The Birth of High Gods

How the cultural evolution of supernatural policing influenced the emergence of complex, cooperative human societies, paving the way for civilization

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Abstract

Building on research showing how the evolutionary challenges confronting the emergence of large-scale cooperation can be addressed by culturally transmitted and stabilized mental representations, we explore how the development of beliefs surrounding supernatural policing agents helped surmount the constraints on social group size, monitoring and free-riding. Weighing evidence against arguments that suggest that such religious beliefs are a genetically evolved adaptation for cooperation, we posit that beliefs in "moralizing high gods" that punish non-cooperation within in-groups are the joint product of innate psychological processes that emerged to service non-religious (non-supernatural) functions *and* cultural evolutionary process that favored cooperation-enhancing mental representation supported by these innate psychological processes. Specifically, we argue that several features of the moralizing high god are best understood as historical products of longer-term cultural evolutionary processes driven by competition among cultural groups.

Voltaire's well-tread quote, "If God did not exist, it would be necessary to invent him" was written with direct reference to the effectiveness of God as a supernatural policing agent (Voltaire & Redman, 1977)We argue that indeed supernatural policing was a driving force for the 'invention' of God, but this invention—like so many other cultural products—was not the product of a brilliant religious mind or a committee of Machiavellian priests. Instead, omniscient, moralizing supernatural agents derived from a suite of religious beliefs that were culturally selected for their ability to galvanize cooperation in larger-group, promote in-group cohesion, and foster competition with other social groups. The emergence of religions, and modern world religions in particular, has been a cumulative processes involving a myriad of interacting individuals that stretched over hundreds of generations of interacting individuals within the context of intergroup competition.

Humans are not just social, group living animals, they are also highly cultural animals (Henrich, 2008; Norenzayan, Schaller & Heine, 2006). The cognitive and behavioral capacities that make human culture possible – complex communication skills, social learning mechanisms and biased information processing that favors common traits and prestigious individuals – evolved because they allow individuals to readily adapt their behavior to the novel and changing environments at rates much faster than genetic evolution (Boyd & Richerson, 1985; Henrich & Boyd, 1998; Henrich & Gil-White, 2001; Richerson & Boyd, 2005; Tomasello, 1999; Tomasello et al., 1993).

Natural selection has equipped many species with both individual and social learning capacities. As individuals of these species confront the challenges of survival

and reproduction, they use their naturally evolved learning capacities to locally adapt.. When encountering an evolutionarily novel food, crows and chimpanzees (just to name two) can individually figure out how to use tools for extracting the food (Hunt, 1996; McGrew, 1974). Chimps and dolphins can learn about these tools from conspecifics, who have already figured out the problems individually (Boesch & Tomasello, 1998; Rendell & Whiten, 2001). This means that evolutionary problems are often tackled first, in many species, by learning. Cultural evolution in humans has solved a vast range of evolutionary challenges, as the insights and accidents of generations accumulate and populations become increasingly better adapted (Boyd & Richerson, 1995). Clothing is a cultural adaptation to cold weather. Fire is an energy-saving and nutrient releasing cultural adaptation to acquiring high quality food that shape the subsequent evolution of our digestive system(Wrangham, Machanda, & McCarthy, 2005). The use of different spices across human societies shows that "spicing," including tastes and recipes, are a cultural adaptation to meat-borne pathogen that are particularly dangerous in hot climates (Sherman & Billing, 1999). Inuit kayaks are culturally evolved engineering marvels that adapt this tropical primate to arctic hunting. These are true adaptations in the evolutionary psychological sense, since they are complex, functionally-integrated solutions to recurrent ecological problems. But, they are not directly the product of natural selection acting on genes (Richerson and Boyd 2005), or evoked from domain-specific modules.

On the one hand, genetically evolved aspects of our minds and bodies can constrain cultural developments. And, certainly genetic evolution laid the groundwork for the emergence of cultural learning and cultural evolution. On the other hand, however,

cultural traits can arise and spread to address environment social problems, which in other species could only be dealt with by genetic evolution. For example, the omnivore's dilemma (Rozin, 1987) suggests that the human capacity to eat a wide range of plant and animal products dramatically increased calorie intake and hence survival, but also gave rise to selective pressures to avoid harmful substances (such as rotten meat, poisonous plants) that could have been lethal. Along with evolved psychological adaptations (e.g., the emotion of disgust), an interlocking set of culturally evolved beliefs, practices and institutions (food taboos, hygiene rules, eating rituals) to shape human diets in adaptive ways. Careful mathematical modeling of the interaction between cultural and genetic evolutionary processes shows that culture need not be on a tight "genetic leash." Sometimes the 'cultural tail' wags the 'genetic dog' (Rogers, 1989), meaning that cultural evolution can drive genetic evolution by altering the selective environment faced by genes.

