of the mental lives of gods. Furthermore, the same biases that color the perception of other human minds also influence what people think about gods' beliefs. Finally, recent research is beginning to demonstrate that individual differences in mind-perception abilities also influence individual differences in the degree to which people even believe in supernatural agents in the first place.

Religious Beliefs Trigger Mind Perception

> O LORD, you have searched me and you know me
> You know when I sit and when I rise; you perceive my thoughts from afar.
>
> You discern my going out and my lying down; you are familiar with all my ways.
>
> Before a word is on my tongue you know it completely, O LORD.
>
> —Psalm 139, 1–4 (New International Version)

Thus far, I have proposed that mind perception causes and constrains belief in gods. However, this relationship could be bidirectional. We expend a great deal of our cognitive resources perceiving other minds, and these other minds, in return, try to perceive the contents of our own minds. People react in a number of predictable ways when they detect other minds and feel that they are targets of these other minds' attentions. Belief in supernatural agents capable of monitoring human behaviors and intentions likely triggers many of these same consequences that are triggered when we feel that other minds are present and attending to us.

Many gods, as described in various religious traditions, have unusual physical and perceptual attributes that might even exacerbate the effects of mind perception, provided that people are able to somewhat override their implicitly anthropomorphic representations of supernatural minds. Other humans may be absent or present in a

given context. Gods such as the Judeo-Christian deity, however, are described as omnipresent. We may be able to avoid other people for a time if we please, but this sort of god is unavoidable, potentially leading believers to react as if somebody is always present. In addition, many gods—again including the Judeo-Christian deity—are described as omniscient and morally concerned. They know everything, including peoples' intentions and motivations. People may be able to deceive each other, or to keep their true desires hidden. But they cannot hide their minds from their gods. Thus, belief in these sorts of gods is likely to trigger the already discussed effects of perceived social surveillance.

The effects of belief in watchful gods on social behavior could manifest in at least two different ways. On the one hand, it is possible that belief in an omnipresent, omniscient god could lead to stable long-term effects. Individuals who believe that they are always being monitored by a god who is always present could exhibit long-term changes associated with mind perception. For example, it is possible that religious believers would generally behave more prosocially or would be more chronically self-conscious. On the other hand, it is possible that the effects would be present only when the immediate situation makes god concepts especially salient.

Thus far, the preponderance of evidence supports the latter supposition. A number of researchers (e.g., Pichon, Boccato, & Saroglou, 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007) have demonstrated a number of interesting effects of religious priming. Across these investigations, the situational effects of priming religious concepts typically overpower any effects of chronic individual differences in religious beliefs. In addition, Christians tend to behave better on Sundays than they do the rest of the week. For example, in the domains of both pornography (Edelman, 2009) and charity (Malhotra, 2008), Christians tend to act far more "Christian" (e.g., resisting the sins of internet flesh and giving money to charity) on Sunday, relative to the rest of the week. One (admittedly speculative) interpretation of these effects is that for Christians, God is more salient on Sunday than throughout the week, and the day of the week thus serves as a natural prime reminding Christians of their God. In sum, it seems that belief in gods is most likely to trigger the behavioral and psychological consequences of mind perception when gods are made immediately salient, leading to a number of novel predictions stemming from a relatively simple chain of logic.

The perceived presence of others, as well as perceived social surveillance, triggers a basic mind-perception process. As people become aware that other individuals are around, they realize that they are targets of attention. This mind-perception process, in turn, can trigger a diverse range of reactions. If people perceive gods as mindful agents capable of monitoring their behavior, then reminders of gods should produce similar effects across a wide number of domains, as do temporary reminders that other humans are present and attentive to one's own behavior. Existing literatures already provide well-validated methods for studying the consequences of perceiving a god's mind in this way, and an increasing amount of research directly relates religious beliefs to various consequences of mind perception. Thus, there is much untapped potential for research that does not even need an injection of new experimental techniques, only a new perspective for recombining already-proven methods. The study of prosocial behavior, socially desirable responding, and self-awareness already illustrate the utility of viewing religion in terms of the mind-perception processes it triggers.

Prosocial behavior

People are more likely to engage in prosocial behavior when they feel that other minds are monitoring their behavior (e.g., Bateson et al., 2006; Haley & Fessler, 2005). There is, however, a comparative dearth of information about what happens when people feel that gods are monitoring their behavior. Do people also engage in more prosocial behavior when they feel like a god is minding their business?

In recent years, researchers from a variety of disciplines have begun to investigate the possible evolutionary, cultural, social, and psychological consequences of belief in morally concerned gods who are capable of monitoring and policing human behavior. In particular, some (e.g., Johnson & Bering, 2006; Norenzayan & Gervais, 2012; Norenzayan & Shariff, 2008) have hypothesized that belief in this sort of god can promote prosocial behavior and cooperation among groups because people are acutely sensitive to reputational information. That is, people behave more prosocially when they feel they are being monitored, and belief in supernatural monitors could yield the same effects.

