



## Reports

## Like a camera in the sky? Thinking about God increases public self-awareness and socially desirable responding

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## ABSTRACT

Believers describe God as a strategic social agent who perceives human thoughts and actions. Thinking about God therefore might make believers feel as if their behavior is being monitored, a possibility we call the *supernatural monitoring hypothesis*. Three studies offered new and converging empirical support for this hypothesis using two variables that are sensitive to perceived social surveillance: public self-awareness and socially desirable responding. For believers, the effect of an explicit God prime on public self-awareness was comparable to the effect of thinking about how other people view oneself (Experiment 1). An implicit God concepts prime increased public self-awareness (Experiment 2) and socially desirable responding (Experiment 3) among believers. These studies offer the first direct evidence that thinking of God triggers perceived social surveillance.

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“His eyes are on the ways of men; He sees their every step.”  
Job 34:21, NIV

Belief in supernatural agents is a hallmark of our species. In religious groups around the world, gods are seen as intentional moral agents with human-like beliefs and desires; many gods are believed to monitor, judge, reward, and punish human behaviors and intentions (e.g., Atran & Norenzayan, 2004; Bering, 2006; Boyer, 2001; Norenzayan & Shariff, 2008). Yet, despite the obvious importance of such beliefs in human cultures around the world, relatively little is known about the psychological and cognitive consequences of belief in supernatural monitoring. When believers think about watchful deities, do they in fact feel as if they are being monitored? In the present paper, we examine evidence for the as-yet untested *supernatural monitoring hypothesis*: that thinking of God triggers the same psychological responses as perceived social surveillance.

The supernatural monitoring hypothesis has important implications for a growing literature investigating the relationship between religion and cooperation (e.g., Bering, 2011; Norenzayan & Shariff, 2008; Preston, Ritter, & Hernandez, 2010). Specifically, the supernatural monitoring hypothesis speaks to the more basic question of why religion might *cause* large scale anonymous prosociality in humans. People are less prone to selfishly cheat the system when they feel watched (e.g., Bateson, Nettle, & Roberts, 2006; Haley & Fessler,

2005), and if reminders of moralizing gods make people feel watched, then beliefs in moralizing gods, who can monitor social interactions even when no humans are watching, may have been instrumental for promoting large scale human cooperation among strangers. Consistent with this, Roes and Raymond (2003) found that across a sample of 186 human societies, belief in watchful, moralizing gods was positively correlated with measures of group cohesion and size. In addition, experimental research reveals that even subtle reminders of God and religion also promote prosocial behavior (e.g., Pichon, Boccato, & Saroglou, 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007; see also McKay, Efferson, Whitehouse, & Fehr, 2011). The supernatural monitoring hypothesis offers a unified explanation for these findings and implies that God concepts may promote prosociality in part by reminding people of watchful supernatural agents who are capable of moral judgment (see, e.g., Bering, 2006; Boyer, 2001; Johnson & Bering, 2006; McKay et al., 2011; Norenzayan & Shariff, 2008).

Although it has not yet received much direct empirical attention, the supernatural monitoring hypothesis is plausible given converging evidence that supernatural agent beliefs are rooted in ordinary human social cognition. Human abilities to perceive other minds in the world (e.g., Waytz, Gray, Epley, & Wegner, 2010) cognitively underpin supernatural agent beliefs (e.g., Barrett, 2000; Bering, 2011; Boyer, 2001, 2003; Gray & Wegner, 2010), and reasoning about supernatural agents “piggy-backs” on established neural mechanisms that regulate reasoning about human minds. Schjoedt, Stodkilde-Jorgensen, Geerts, and Roepstorff (2009) found that, for Christians, praying to God produced activation in the brain regions classically identified with mind perception (e.g., Castelli, Happe, Frith, & Frith, 2000). Given these results, the authors (p. 205) concluded that “praying to God is an intersubjective

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experience comparable to ‘normal’ interpersonal interaction.” In addition, when believers think about God’s mental states, brain regions underlying mind perception are again activated (Kapogiannis et al., 2009).