In this chapter we explore the idea that some of the central features of religion, and in particular those features that have spread so successfully since the origins of agriculture, have emerged via competition among different cultural groups, bearing different religious beliefs and practices. An integrated suite of religious beliefs, rituals, practices and institutional forms thus evolved to addresses the evolutionary challenge of sustaining large-scale cooperation and exchange among non-relatives. We further consider the possibility that these cultural evolutionary processes, if they have occurred over a sufficiently long time span, may have influenced the course of human genetic evolution in a process know as culture-gene coevolution. Culture and genes may have interacted to make certain aspects of religion – such as big gods - more "thinkable".

To begin, we lay a foundation for this effort by summarizing an account of the cognitive capacities which underlie supernatural agent beliefs (Gods, ghosts, ancestor spirits) as evolutionary byproducts—natural selection did not favor these capacities because they gave rise to supernatural beliefs. Then, we argue that the human capacity for deep commitment to such beliefs was exploited through the mechanisms of cultural evolution to serve as supernatural policing agents to solve the evolutionary problems associated with cooperative behavior in large, genetically unrelated groups. While we are not the first to advance the idea that religion galvanizes cooperation within groups (for early discussions of religion and social cohesion, see Durkheim, 1912/1995; for recent treatments, see Irons, 1991; Johnson and Krueger, 2004; Sosis & Alcorta, 2003; Wilson, 2002), our aim is to argue for the central role of belief in supernatural agents (in addition to religious ritual) and a culturally evolved (rather than genetically evolved) explanation for these innovations. To do so, we must first visit the current discussion of religion's place within the story of human evolution.

The Cognitive Architecture of God Concepts

Several theorists of religion (e.g., Johnson & Bering, 2006; Landau, Greenberg, & Solomon 2005) have argued that religion is a naturally selected genetic adaptation – a trait-complex, in the same way that the vertebrate eye, or echolocation in bats, is an adaptation that has conferred a reproductive advantage to ancestral organisms. Such arguments need to fulfill the strict criteria of adaptive design that are the standard in evolutionary biology: compelling adaptive function in ancestral environments, unitary and complex design, efficiency, precision, specificity, economy, and reliability (cf. Williams 1966). Such a model also needs to rule out both the possibility that religion is a

cultural byproduct of adaptive design (Atran & Norenzayan, 2004) and also that it is not a product of adaptive cultural learning processes (Joseph Henrich & McElreath, 2006; P. J. Richerson & Boyd, 2005), of the kind that produced adaptations like kayaks and spicing in food preparation recipes. As we will argue in this chapter, religion fulfills none of these criteria (for similar views, see Atran, 2002; Boyer, 1999; Kirkpatrick, 1999; Bloom, 2005).

Instead, we argue that religion is not an evolutionary adaptation *per se*. In fact "religion" is not a unitary thing, but simply points to a family resemblance category of converging set of cultural byproducts, rooted in innate psychological tendencies that constrain and channel the transmission and survival of religious beliefs and practices. These four converging paths are counterintuition (supernatural agents), commitment (motivation belief in counterintuitive agents, displays in costly sacrifices), compassion (relieving existential anxieties), and communion (ritual) (Atran & Norenzayan, 2004). These psychological criteria—the four Cs of religion—are themselves cultural manipulations of psychological adaptations (agency detection, costly commitment) or panhuman existential concerns (fear of death, of social deception), and many belief systems in many places do not even have all four (Johnson, 2003). Religions evolve along culturally distinct though partially-convergent paths that are constrained by a complex evolutionary landscape reflecting cognitive, emotional and material conditions for ordinary social life. Given the mental and social realities of this landscape, certain religious elements are more likely to proliferate. For example, in terms of what supernatural agents come to be believed, there is an optimal balance of how much these beings conform to and how much they violate our intuitive assumptions about physical,

biological and psychological phenomena. The proliferation sweet-spot is a *minimally* counterintuitive supernatural being – super enough to capture attention, and natural enough to still make sense.

The combination of an intuitive conceptual grounding and an interesting non-intuitiveness makes beliefs more likely to be transmitted and retained in a population than random departures from common sense. On the one hand, category violations that shake basic notions of ontology are attention-arresting, and hence resistant to memory degradation. However, only if the resultant impossible worlds remain bridged to the everyday world can information be stored, evoked and transmitted (Atran & Sperber, 1991; Atran & Norenzayan, 2004; Boyer, 1996). Several lines of experiments support these assertions, indicating that minimally counterintuitive concepts (Boyer & Ramble, 2001; Barrett & Nyhof, 2001) as well as minimally counterintuitive narrative structures such as folktales (Norenzayan, Atran, Faulkner, & Schaller, 2006) have a cognitive advantage over other cognitive templates be they entirely intuitive, or maximally counterintuitive. Once these beliefs are cognitive selected, they are available to undergo cultural selection and stabilization. In what follows, we explore how cultural evolutionary processes may have selected among the potential pool of readily transmittable beliefs to expand and galvanize cooperative behaviour in large social groups.