A number of independent investigations reveal that experimentally priming thoughts of gods and religion leads to increased honesty (Randolph-Seng & Nielsen, 2007), willingness to volunteer (Pichon et al., 2007), and anonymous generosity and fairness (Shariff & Norenzayan, 2007). The prosocial benefits of supernatural agent beliefs may have profound effects for cultures, as cultural groups that endorse the existence of omniscient, all-powerful, morally concerned deities tend to be more successful (Roes & Raymond, 2003) and, across a large-scale study in 14 societies, people who believed in moralizing gods from the major "world faiths" (e.g., Christianity, Islam) were more generous in two well-known anonymous behavioral economic games (J. Henrich et al., 2010).

Although the prosocial effects of religious priming are consistent with the hypothesis that priming god concepts leads people to feel that their behavior was being monitored, at least two other plausible mechanisms are also available. First, religion is associated with a prosocial stereotype, and the activation of a prosocial stereotype may be sufficient to elicit prosocial behavior (see, e.g., Pichon et al., 2007; Randolph-Seng & Nielsen, 2007). Second, and similarly, primed religious concepts may evoke prosocial behavior by reminding participants of prosocial norms. Norms are powerful determinants of human behavior and are increasingly important to scientific approaches to culture (e.g., N. S. Henrich & Henrich, 2007; Sripada & Stitch, 2005). In the aforementioned study relating world religions to prosocial behavior (J. Henrich et al., 2010), market norms were also powerful predictors of prosocial behavior, and anonymous prosociality might have been proximally mediated by the enforcement of prosocial norms, whether by market integration or religious faith. Furthermore, norms are most likely to influence behavior when they are brought to an individual's attention (Krupka & Weber, 2009). Primed religious concepts may lead to prosocial behavior by focusing people on already (at least partially) internalized prosocial norms.

In sum, priming thoughts of gods—just like cues of human surveillance—increases prosocial behavior. This is consistent with a mind-perception mechanism, but other mechanisms are also plausible. Researchers have thus far mostly tested the effects of primed religious concepts on prosocial behavior. Ironically, studies that use religious concepts as manipulations and prosocial behavior as dependent variables will be unable to provide direct support for the supernatural social surveillance explanation, because they will always be susceptible to alternative explanations focusing on the role of prosocial stereotypes and norms (see also McKay & Dennett, 2009).

If priming people with god concepts produces prosocial benefits only by reminding them of prosocial stereotypes and norms, then reminders of novel supernatural agents not having an a priori association with either prosocial stereotypes or norms should not lead people to good behavior. To the contrary, after hearing about either the ghost of a deceased graduate student (Bering, McLeod, & Shackelford, 2005) or an invisible princess inhabiting the lab (Piazza, Bering, & Ingram, 2011), adults and children, respectively, tend to curb their selfish cheating impulses. Additional support for the supernatural watcher account of religious prosociality comes from experiments investigating the how priming god concepts affects other variables known to be sensitive to the perceived presence of others but not to be directly related to prosocial stereotypes and norms.

Socially desirable responding

Feeling watched increases prosocial behavior, but it also leads people to put their best foot forward, even at the expense of honesty (Sproull et al., 1996). Socially desirable responding, in particular, is a potentially useful way to test whether priming religious concepts triggers mind perception or merely makes people act in accordance with prosocial norms and stereotypes. If priming gods merely makes prosocial stereotypes and norms salient, then they should perhaps increase honesty (which translates into decreased socially desirable responding). On the other hand, if reminders of gods make people feel watched, then people should instead engage in more socially desirable responding. By pitting two proposed mechanisms against each other in this way, researchers can tease apart the different effects of priming religious concepts on cognition and behavior.

Recent evidence supports the predictions derived from a mind-perception perspective. On one commonly used measure of socially desirable responding (Reynolds, 1982), participants are asked to indicate whether 11 statements are true of them. The statements concern either common, but socially undesirable, actions (e.g., "I am sometimes irritated by people who ask favors of me."), or unrealistically positive actions (e.g., "No matter who I'm talking to, I'm always a good listener."). People are thus forced to choose between giving an honest answer to each item (e.g., "Yes, I occasionally tune out boring people") or to give a socially desirable answer (e.g., "No, I have never been irritated by a favor request"). How do reminders of gods affect scores on this measure? Canadian undergraduates who report strong religious belief (but not individuals low in belief) exhibit significantly more socially desirable responding after being primed with god concepts (Gervais & Norenzayan, 2012b, Study 3). Consistent with a mind-perception mechanism, reminders of gods increase socially desirable responding (at the expense of honesty) among those who believe in them.

