

Accounting for cross-cultural variation in the minds of gods

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Abstract

In this chapter, we discuss some of the merits and limitations of current accounts of cross-cultural variation in religious appeals, beliefs and behaviors. On this basis, we advance a cultural evolutionary account of cross-cultural variation in beliefs about and appeals to gods' minds that includes a set of criteria for predicting the content of so-called "god-problems"—locally salient social dilemmas addressed by behaviors about which supernatural agents care. In order to assess these predictions, we survey a range of ethnographic cases of varying levels of detail and find general support for the criteria. In essence, we argue that gods and spirits are cross-culturally associated with specific concerns and appeals that direct attention to the challenges of local social life. We close with highlighting predictions and open questions that follow from the outlined account.

Keywords: cultural evolution, god problems, supernatural punishment, social dilemmas

1. Introduction

Many contemporary cognitive and evolutionary accounts of religion converge on the insight that religious thought and behavior exploit reliably-developing psychological systems (Geertz, 2020; see in present volume: Balch and McNamara; Burdett; Johnson). While much work has focused on identifying such building blocks of mental and behavioral aspects of religion (see in present volume: Sørensen and Purzycki; Teehan; van Elk and Schjoedt; Wildman and Lane), comparably little attention has been allocated to systematically assessing and accounting for cross-cultural variation in beliefs about what concerns the gods, and what the behaviors gods care about tell us about local social life.

In this chapter, we discuss current approaches to cross-cultural variation in beliefs about and appeals to gods and their postulated concerns (Section 2) and, on that basis, advance a cultural evolutionary account (Section 3) that includes a set of criteria for predicting the set of concerns and interests that a given deity might be associated with in varying socioecological contexts (Bendixen et al., n.d.b; Bendixen and Purzycki, 2020, 2021). We then survey a range of ethnographic case studies, primarily in the context of smaller-scale societies, and assess how the predictive criteria stack up against this evidence (Section 4). In essence, we argue that gods and spirits are cross-culturally associated with specific concerns and appeals that point to problems and challenges of local social life—what we refer to as "god-problems". We conclude that available ethnographic case studies are consistent with the outlined "god-problem" predictions, but that more work is required to fully evaluate the relationship between god appeals and local social ecologies. To that end, we consider avenues for future research on cross-cultural variation in beliefs about and appeals to the minds of gods (Section 5).

2. Current accounts of cross-cultural religious variation

Several lines of research identify religious variation as functions of local social and ecological factors. For instance, Baumard and Boyer (2013) argue that moralizing religious traditions originally arose as a response to increased material affluence (see also Baumard et al., 2015). Based on one variant of life-history theory, they argue that when basic human needs such as access to food and protection are met, people “turn their attention to other domains of evolved preferences, such as maximizing personal wellbeing, enjoying friendship, and cultivating aesthetics, the good life that is portrayed as the goal of many moral movements. Consistent with this, moralizing religions recruited their first adepts among the affluent social classes [...]” (Baumard and Boyer, 2013, p. 277).

Evidence for this view includes the observation that moralizing world religions emerged and spread out from particularly fertile geographical regions. Most such research assumes that “moralizing religions” are those that include gods that care about human morality. However, setting aside the controversial application of life-history theory (e.g., Nettle and Frankenhuys, 2020) and that cross-cultural individual-level data does not support the predicted association between material security and moralizing god beliefs (Purzycki et al., 2018), the argument hinges on the critical assumption that moralizing religions do not usually emerge until a society reaches some threshold level of energy capture. While this and related assumptions (e.g., society size, urbanity, etc.) are central to many current debates in the cognitive and evolutionary science of religion, emerging empirical evidence (Beheim et al., 2021; Bendixen et al., n.d.b; McNamara et al., 2016; McNamara and Henrich, 2018; McNamara et al., 2021; Purzycki, 2011, 2013, 2016; Purzycki et al., 2022; Shaver et al., 2017; Singh et al., 2021) as well as general surveys of the ethnographic literature (Boehm, 2008; Purzycki and Sosis, 2022; Swanson, 1960) seem to suggest that many deities of smaller-scale societies are, in fact, morally concerned to some significant degree (see also below and Petersen and Purzycki & McKay in the present volume).