Cooperation in Large Groups

The social environment of religion's infancy was one likely characterized by relatively small groups. These groups were held together by a few behavioral mechanisms that have genetically evolved in non-human species to permit limited

amounts of cooperation. Social organisms confront a tension between the stability and cooperativeness of the social group, on the one hand, and the selfishness of the individual, on the other. While group living conveys many advantages to individual members (e.g., avoidance of and protection from predators), there are many potentially cooperative circumstances in which it is more advantageous for individuals to evade contributing to the collective and free-ride on the contributions of others. This strategy will, unchecked, prove so successful that it will overrun an entire population, making group living an impossibility.

As a result, the evolutionary mechanisms of kin selection and reciprocal altruism have favored the emergence of altruism toward relatives and in reciprocal dyads or very small groups. Among humans, indirect reciprocity, wherein reputations can be ascertained by third parties rather than only through personal interactions, has increased the number of potential dyadic partners. However, indirect reciprocity does not increase the size of the cooperative group, and operates effectively only so far as these reputations can be very reliably transmitted and recalled for most potential partners (N. S. Henrich & Henrich, 2007). None of these mechanisms permits large-scale cooperation.

Thus, though humans have evolved to use each of these strategies, the extent of human social interaction was still, for much of human history, , limited to cooperation in very small groups. There are two ways in which human sociality was limited. First, . kin selection and reciprocity are limited to small cooperative units of two or three individuals, and cannot explain interactions in which large of numbers cooperate in the same unit, such as in warfare, group hunting and food sharing, recycling, giving blood, voting, or community house construction. Second, since groups were likely regulated by

reputational information and personal relationship, this caps the size at which individuals can maintain a generalized sense of trust toward fellow group members Extrapolating from neocortex size, Dunbar (2003) has estimated that human brains were designed to manage ancestral group of about 150. Beyond this number, unfamiliarity abounds, trust disintegrates, reciprocity is compromised and groups divide or collapse. While this specific number could be disputed (e.g., Smith, 1996), it is apparent today from the size of modern human settlements that solutions have been found to the limitations that used to make such settlements unstable. This effect is demonstrated in ethnographic work in part of New Guinea where villages routinely split once they exceed about 300 people (i.e., 150 adults). Tuzin (1976, 2001) details historical emergence of an anomalous village of 1500 people, and shows how culturally-evolved beliefs about social organization, marriage, norms, rituals, and supernatural agents converge to maintain harmony and galvanize cooperation in a locale where this scale was previously unknown.

archeological evidence makes clear that human societies had begun to "scale-up" group size and the scale of cooperation between 14,000 and 12,000 years ago, as the Pleistocene gave way to the Holocene and the pre-agricultural villages of the Natufians gave way to towns such as Jericho (Cauvin, 1999). A number of innovations – all necessary, none sufficient – emerged around this time that allowed larger populations to live relatively harmoniously in cohesive groups. Revolutions in agriculture, hierarchical political organization, and, we argue, religious beliefs and associated costly rituals made such settlements sustainable[1].

[1] While the scaling-up of human societal size and degree of cooperation was clearly moving up at the beginning of the Holocene, it is perfectly plausible that cultural evolution, driven by competition among cultural groups, has been occurring for tens of thousands of year prior to the agricultural revolution (Richerson and Boyd 2005). From around 45,000 to 20,000 years ago in southern Europe cultural

The role of gods in promoting cooperation

Emerging religious belief systems, we suggest, increased trust among unrelated individuals, allowing cooperation to expand beyond the small groups to which it had been previously limited. There is empirical evidence that religion, today, facilitates trust and cooperation among genetically unrelated individuals. Recently, Tan and Vogel (2005) examined religiosity in the context of a trust game. The results were clear: religious trustees were trusted more, particularly by religious trusters, and religious trustees were indeed more cooperative in turn towards the trusters. Importantly, these findings were not reducible to ingroup-outgroup processes. Consistent with these results, Gervais, Shariff, & Norenzayan (2007) found that prejudice towards atheists is mainly driven by moral distrust, rather than by visceral antipathy, as is the case for ethnic prejudice (Allport, 1954). Sosis and Ruffle (2004) examined the link between religion and cooperative behavior in Israeli kibbutz. They found that religious kibbutz members were more cooperative than secular members, and religious attendance predicted cooperative decision making controlling for a number of variables. In a different analysis, Sosis and colleagues compared the longevity of religious and secular communes in 19th century America (Sosis & Bressler, 2003). For any given year, religious communes were found to outlast those driven by secular ideologies such as socialism, by a factor of four. The remarkable survival value of religion could be explained by the cooperative advantages