Furthermore, reasoning about God is constrained by the same biases that influence reasoning about human minds. During the age range in which children typically begin to explicitly attribute false beliefs to other humans, they also begin to attribute false beliefs to God; only older children are able to explicitly override this inference and give the “theologically correct” answer that an omniscient God by definition cannot hold false beliefs (Lane, Wellman, & Evans, 2010). Even adults implicitly represent an omniscient God as having essentially anthropomorphic mental limitations (Barrett & Keil, 1996). Furthermore, people have an egocentric bias when reasoning about other humans’ beliefs (e.g., Krueger & Clement, 1994), and Epley, Converse, Delbosch, Monteleone, and Cacioppo (2009) elegantly demonstrated that peoples’ representations of God’s mind are even more egocentrically biased than are their representations of other peoples’ minds.

This intimate connection between ordinary social cognition and supernatural agent beliefs suggests that thinking about God might trigger the same suite of social cognitive consequences known to occur when people feel that they are targets of another mind’s attention. Generally consistent with this hypothesis, subliminal God primes lead believers – but not atheists – to attribute authorship of events to external agency (Dijksterhuis, Preston, Wegner, & Aarts, 2008). It is therefore plausible that thinking of God affects other social cognitive processes associated more directly with perceived social surveillance. Specifically, when people feel watched or judged, they experience public self-awareness (e.g., Duval & Wicklund, 1972) and are more prone to socially desirable responding (e.g., Sproull, Subramani, Kiesler, Walker, & Waters, 1996). This implies that thinking of a watchful God would similarly elicit public self-awareness and increase socially desirable responding among believers. Although theoretically compelling, direct experimental research on these questions is currently nonexistent.

Across three experiments, we hypothesized that thinking of God would increase public self-awareness (Experiments 1–2) and socially desirable responding (Experiment 3) for believers. Although religious primes consistently affect religious believers, there is no empirical consensus regarding the effects of religious primes on nonbelievers (see, e.g., McKay & Dennett, 2009; Norenzayan, Shariff, & Gervais, 2009). Thus, we also explored the effects of reminders of God on nonbelievers, but had no a priori predictions.

### Experiment 1: God vs. people

In Experiment 1, we hypothesized that thinking of God and thinking of social evaluation by other people would similarly elicit public self-awareness. Participants were randomly assigned to a control condition, a God Prime condition, or a People Prime condition in which they thought about how other people view them. In addition, we measured individual differences in religious devotion as a potential moderator.

#### Method

##### Participants

In exchange for partial course credit, 277 Canadian undergraduates (63% female; age: 18–46,  $M = 20.36$ ) participated in this experiment. This sample was ethnically diverse (49% East Asian, 30% Caucasian/White, 16% South Asian, 5% Mixed/Other). The participants had diverse religious backgrounds: 27% “None,” 33% Christian, 16% Atheist, 8% Agnostic, 4% Buddhist, 1% Other/No answer given, 5% Muslim, 1% Jewish, and 4% Sikh.

##### Procedure

Participants began the experiment by completing a priming task. Next, they completed a self-awareness measure. After completing a number of filler tasks, the participants completed a commonly used religiosity measure.

**Priming task.** Participants began with a task adapted from Morewedge and Clear (2008). In this task, all participants were presented with thirteen adjectives (e.g., loving, distant) which participants were randomly assigned to rate based on different criteria. In the Control Prime condition, participants ( $N = 81$ ) rated the adjectives based on their perceived frequency in everyday speech. In the God Prime condition, participants ( $N = 114$ ) rated how well each of the thirteen adjectives describe God. In the People Prime condition, participants ( $N = 82$ ) rated the extent to which each adjective describe the way that other people view them. All ratings used 7-point Likert scales with anchor labels varying by condition.

**Public self-awareness.** Participants completed the Situational Self-Awareness Scale (Govern & Marsch, 2001), which measures public and private self-awareness, as well as awareness of one’s surroundings. Crucially, the three item public self-awareness component is uniquely sensitive to cues of social surveillance (e.g., the presence of a video camera) and served as our primary dependent variable<sup>1</sup> (items: “Right now I am self-conscious about the way I look.” “Right now I am concerned about what other people think of me.” “Right now, I am concerned about the way I present myself.”).

**Religiosity.** We measured religiosity with the Hoge (1972) Intrinsic Religiosity Scale. This measure includes a total of ten items, three of which are reverse scored ( $\alpha = .89$ , possible values range from 10 to 70). It measures a personal commitment to God and has been used extensively to measure individual differences in religious commitment. The distribution of scores on this scale was significantly non-normal (Kolmogorov–Smirnov  $p < .001$ ; skewness: .86), so we performed a standard median split, yielding a High Belief group ( $N = 136$  individuals scoring higher than 28) and a Low Belief group ( $N = 141$  individuals scoring at or below 28).