Other analyses show that moralizing god beliefs arise in materially *insecure* societies (Botero et al., 2014; Skoggard et al., 2020; Snarey, 1996). According to this body of work, moralizing deities that are watchful of human behavior and punitive in cases of deviance from collective moral norms (e.g., theft, generosity, murder, kindness, etc.) are a culturally evolved response to threats such as environmental stress and resource scarcity, since societies under threat can particularly benefit from the notion of a punitive and monitoring “eye in the sky” that curbs defection and enforces fair distribution of limited common goods¹.

Extending this view with a synthesis of historical and experimental evidence, Norenzayan et al. (2016) and Henrich (2020, ch. 4) argue that beliefs in morally knowledgeable, monitoring, and punitive deities generally contribute to within-group cooperation thereby bolstering a cultural group in the competition with other groups, thus further increasing the cultural selection for moralizing god beliefs (see also Atran and Henrich, 2010; Roes and Raymond, 2003). Related to these views, Jackson et al. (2021) advance the suggestion that religious traditions that include notions of supernatural punishment of norm violations arise in and sustain “tight” societies (Gelfand et al., 2011), where strict norm adherence is particularly critical to social cohesion, perhaps as a consequence of environmental shocks or group conflicts (Caluori et al., 2020; Skali, 2017, see also Jackson and Gray, present volume).

¹Note, however, that many of these studies rely on coded data for so-called “high gods”, *creator* deities that may or may not be “specifically supportive of human morality”. See Bendixen et al. (n.d.c) and Purzycki and McKay (present volume) for further discussion.

There is mixed empirical evidence for these views. Cross-culturally, general levels of religious commitment indeed seems to rise in the wake of natural catastrophes (Sinding Bentzen, 2019) and war (Henrich et al., 2019) and decline in the context of well-functioning governments (Zuckerman et al., 2018). Across a number of observational and experimental studies, Jackson et al. (2021) find that ecological threats predict punitive religious beliefs and that this relationship is partly mediated by cultural tightness. Further, food insecurity predicts increased commitment to moralistic deities (but not to “local” deities and spirits) across more than 2,000 participants from 15 diverse cultures (Baimel et al., 2022), and high material insecurity combined with beliefs in punitive ancestor spirits (but not punitive beliefs about the Christian God) predict increased in-group favoritism in an economic game experiment among Yasawa Fijians (McNamara et al., 2016). On the other hand, across eight field sites, Purzycki et al. (2018) failed to find evidence for any relationship between food insecurity and ratings of locally relevant deities as moralistic, punitive, or omniscient.

While these approaches and findings are valuable, they mostly focus on the explicitly moralistic aspects of deities (for a detailed discussion of this issue, see Purzycki and McKay, present volume). This, in turn, has left a lacuna in contemporary research of how to account for other matters that are also often associated with deities. What are these “other matters”? On the basis of a general survey of ethnographic work, Purzycki and McNamara (2016) classify the concerns of deities into three broad classes, namely as having to do with human behavior around or toward other people (morality, virtue, etiquette), the gods (rituals, beliefs), and nature (ecology, natural resource management). Similarly, McNamara and Purzycki (2020) argue that god beliefs and appeals co-evolve with features of local socioecological conditions and the local cultural psychology. For instance, cultures of honor are typically found in socioecological settings such as pastoral societies where land is sparsely inhabited, formal institutions are weak, and where displays of individual toughness is an informal avenue to maintaining social order (Cao et al., 2021; Nisbett and Cohen, 1996). If the minds of gods are indeed reflections of such socioecological patterns, gods in these societies are predicted to be perceived as concerned with behaviors that support the underlying norms and values. According to McNamara and Purzycki (2020), such behaviors should include ritual displays at geographically strategic locations, such as border territories, that signal trustworthiness (Purzycki and Arakchaa, 2013), and punishing deviations from norms that compromise honorable reputation management (but, crucially, not punishing acts of redemption that seek to offset a previous misdeed, since a culture of honor deems this acceptable, if not the required, behavior). While compelling, these predictions remain untested.