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complexity was clearly flourishing, with cave art, figurines, sophisticated tools, and ceremonial burials. Populations may have been dense and semi-sedentary, and there is evidence of societal complexity greater than that typically associated with foragers throughout the Upper Paleolithic (Kelly, 1995; Price & Brown, 1988).

that it confers to groups. But what accounts for these seemingly religiously-derived cooperation and trust benefits?[2]

We hypothesize that cultural evolution favored the emergence of an interrelated suite of beliefs about the traits of supernatural agents. As background, the religions of small-scale societies including foragers often do not have one or two powerful gods who are markedly associated with moral behavior (Roes and Raymond, 2003) . Many gods are ambivalent or whimsical, even creator gods. Gods, in most small-scale societies, are not omniscient or omnipotent. Notions of a pleasant afterlife appear to have been a relatively recent innovation (McNeil, 1991). We suggest that moralizing high gods gradually moved to the forefront of religious systems as cultural evolution—driven by processes favoring larger, more cooperative, more harmonious groups—favored rituals and practices that instill greater degrees of committed belief in people about gods who (1) cared about cooperative and harmony-enhancing behavior (the group's moral norms), (2) could and would reward and punish appropriately, and (3) had power to monitor all behavior all the time. These religious beliefs helped expand the sphere of human cooperation. In particular, we suggest that the fear of imagined supernatural policing agents helped overcome the constraints imposed on the scale of human social interaction and cooperation by our kin and reciprocity based psychologies.

The omniscience of these agents extend one's vulnerability to 'being caught' to all times and all places. Some gods can even read people's thoughts. Moreover, there are no restrictions on how many individuals' transgression these supernatural agents can keep

[2] Sosis and colleagues apply "costly signaling" to argue such ritual signals can curb the free rider problem and thus facilitate cooperation and trust. We don't dispute the importance of ritual, but here would like to focus on explain the nature of the gods involved. Costly signaling has nothing to contribute towards explaining the nature religious beliefs.

track of. The consequence is that ‘hidden defection’, which was still a viable individual strategy in groups with indirect reciprocity, is markedly reduced.

Partially outsourcing not only the monitoring but also the punishing aspects of cheater detection to supernatural agents also contributes to addressing the problem of costly punishment (Johnson and Bering, 2006). The costliness of punishing cheaters (through both the act of punishing and the potential retribution for this act) itself creates a second order of cheaters – those that free ride on their punishing duties. This is a problem that can extend, at least theoretically, *ad infinitum* (Henrich and Boyd, 2001). Since supernatural agents are not generally thought to be privy to the same concerns as men, they can be seen to punish without cost or fear of retribution. Finally, the belief that the punishments of moralizing high gods are accurate and complete is favored by cultural evolution. The idea that no one escapes the omniscient judge may help satisfy human intuitions about fairness and justice (Haidt and Joseph, in press). The belief in a supernatural watcher can extend the otherwise limited scope of human cooperation, effectively infinitely, provided that the fear of these supernatural beings reaches a near-ubiquitous distribution in the group.

The above claims are bolstered by a growing body of empirical support (see Norenzayan & Shariff, 2008). Snarey (1996) examined the features of God concepts across cultures as a function of life-threatening water-scarcity. Societies with high water scarcity were more likely to have morally concerned Deities who encouraged the prosocial use of natural resources. This finding held even when controlling for cultural diffusion of high Gods via missionary activities. Thus, high gods were culturally selected when freeloading was particularly detrimental to the cohesiveness of the social group.

In a similar cross cultural analysis, Roes and Raymond (2003) predicted, and found that, across cultures, large societies are associated with moralizing high gods—group size was correlated with the existence of supernatural watchers who are concerned about the morality of human interactions. This finding held controlling for the cultural diffusion of high gods via missionary activity, as well as for societal inequality.

In societies with moralizing gods, a fear of supernatural agents among individuals can be simply evoked in order to enforce moral norms. In one study, children were explicitly told not to look inside a box, and then left alone in the room with it (Bering, 2003). Those who were previously told that a fictional supernatural agent, Princess Alice, is watching are significantly less likely to peek inside the forbidden box. A later study (Bering, 2005) found a similar effect in university students. Those who were casually told that the ghost of a dead student had been spotted in the experimental room were less willing to cheat on a rigged computer task.