Self-awareness

Self-awareness theory (e.g., Duval & Wicklund, 1972) holds that people can oscillate between two different states of self-awareness. When people view themselves as a target of social scrutiny, they direct their attention onto themselves and experience public self-awareness; when they direct their attention outward, however, they experience private self-awareness (these states are also termed objective and subjective self-awareness, respectively). Germane to the present topic, reminders of social monitoring heighten public self-awareness, but not private self-awareness. For example, people experience public self-awareness when they have video cameras

directed at them (Duval, Duval, & Mulilis, 1992; Federoff & Harvey, 1976; Govern & Marsch, 2002) or when performing a task in front of an audience (e.g., Carver & Scheier, 1978).

Just like the presence of a video camera, experimental reminders of gods increase public self-awareness but not private self-awareness (Gervais & Norenzayan, 2012b, Study 2). In addition, for Christians reporting strong religious belief, the effect on public self-awareness of thinking about God is statistically indistinguishable from the effect of thinking about being judged by one's peers (Gervais & Norenzayan, 2012b, Study 1). These public self-awareness effects are particularly striking because some of the items that constitute the public self-awareness measure (Govern & Marsch, 2002) directly tap feelings of concern about how others (literally, physically) view them, such as "Right now, I am concerned about the way I look." Future research should test whether this self-awareness effect in part mediates the effect of primed religious concepts on prosocial behavior.

Additional empirical avenues

When people think of their gods, they tend to act the same as they do when they feel like they are being watched, at least in the domains of prosocial behavior, socially desirable responding, and self-awareness. If thinking of gods triggers a basic mind-perception process, then reminders of gods should also affect performance on a wide variety of other tasks that are similarly sensitive to the presence of other humans (e.g., bystander apathy, perspective taking, or social facilitation).

The message is not that thinking about gods leads people to a smorgasbord of different reactions. That is probably true of most interesting, important stimuli in the world. But it is not very useful to know. Rather, the evidence reviewed in this section, plus evidence that will hopefully accumulate in future investigations, helps to draw a more coherent picture of how basic psychological processes such as mind perception can be triggered when people think about mindful supernatural agents. The diverse effects of primed religious concepts are useful inasmuch as they triangulate on a deeper understanding of these basic psychological processes, as well as how these basic processes influence broader cultural phenomena such as religion.

Conclusions

The scientific study of religion has proceeded in fits and starts over the past century or so. Since at least William James's 1902 classic *The Varieties of Religious Experience*, the psychological and behavioral sciences have played a central role in this endeavor, although psychologists' interest in studying religious belief has waxed and waned over the ensuing decades. Recently, however, the psychological study of religion has flourished. This flourishing has been precipitated in no small part by researchers turning to research from well-established fields of inquiry that are outside of the traditional domain of the psychology of religion. This includes productive research sparked by both diverse fields such as economics, evolutionary biology, and cultural transmission, as well as other domains within psychology, such as memory, attachment, developmental psychology, and social psychology.

By drawing upon these diverse fields, researchers are able to import already successful theoretical frameworks and methodological toolkits and apply them to understanding religious beliefs. The various theoretical frameworks allow researchers sharper lenses through which to view their data, as well as more efficient sieves with which to filter their numerous hypotheses. It allows researchers to select from a bevy of well-validated tools to test novel hypotheses.

Mind perception provides an exciting framework for understanding numerous different aspects of religious cognition. People are adept at inferring the contents of other human minds and seem to be equally adept at inferring the existence of mindful supernatural agents. However, the origins of mind perception as a tool for understanding human behavior have left their fingerprints on people's conceptions of their gods, and people at least implicitly represent their gods as having essentially human mental limitations. The degree to which people differ in their ability to perceive and represent other human minds also influences the degree to which they even believe in the existence of gods, with important implications for religious beliefs among autistic populations, religious beliefs and gender differences, and perhaps even the heritability of religiosity. This, in turn, implies that there might be various different types of atheists in the world, each of whom arrived at disbelief via different cognitive routes and cultural pressures (Norenzayan & Gervais, 2013). Finally, thinking about gods seems to produce largely the same effects across a variety of different variables as being monitored by other humans. Believing that a god is watching triggers the same mind-perception process—with its attendant results—as performing tasks in front of a video camera or an audience.

Researchers have increasingly been able to elucidate both the cognitive demands of religious beliefs as well as the plausible evolutionary origins of belief in supernatural agents. These two endeavors have converged on the notion that mind perception is fundamental to religious cognition. Mind perception, in turn, provides a coherent framework that promises to shed continuing light on numerous facets of religious cognition, with important

implications for the study of mind perception's broader consequences in the world.

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Notes

1. Religions reliably include a few key attributes (e.g., ritual, supernatural-agent beliefs, group cohesion). Although all of these attributes are important and worthy of study, the present article focuses specifically on supernatural-agent beliefs and their effects on those who hold them, rather than on the broad landscape of religion as a whole.
2. This is not to imply that certain features of religion may not themselves be either cultural or biological adaptations in their own right. Debates on whether religion is itself a by-product or an adaptation fail to recognize that, because religion is a multifaceted suite of distinct and interacting phenomena, by-product versus adaptation is inherently a false dichotomy.

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