#### Results and discussion

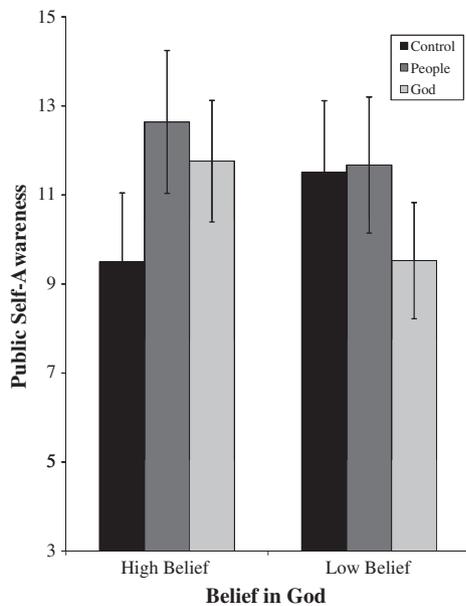
We tested the hypothesis that, for believers, thinking of God and thinking of human social evaluation similarly elicit public self awareness. A 3 (Prime: Control, People, God) by 2 (Belief: High, Low) between subjects ANOVA revealed a marginal main effect of Prime that was qualified by a significant Prime by Belief interaction (Fig. 1),  $F(2, 270) = 2.73$ ,  $p = .07$ ,  $\eta^2 = .02$  and  $F(2, 270) = 4.13$ ,  $p = .02$ ,  $\eta^2 = .03$ , respectively.<sup>2</sup> To clarify the interaction, we performed separate one way ANOVAs examining the effect of the primes for High Believers and Low Believers.

Public self-awareness significantly differed among the three priming conditions for High Believers,  $F(2, 132) = 4.33$ ,  $p = .02$ ,  $\eta^2 = .06$ . Planned  $t$ -tests revealed that, as hypothesized, both the God Prime ( $M = 11.76$ ,  $SD = 5.43$ ) and the People Prime ( $M = 12.64$ ,  $SD = 4.90$ ) significantly increased public self-awareness relative to the Control Prime ( $M = 9.50$ ,  $SD = 4.53$ ),  $t(94) = 2.17$ ,  $p = .03$ , *Cohen’s d* = .45 and  $t(79) = 3.00$ ,  $p = .004$ , *Cohen’s d* = .67, respectively. Public self-awareness did not significantly differ between the God Prime and the People Prime,  $t(91) = .81$ ,  $p = .42$ , *Cohen’s d* = .17. For believers, thinking of other peoples’ social evaluations and thinking about God similarly increased public self-awareness.

Public self-awareness also significantly differed among the three priming conditions for Low Believers,  $F(2, 138) = 2.72$ ,  $p = .04$ ,  $\eta^2 = .04$ . Planned  $t$ -tests revealed that the God prime ( $M = 9.53$ ,  $SD = 5.02$ ) decreased public self-awareness, relative to both the

<sup>1</sup> Private self-awareness and awareness of surroundings were not of primary theoretical interest, and did not produce reliable effects across studies. In contrast, thinking of God produced consistent and unique effects on public self-awareness. Full analyses are available from the authors.

<sup>2</sup> Generalized eta squared ( $\eta^2_G$ ) facilitates comparisons between repeated-measures and between-groups effects.



**Fig. 1.** Public self-awareness among High- and Low-Belief participants after a Control prime, a God prime, or after thinking about how other people view them (People) (Experiment 1). Error bars represent 95% confidence intervals.

Control Prime (marginally;  $M = 11.51$ ,  $SD = 5.39$ ), and People Prime (significantly;  $M = 11.67$ ,  $SD = 5.31$ ),  $t(96) = 1.86$ ,  $p = .07$ , *Cohen's*  $d = .38$  and  $t(100) = 2.08$ ,  $p = .04$ , *Cohen's*  $d = .42$ , respectively. However, the People Prime did not significantly increase public self-awareness relative to the Control Prime,  $t(80) = .14$ ,  $p = .89$ , *Cohen's*  $d = .03$ . For Low Believers, thinking of God reduced public self-awareness, relative both to the Control Prime and the People Prime.