If reminders of a supernatural agent can reduce cheating, reminders of a moralizing high God may reduce selfish behavior and increase generosity even towards strangers. Shariff and Norenzayan (2007) tested this possibility. Participants who were implicitly primed with God concepts behaved more altruistically in an economic game measuring fair behavior than those receiving either a neutral prime, or no prime at all. In an anonymous, non-iterated version of the “dictator game,” participants were randomly assigned to be either the ‘giver’ or the ‘receiver’. Those assigned to the role of the giver were allotted ten dollars which they were given the opportunity to share – in any amount they saw fit – with the receiver, who would otherwise receive nothing. Assured anonymity from the other player, and confidentiality in their decision, 38% of givers in

the control conditions kept all the money for themselves. This figure fell to 14% for participants implicitly primed with God concepts. At the same time, the proportion offering $5 to the receiver – an even half of the money – rose from 20% in the control conditions to 48% in the religiously primed condition. Among non-student atheists, however, the god primes had no effect. Subsequent studies showed that this effect is not explainable in terms of changes in positive or negative mood, nor in terms of increases in feelings of empathy.

Although other interpretations are possible, these results suggest that the imagined presence of supernatural watchers can reduce selfishness and increase the adherence to fairness norms, even among anonymous strangers. Throughout history, this combination of cheating reduction and generosity fostering, would have proved even more effective at stabilizing large societies than cheating reduction on its own. But is this suite of beliefs surrounding moralizing high gods a product of long-term cultural evolution or a reliably developing product of genetic evolution, and thus a piece of human nature? Like most of human thought and behavior, there will undoubtedly be influences from both genetic and cultural evolution on these beliefs. Certainly, as discussed earlier, the mental capacities which make such beliefs plausible, even "thinkable" are the product of the genetic evolution. Equally certainly, the specific content of religious beliefs, such as the belief in Old Man Coyote, Vishnu, or the Abrahamic God, are transmitted culturally. A better question, then, is *to what extent* and *which* specific details of religious beliefs in supernatural watchers are culturally rather than biologically evolved? This is where the debate begins.

Supernatural Punishing Agents – cultural or genetic adaption?

A number of theorists (e.g. Johnson and Bering, 2006; Harris and McNamara, in press) have proposed that religious beliefs, like those associated with supernatural watchers, are genuine genetically-evolved adaptations for enhancing human cooperation. That is, they suggest that there are modules for religious beliefs that originated in genetic mutations and have been favored by natural selection due to their cooperation enhancing abilities. Johnson and Bering (2006), specifically, suggest that the belief in supernatural agents served the adaptive purpose of the wholesale suppression of selfish behavior.

While we are in agreement with much of Johnson and Bering's argument regarding the effects of moralizing supernatural agents on cooperation, we disagree with their suggestion that these beliefs emerged as genetic adaptations. The position that we endorse places many of the important details of religious beliefs in general, and the beliefs about the characteristics of supernatural agents more specifically, in greater debt to cultural evolution (see also Henrich, 2007; Atran & Norenzayan, 2004). Instead of being a specific genetic adaptation, we argue the fear of punishing supernatural policing agents developed as evolutionary byproducts honed over generations by cultural evolution. The evolved structure of the brain resulted in a mind that was very receptive to ideas about supernatural agents, a receptivity that was capitalized upon by competing cultural variants of supernatural agents.

There are a number of factors that favor our approach over that of the 'god-beliefs as genetic adaptation.' First, theoretically, the "reputational" models of cooperation verbally described by these authors (Bering, 2006) are actually unlikely to favor or explain larger-scale cooperation in purely genetic evolutionary models, although they can

work well for cultural evolution. Second, it not clear how beliefs in supernatural agents could be encoded in DNA, and even if they can be, it's not clear why natural selection would resort to programming supernatural beliefs into the human genome, as opposed to pursuing a variety of other, seemingly less costly, routes to addressing the adaptive problem created by reputation management. Third, the genetic adaptation approach would seem to flounder with the empirical evidence indicating that many small-scale societies lack moralizing high gods that act as omniscient supernatural punishers. Below, we briefly discuss each of these issues.

Evolutionary modeling: the selection between multiple stable strategies

Formal genetic evolutionary models based on purely within-group natural selection do not provide a solution to larger-scale cooperative dilemmas (Joseph Henrich, 2006; N. S. Henrich & Henrich, 2007; Panchanathan & Boyd, 2004). These models—whether they involve costly punishment or reputation-based withdrawal of help—show that the same process can stabilize *any* costly behavior (including costly maladaptive behaviors that hurt the group and the individual), not merely cooperative behaviors. This means that these approaches suffer from an "equilibrium selection problem" and we have no theoretical reason to expect within-group genetic selection to favor larger-scale cooperation. Within-group transmission processes, therefore, cannot provide a complete solution to the dilemma of larger-scale cooperation.