In this latter view, then, beliefs about and appeals to the minds of gods are complex products of the interaction between local socioecological conditions, cultural-historical contingencies, and cognitive constraints of the human mind (see also McNamara, present volume). The cultural evolutionary account developed in this chapter, and to which we now turn, builds on this work by deriving a more general set of predictive criteria of the kinds of behaviors that we might expect deities to be associated with in varying socioecological contexts.

3. “God-problems”: A cultural evolutionary account of variation in gods’ minds

We propose that cultural models of gods’ concerns point to particular kinds of challenges and problems—and behaviors that mitigate them—that people face or have faced together in the past. We refer to such problems as “god-problems” and argue that they have generally recurring features (cf., Bendixen et al., n.d.b; Bendixen and Purzycki, 2020). First, since social life is rife with temptations to free-ride on the efforts of the collective, gods and spirits should generally be concerned

with threats to cooperation and coordination or behaviors that address such threats. Specifically, we would expect god-problems to take the form of game-theoretic dilemmas (see Lightner and Purzycki, present volume): scenarios in which the collective maximally benefits when all members fully cooperate, but each individual maximally benefits (at least in the short-term) if everybody else fully cooperates while they themselves free-ride, thus creating a conflict of interest between the collective and the individual. Further, in order to qualify as threats to the fabric of social living, god-problems must reflect social dilemmas that are central to local social life.

Are all costly and/or salient social dilemmas potential god-problems? Rather, we suggest that potential god-problems constitute the subset of local social dilemmas, where defection is not easily monitored and sanctioned by (appeals to) secular institutions. Beliefs about and appeals to watchful and punitive superhuman forces are possibly convincing and effective at curbing temptations to free-ride when well-functioning secular alternatives are unavailable (e.g., Johnson, 2005; Rossano, 2007; Rossano and LeBlanc, 2017), and particularly when a wide variety of maladies can be interpreted as instances of supernatural punishment (e.g., Hartberg et al., 2016; Leeson and Suarez, 2015), or when the harmful consequences of widespread deviance are non-obvious. In essence, appealing to the concerns of gods and spirits—for example by explaining “bad luck”, illness, and deaths as instances of supernatural intervention resulting from some norm violation (Boyer, 2021; Fitouchi and Singh, nd)—is a culturally evolved social technology that recruits reliably-developing cognitive intuitions and align collective interests. Therefore, appeals to gods and spirits will culturally evolve to include behaviors that point to the kinds of challenges that people and communities face, in particular conflicts of interest and threats to coordination and cooperation.

A recent free-list study conducted across eight diverse societies found preliminary support for this account and its predictive criteria, in that cross-culturally spirits’ and deities’ concerns indeed seem to point to local threats to cooperation and mitigating behaviors (Bendixen et al., n.d.b). However, to assess the evidential basis for these predictions more broadly, in the next section, we review a range of ethnographic observations. We first turn to a more detailed analysis of a particularly rich ethnographic case study and how the god-problem criteria fare in the face of this material. We then embark on a wider tour of the ethnographic record.