For High Believers, thinking of God – much like thinking of how other people view them – elicited public self-awareness. These results are consistent with the interpretation that, for believers, thinking about God is psychologically similar to thinking about how one is viewed by other humans. This pattern did not generalize to Low Believers, who produced a somewhat puzzling pattern of results. Aside from the surprisingly high public self-awareness in the Control condition, however, the pattern of results was consistent with the interpretation that, for Low Believers, thinking of God was not psychologically comparable to thinking of the social judgment of their peers. In other words, the initially puzzling pattern of results likely has more to do with Low Believers scoring high on public self awareness in the control condition than with any inconsistency regarding the effects of our two theoretically-relevant conditions where we juxtaposed thoughts of God and human social judgment.

Experiment 1 used a relatively explicit priming technique, potentially introducing some experimental demand characteristics. We addressed this concern by using implicit God priming, a procedure that does not involve conscious awareness of priming manipulations, in remaining studies. In Experiment 2, we tested whether implicit God primes increase public self-awareness; in Experiment 3, we tested whether the same implicit God primes increase another variable sensitive to perceived social surveillance: socially desirable responding.

## Experiment 2: Implicit God Prime

In Experiment 2, we used a standard implicit priming technique (Srull & Wyer, 1979) that is commonly used to prime concepts outside of conscious awareness. We tested the hypothesis that even implicit God concept primes increase public self-awareness.

## Method

### Participants

Thirty eight undergraduates (age 18–25,  $M = 20.31$ ; 76% female) participated in this experiment and were randomly assigned to either the God concepts prime condition ( $N = 21$ ) or the Control prime condition ( $N = 17$ ). This was a religiously diverse sample (18% Christian, 5% Muslim, 34% “None”, 5% Atheist, 5% Agnostic, 3% Sikh, 29% No identification given). Ethnicity data were not collected in this study. On a binary belief in God item, participants indicated whether or not they believed in God, providing an even split (50% No, 50% Yes).

### Procedure

The priming apparatus utilized the scrambled sentence paradigm of Srull and Wyer (1979), and both the God concepts prime and the Control prime were identical to those used by Shariff and Norenzayan (2007). Participants unscrambled ten sets of five words by dropping one word and rearranging the others to form a sentence. In the God concepts condition, five of the sentences contained target God concept words (God, spirit, divine, prophet, sacred), whereas in the Control prime condition the words were unrelated to religion and did not have a coherent theme. Following the primes, participants completed the same self awareness measure (Govern & Marsch, 2001) used in Experiment 1, a number of filler tasks, and a single item binary (Yes/No) belief in God item. On a standard funnel debriefing questionnaire, no participants expressed suspicion regarding the religious nature of the prime or the hypothesis of the study.

### Results

We tested the hypothesis that implicitly-primed God concepts would increase public self-awareness for believers. A 2 (Condition: God, Control) by 2 (Belief in God: Believer, Nonbeliever) between-subjects ANOVA revealed a significant main effect of Condition such that God primes increased public self-awareness,  $F(1, 34) = 5.00$ ,  $p = .03$ ,  $\eta_p^2 = .13$ ,  $M_{God} = 13.57$ ,  $SD_{God} = 4.81$ ,  $M_{Control} = 9.71$ ,  $SD_{Control} = 5.16$ . There was no significant main effect of Belief in God ( $p = .97$ ), and Belief in God did not moderate the effect of the God primes ( $p = .71$ ). Implicit God primes increased public self-awareness. In contrast to Experiment 1, this effect was not moderated by individual differences in belief in God (an issue discussed further in the General discussion). In Experiment 3, we aimed to conceptually replicate the effects of Experiment 2 using a distinct variable that also increases when people feel watched: socially desirable responding.

## Experiment 3: Socially desirable responding

When people feel that their behavior is being monitored, they tend to cast themselves in a positive light. If God primes make people feel watched, then they should also increase socially desirable responding. Although previous research demonstrates a positive association between religiosity and socially desirable responding (e.g. Burriss & Navara, 2002), we are unaware of any experiments demonstrating a causal relationship. We hypothesized that, because perceived social surveillance increases socially desirable responding (e.g., Sproull et al., 1996), implicitly priming God concepts would also increase socially desirable responding.

## Method

### Participants

Fifty eight undergraduates (age 18–26,  $M = 19.72$ ; 69% female) were randomly assigned to either the God concepts prime condition ( $N = 32$ ) or the Control prime condition ( $N = 26$ ). This was a diverse sample, in terms of both religion (31% Christian, 2% Muslim, 5% Jewish, 33% “None”, 7% Atheist, 21% Agnostic, 2% No identification given) and

ethnicity (21% White/Caucasian, 43% East Asian, 7% South Asian, 26% Mixed/Other).