However, if we consider cultural evolution and allow these alternative stable equilibria to compete in a process called cultural group selection, cultural evolution can favor norms and beliefs that lead to larger-scale cooperation. This process, described below, is well-modeled and does not suffer from the problems often associated with

arguments for the genetic group selection of cooperation (N. S. Henrich & Henrich, 2007).

The above description of reputation and cooperation may be surprising, as some psychologists have repeatedly claimed that “individual-level selection” based on reputation can favor larger-scale cooperation (Bering, 2006). There are three issues that would seem to need clarifying. First, we emphasize that we are referring to the analysis of mathematical models, not verbal models. Whenever theorists, deploying the mathematical tools that have long formed the bedrock of the study of evolutionary processes (M. A. Nowak, 2006), have sought to model reputation-based processes for solving larger-scale cooperative dilemma, the above-mentioned issue of equilibrium selection emerges (Panchanathan & Boyd, 2004). That is, there is simply no mathematical model that supports the purely verbal models that some evolutionary psychologists have so frequently asserted: all such models generate multiple stable equilibria that include cooperative outcomes along with numerous non-cooperative ones. Viewed as genetic evolutionary process, these models require some mechanism, like genetic group selection, to shift among these equilibria.

Second, part of this confusion may result from a failure to distinguish cooperation in dyads from larger-scale cooperation in big groups. Reputation can favor cooperation in dyads (Leimar & Hammerstein, 2001; Panchanathan & Boyd, 2003), but this is not the kind of cooperation at issue. The models typically cited by psychologists, if any are cited at all, are limited to dyadic cooperation and do not extend to larger cooperative groups. Reputation-based reciprocity can provide a foundation for human concerns about reputation (Martin A. Nowak & Sigmund, 2005), but either cultural evolution or culture-

gene coevolution is needed to explain why reputation extends to cover all manner of social norms, including those that stabilize larger-scale cooperation.

Third, the kind of cultural group selection we are discussing does involves groups at stable in equilibria, some of which are cooperative and some of which are not. The is not the kind of between-group influence on individual fitness that most non-specialist are accustomed to reading about, and is not susceptible to the usual concerns that target the genetic group selection of altruism. In an ecology of different groups, defectors entering cooperative groups are suppressed by within-group selective processes (via punishment or reputational damage). This is unlike the usual case of genetic group selection in which defectors reap a fitness bonanza when they enter cooperative groups (lots of people to free-ride on). The effect of this suppression of free-riding is to maximize the importance of the variation between groups and magnify the importance of competition among groups (Joseph Henrich & Boyd, 2001).

Evolutionary Fit: Wholesale versus selective suppression of selfishness

Our second concern is the suggestion that the fear of supernatural policing agents was a genetic adaptation rests heavily on the assumption that such a belief could be genetically encoded, an assumption that can by no means be casually overlooked. Despite rampant speculation, there is no evidence to support the idea that modules evolve at the level of particular beliefs. Moreover, many have criticized the extension of biological evolutionary explanations to this level of specificity on theoretical and empirical grounds (e.g. Panksepp and Panksepp, 1999; Fodor, 2000).

However, granting that beliefs could develop as mutations and ignoring the empirical record of religion in small-scale societies, is it plausible that such a mutation

would proliferate? According to Johnson and Bering, the fear of supernatural watchers emerged in response to the ability that humans developed to communicate information about reputations. In this new environment where one's slights and transgressions could be broadcast beyond the offended party, the selfish strategies of yore became much more costly. As a result, those possessing the mutation of a fear of omniscient watchers would have acted less selfishly in general, as they were in constant fear of being judged by the watcher, and thereby would be less likely to attract the negative repercussions of being caught and exposed as a selfish operator. The wholesale suppression of selfish behavior, they conclude, would be ultimately adaptive at the individual level.

Theoretically, the introduction of the omniscient, punishing supernatural agents is both a roundabout and a suboptimal strategy to be genetically selected for. True - evolution does not always take the shortest distance between two points, but there is considerable evidence to indicate that more direct and effective strategies did develop to overcome this new threat of public exposure, not the least of which is keeping ones selfish freeloading hidden. Why would beliefs emerge that cause one to improperly calibrate to the threat of reputational-damage? Why not simply do what natural selection has so often done in non-humans, and select for domain-specific forms of risk aversion?

Instead of the undiscerning strategy associated with the fear of supernatural watchers, it appears that humans have evolved a discriminate strategy wherein selfish, freeloading behavior was suppressed in those situations where one's reputation was vulnerable. These types of clandestine strategies seem to be present in rudimentary forms in chimpanzees and are significantly more elaborate in humans (Byrne and Whiten, 1988). The obvious advantage of this adaptation is that, even if a very conservative,

hypersensitive approach to protecting one's reputation is taken, it avoids more false positive errors where one could have gotten away with acting selfishly, while still managing to keep false negatives to a tolerable minimum.

Recent empirical evidence demonstrates this hypersensitivity with which people hide their selfishness. Two studies, in particular, show how people in what are rationally understood as anonymous situations, act less selfishly when they are in the mere presence of images of eyes, or eyespots. Haley and Fessler (2005) found that people are more likely to act prosocially on a computer based economic game when stylized eyespots were subtly embedded on the computer's desktop. Bateson, Nettle and Roberts (2006) showed that people were less likely to cheat on paying at a self-serve coffee station based on the 'honour system' when a pair of eyes were conspicuously featured on the price list poster. This sensitivity to eyes is an evolutionary ancient adaptation down to the level of birds (Stevens, 2005) and fish (Neudecker, 1988), which has, in humans, been exploited for reputation protection.

What is also notable about these studies, is that in the control conditions, where anonymity is more securely simulated, selfish behaviour and cheating behaviour are rampant. In the Shariff and Norenzayan (2007) study, student subjects in the control conditions generally acted exceedingly selfishly in the dictator game when the purported anonymity protected their reputations, an effect found for both religious and nonreligious players. And this is not unusual behaviour for students. Hoffman et al. (1994) have shown that as students feel more and more secure in their anonymity, prosocial behaviour drops steeply. Interestingly, these effects are less pronounced in non-students. We can

only speculate about the past, but it is clear today that selfishness has not been wholly suppressed, but ardently, adeptly, and adaptively hidden.

In addition, the fear of supernatural agents can carry with it substantial costs, which, again would make alternative, simpler methods of suppressing selfish behavior much more compelling genetic bargains. Examples, such as Voodoo culture (e.g., Rigaud, 1985) where the spread of the paranoia over supernatural agents becomes nearly paralyzing, demonstrate that supernatural devotion so apparently costly that they test the resolve of the most fervent pan-adpatationist. Similarly, widespread witchcraft beliefs are notorious for sowing hatred and disharmony in communities, and often inhibit the adoption of health-enhancing medical practices. They demonstrate, again, that the invention of supernatural agents is both an overly roundabout, as well as an overly inefficient means of attaining the ends for which it has been suggested.

In sum, adaptations that honed people's ability to cheat, defect or act selfishly without getting caught would have proved, not only more adaptive, but also more likely to have been genetically evolved. This casts the development of a fear of supernatural agents in a new light. Instead of emerging in an environment where the existing strategies were openly selfish and liable to get one socially exiled, we suggest that they emerged in an environment where selfish behavior was carefully hidden. In this environment, belief in supernatural agents would have actually proved *mal*adaptive. Those fearing their gods or desiring their rewards would have curtailed their tendencies to lie, cheat, and steal even when they could get away with it. Natural selection operating within groups in a non-cultural world should have, if anything, led humanity away from these beliefs, instead of towards them. And yet, here we are.

Empirical problems: many religions do not have gods like that

Finally, the genetic adaptation approach to supernatural beliefs faces some straightforward empirical problems. The big problem is that not only do millions of atheists not believe in supernatural agents, but people of many small-scale societies don't believe in the types of moralizing high gods that the purely genetic approach would predict. Fans of the "genetic adaptation approach" typically presume that atheists are not really unbelievers, in a deep emotional sense. This has yet to garner empirical support, though emerging evidence shows that, if it does actually exist, this deep belief does not translate into meaningful behavior. Self described atheists are, for example, differently affected by unconscious religious primes (Shariff & Norenzayan, 2007, study 2) Moreover, this approach provides no ready explanation for the lack of moralizing high gods in many small-societies, or the historical association of moralizing high gods and complex, cooperative societies (Roes & Raymond, 2003)?[3]

Highlighting the fact that high god concepts are the product of cultural, not genetic innovation, it is worth noting that ancestor gods found in many village societies often cannot observe people beyond village boundaries, are sometimes limited to observing people's behavior (they cannot read minds and intent), may lack the power to act, cannot give a heavenly reward, and may only care about specific acts and not general principles. Because they are not omniscient mind readers, they can misinterpret human intentions and goof, resulting in unjust punishment.

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[3] Johnson (2008) has since argued that even atheists, and members of cultures with high gods, still maintain some mechanisms of supernatural – though not deistic – punishment. Karma, or Just-World Beliefs, for instance, may fill the same policing functions as high gods. This may be true, however, it only succeeds at pushing back the issue of what exactly is being genetically selected for. The data suggesting the relative success of cultures which, having the same human genes, but then culturally selecting paradigmatic high gods, still demonstrate that there are fitness benefits to certain cultural variants, that is, cultural selection.

The logic, then, of supernatural policing agents is better found in cultural evolution. The persistence of the fear of supernatural watchers in the face of immediate individual costs can be compellingly explained through cultural group selection, without direct reference to a specialized genetic adaptation. This explanation is explored in detail in the next section.