### Procedure

Priming conditions were identical to those in Experiment 2. After completing the implicit priming manipulation, participants completed a short version of the Marlowe–Crowne Social Desirability Scale (Reynolds, 1982). Participants indicated whether or not 11 statements are true of them. The statements concern either common, but socially undesirable, actions (“I am sometimes irritated by people who ask favors of me”), or unrealistically positive actions (“No matter who I’m talking to, I’m always a good listener”). Participants were thus forced to choose between giving an honest answer to each item, or to give a socially desirable answer. We summed the number of socially desirable responses given to the 11 items. Finally, participants completed a single face-valid measure of belief in God by rating their belief in God from 0 (God definitely does not exist) to 100 (God definitely exists). Because this item yielded a marginally nonnormal distribution (Kolmogorov–Smirnov  $p = .07$ ; skewness: .13), we performed a median split, as in Experiment 1. Participants were thus separated into a High Belief group ( $N = 29$  individuals rated belief in God above 47), and a Low Belief group ( $N = 29$  individuals rated belief in God at or below 47). On a standard funnel debriefing questionnaire, no participants expressed suspicion regarding the religious nature of the prime or the hypothesis of the study.

### Results and discussion

We tested the hypothesis that implicitly-primed God concepts would increase public self-awareness for believers. A 2 (Condition: God, Control) by 2 (Belief: High, Low) between subjects ANOVA revealed a significant a Condition by Belief interaction (Fig. 2), which qualified a significant main effect of Condition,  $F(1, 54) = 3.90, p = .05, \eta^2_c = .07$  and  $F(1, 54) = 4.20, p = .045, \eta^2_c = .07$ , respectively. Overall, there was no main effect of Belief,  $p = .75, \eta^2_c = .002$ . We decomposed the interaction with planned  $t$ -tests. As expected, High Believers exhibited significantly more socially desirable responding when primed with God concepts ( $M = 4.93, SD = 1.62$ ), relative to the Control condition ( $M = 2.79, SD = 1.81$ ),  $t(22) = 3.23, p = .004, Cohen's d = 1.38$ . Among Low Believers, socially desirable responding did not differ between the

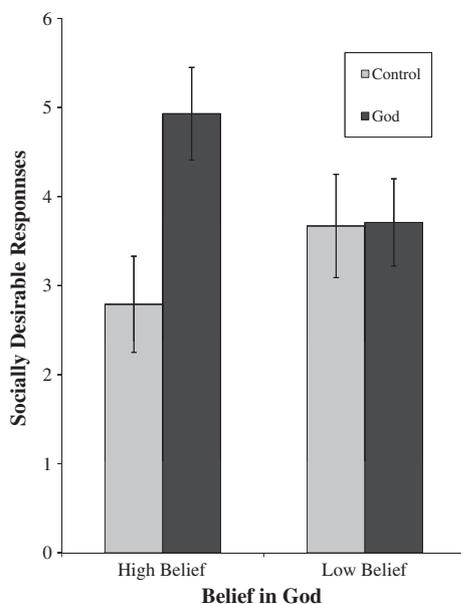


Fig. 2. Implicit God primes increased socially desirable responding among High Believers, but not Low Believers (Experiment 3). Error bars represent 95% confidence intervals.

God concept prime condition ( $M = 3.71, SD = 2.37$ ) and the Control condition ( $M = 3.67, SD = 2.15$ ),  $t(32) = .24, p = .81, Cohen's d = .08$ . In sum, God primes increased socially desirable responding, an effect entirely driven by High Believers. These findings converge with the first two experiments to demonstrate that, for believers (and possibly some nonbelievers), thoughts of God increase perceptions of being under social surveillance.

### General discussion

The intimate connection between mind perception and God “perception” implies that thoughts of God might cause many of the same psychological consequences as does being aware that other people are monitoring one’s behavior. Consistent with the supernatural monitoring hypothesis, for believers, explicitly thinking about God heightened public self-awareness in a manner comparable to thinking about social evaluation (Experiment 1). Furthermore, even thoughts of God activated without conscious awareness increased both public self-awareness (Experiment 2) and socially desirable responding (Experiment 3), both of which are sensitive to perceived social surveillance. These latter two studies speak against the possibility that these effects are due to demand characteristics.

These results were consistent with the hypothesis that thinking of God triggers the same social cognitive processes that are activated by real-time social surveillance by other individuals. Furthermore, the present results were robust across at least 2 different variables sensitive to social surveillance (public self-awareness, socially desirable responding), and two different methods for eliciting thoughts of God (explicit priming, implicit priming).

As expected, we found that God primes increase perceptions of social surveillance for believers across all studies, but our results regarding nonbelievers were inconsistent, even when using identical implicit primes (Experiments 2–3). However, we note that only in Experiment 2 did God primes affect believers and nonbelievers similarly. Given both that these experiments were intended primarily as an initial exploration of the supernatural monitoring hypothesis, and also our lack of clear a priori hypotheses regarding the effects on nonbelievers, we are hesitant to offer too much speculation regarding this single result. Instead, we highlight that the inconsistent moderation observed in this paper reflects the current state of the religious priming literature.

The literature currently offers no empirical consensus regarding whether individual differences in religiosity moderate the effects of religious and supernatural agent priming, and conclusions of both significant moderation (e.g., Dijksterhuis et al., 2008; McKay et al., 2011; Piazza, Bering, & Ingram, 2011; Shariff & Norenzayan, 2007, Study 2;) and no significant moderation (e.g., Laurin, Kay, & Fitzsimons, in press; Pichon et al., 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007, Study 1) enjoy empirical support. With religious priming becoming an increasingly common tool for evaluating the causal effects of religious cognition, it is becoming increasingly important to understand when – and why – religious primes might or might not affect nonreligious individuals, a task for future research (for discussions and potential moderating variables, see McKay & Dennett, 2009; Norenzayan et al., 2009).

### Implications for religion’s role in human cooperation

The present three experiments present an initial investigation of the supernatural monitoring hypothesis. These results suggest that thinking of God makes believers (and possibly some nonbelievers) feel watched, providing one potential mechanism through which supernatural agent beliefs might promote cooperation within social groups. However, religious primes probably also invoke a prosocial stereotype (“benevolent,” “honest”) which causes prosocial behavior through well-understood ideomotor processes (see, e.g., Randolph-Seng & Nielsen, 2007), just as priming an “elderly” stereotype leads participants to act more like elderly

people (e.g., walk more slowly, Bargh, Chen, & Burrows, 1996). While ideomotor processes are empirically well-supported and likely contribute to the link between religious primes and prosocial behavior, the supernatural monitoring hypothesis to date has not received much direct empirical attention. The present paper constitutes an initial foray into this area because it disentangles social monitoring from its prosocial consequences, demonstrating that religious primes affect variables that are sensitive to social surveillance, but not as directly relevant to ideomotor processes. Of course, ideomotor and supernatural monitoring processes are not mutually exclusive, and we expect that both independently contribute to religion's effects on prosociality.

Future research should directly examine whether the prosocial effects of religious primes are in part mediated by perceived supernatural monitoring. In addition, researchers should explore the ways that differing views of supernatural agents might differentially affect social cognition and prosociality. For example, there is a negative relationship between cheating behavior and the degree to which people endorse a vision of God as punitive and judging, rather than beneficent and forgiving (Shariff & Norenzayan, 2011), an effect that is difficult to reconcile with a purely ideomotor account, which presumably would lead to the opposite expectation (i.e., more honesty associated with belief in a more benevolent God). Finally, one intriguing extension of the present studies could explore whether thoughts of God facilitate cooperation across a wide range of contexts. Human surveillance is only an effective tool for promoting prosocial behavior to the extent that other people might be around, but perceived supernatural monitoring may be effective even when no human watchers could plausibly be present.

The capacity and predilection for believing in gods likely emerged as byproducts of everyday human social cognition (e.g., Atran & Norenzayan, 2004; Barrett, 2000; Bering, 2011; Boyer, 2001; Boyer, 2003). One important implication of this is that religious beliefs about gods and spirits tap into the same cognitive processes that underlie social interactions among humans, including an acute sensitivity to reputational cues that others are watching. While researchers continue to debate various explanations for the origins and cultural success of religion, a common hypothesis is that, once religious beliefs arise in a culture, they foster cooperative behavior by making religious believers feel as if they are monitored by their gods (e.g., Bering, 2006; Boyer, 2001; Johnson & Bering, 2006; Norenzayan & Shariff, 2008). The present studies are among the first to provide evidence directly supporting an underlying social cognitive mechanism: thinking about God activates real-time perceptions of social surveillance.

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