Cultural evolution can alter the selective environment faced by genes in ancestral human environments

In the scenario we propose, cultural group selection favored those culturally-transmitted social norms that best promoted cooperation within the group, and success in competition with other groups. The evolution of such norms, which has been extensively modeled, can stabilize costly behaviors through the effects of reputation on the withdrawal of help and through direct costly punishment (as well as some other mechanisms). Cultural group selection merely favors the combinations of particular norms that are most group-beneficial.

However, as this process continues, it favors larger and larger cooperative groups (Roes & Raymond, 2003). As group size increases, it begins to stress the limits of reputational information and diffuse punishment's capacity for stabilizing cooperation and maintaining within-group harmony. We argue that widespread beliefs in certain kinds of supernatural agents can help extend the potency of social norms by covering the expanding opportunities for cheating and free-riding that emerge as the group expands and coverage of reputational information begin to crack. Eventually, these groups, with widespread commitment to powerful, omniscient moralizing gods, would become larger and generally more competitive than groups whose belief structures did not increase

cooperation. Henrich (2007) discusses several case examples, with supporting empirical data, of the cultural group selection of religion in action.

Within these groups, it is generally not optimal to free-ride since combinations of reputation and punishment have stabilized cooperation and other group-beneficial norms. Beliefs in supernatural agents could be disadvantageous since they could prevent an individual from free-riding in situations when he or she might in fact get away with it. However, these same religious systems tend to punish belief in culturally foreign gods or lack of belief. As a result, to get the benefits of free-riding in the occasional opportunistic (non-monitored) situations , non-believers would need to pay most of the costs associated with believing (e.g. helping, participation in rituals) in all monitored situations (to avoid punishment) in order to access those probably rare situations for free-riding. And, if feigning-belief (ie. non-belief) increases one's likelihood of botching the divinely required practices, words, and actions of believers (and getting caught in non-belief), then the relative advantage of non-belief could be outweighed by the extra cost of being more likely to get fingered as an apostate or heretic—and as a result being punished or socially excluded.

At their most extreme, examples of such punishment in *this* world include Muslim theocracies such as that in Iran that place the penalty of death on apostasy. In the next world, those punishments become even more severe; both doctrinal Islam and Christianity promise eternal hellfire for those whose doubt exceeds their belief. But these aren't the only costs that atheists face for their lack of belief. Polling data on social attitudes continue to show atheists to be the least accepted of various major minority groups, including the typically marginalized groups of African Americans, Muslims and

Homosexuals (Edgell et al. 2006). When asked if polled subjects would disapprove of their child marrying an atheist – a standard measure of prejudice – over 47% admitted that they would (the rates if marrying an African American or Muslim were 27% and 34%, respectively). Research exploring the psychology of anti-atheist prejudice finds that this aversion is driven primarily by moral distrust (Gervais et al., 2007), a finding consistent with the theory that nonbelievers pose a perceived threat to a moral system policed by supernatural agents.

Since it is at least plausible that cultural groups with different forms of social organization and different religious beliefs have been competing for tens of thousands of years (P. Richerson & Boyd, 1998), our approach opens the possibility that cultural evolution could have altered the selection pressures faced by genes and favor the evolution of a psychology that is more susceptible to believing in and committing to god beliefs. Thus, a psychological predisposition to believing in moralizing gods could then be favored by natural selection within groups (and between groups) as consequence of the ways that cultural evolution (via social norms) shaped social environments. Cultural evolution may have favored genes that make these gods easier to believe in, and commit to. Of course, there may not have been time for much genetic evolution in this regard, but it is nonetheless important to note that natural selection need not oppose such beliefs once cultural group selection has shaped the selective social environment.

Conclusion

A combination of findings from cognitive science and an understanding of cultural evolutionary processes give us the best chance to understand the phenomena of religion in the world today. Modern religious beliefs are deeply rooted in our evolutionary

history, yet they are not the necessary and ineradicable consequences of our genetic makeup, but are part of a much more fluid and responsive cultural system. In short, religions are a coevolutionary phenomenon. The case we have made above suggests that religions are both a cognitive byproduct of reliably developing aspects of our cognition, and a consequence of long-term cultural evolutionary forces, including those very forces that shaped the complex, large-scale, cooperative institutions that dominate the modern world. Our evolved cognition strongly constrains the forms of religious representations. However, not all of the possible representations have the same consequence of outcomes in the lives of individuals and societies. Cultural evolution is influenced by outcomes, and thus can create a force that favors particular kinds of representations of others. While a historically recent phenomenon, it is no coincidence that the world is now dominated by a few great monotheisms, and that much human behaviour is influenced by the belief in a few high gods. To achieve a civilization of this scale, it was necessary to invent them.

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