4. Ethnographic evidence

4.1. *Forest spirits and environmental preservation in the Maya Lowlands, Guatemala*

Atran et al. (2002) studied three distinct cultural-ethnic groups living in the same rain-forest habitat in the Maya Lowlands: a native population, the Itza’ Maya, and two migrant groups. As determined across a range of physical measurements (e.g., in terms of forest clearing, soil quality, biodiversity, etc.), the researchers found that of those three groups the Itza’ practiced simultaneously the most productive and least destructive agricultural forms (see also Atran et al., 1999; Atran and Henrich, 2010; le Guen et al., 2013). This superiority in sustainable subsistence practices appears partly a result of detailed cognitive and cultural models of the environment among the Itza’, including an increased “awareness of ecological complexity and reciprocity between animals, plants, and people” (Atran et al., 2002, p. 432). Importantly, the Itza’ is also the only group where the local spirits are perceived as “actively protecting the forest” (Atran et al., 2002, p. 439), for instance by punishing violations of the spirits’ preferences for certain species and patches of land. These preferences are hypothesized to “represent a synthesis of experience accumulated over generations” and “[v]iolations of spirit preferences can lead to accidents, falling ill, or worse. It matters little

if the supernatural threat is real or not: if people believe in it, the threat of punishment becomes a real deterrent” (le Guen et al., 2013, p. 781). In other words, although at least one of the neighboring groups also uphold taboos on certain locations in the forest such as mountain caves and water streams, only among the traditional Itza’ does conservation of nature unambiguously constitute a “god-problem”. This belief system in turn appears to change the perceived pay-off of exploiting nature in the short-term, resulting in both more sustainable and productive foraging and agricultural practices (for a strikingly similar case, see Eder (1997) on the traditional Batak people of Palawan Island, the Philippines).

This case study lends direct support to the god-problem criteria, in that local spirits are believed to care about a pertinent and pressing social dilemma (environmental preservation) with individually opaque pay-offs (since the collapse of cooperation depends on widespread defection, not any one individual defecting now and then) that seems to be effectively enforced by appeals to supernatural monitoring and punishment (according to physical measurements, the Itza’ practice the most sustainable way of life) in lieu of secular alternatives (e.g., monitoring other people in a dense rainforest is unfeasible; the Itza’ have “few cooperative institutions” to appeal to, (Atran et al., 2002, p. 440)). The richness of the ethnographic material further allow us to discern why only one of the local groups under investigation, the native Itza’, views forest preservation as a god-problem; namely, a combination of inherited folkecological knowledge and attitudes, cultural tradition and historical contingency, and a lack of readily available formal institutions.

So far so good for the god-problem criteria. Furthermore, there are many other suggestive instances in the ethnographic record that shed light on why the minds of gods might have the qualities and attributes they do. We now tour such instances and assess the wider applicability of our account of cross-cultural variation in god beliefs and appeals.

4.2. An ethnographic tour of gods’ minds

As we have just seen with the Itza’ Maya, in many foraging societies, from Siberia (e.g., Jordan, 2003, ch. 6) over South East Asia (e.g., Eder, 1997; Hood, 1993) and Japan (e.g., Murdock, 1934, p. 183-184) to the North American plains (e.g., Brightman, 1993, p. 187-192, 368) and Sub-Saharan Africa (e.g., Schapera, 1930, p. 184-185), a widespread notion is held that people live in a reciprocal relationship with features of their environment, including local plants, animals, and spirits (see also Baimel, present volume; Bird-David, 1999; Rossano, 2007). One implication of this belief system is that hunters can only take prey that “presents itself” to the hunters, that hunters must pay ritualized respects to killed animals and their guardian spirits, and that bad luck or illness will ensue if people do not perform these ritual acts and if they hunt or forage excessively (Purzycki, 2011, 2013, 2016) or are generally wasteful and disrespectful toward nature (Eder, 1997, 1999). Managing natural resources is a game-theoretic social dilemma, where appeals to watchful and punitive superhuman forces alter the perceived pay-offs of unconstrained exploitation (see Lightner and Purzycki, present volume), and resource management is an object of supernatural monitoring and sanctioning in many smaller-scale societies (Hartberg et al., 2016). Similarly, supernaturally enforced ritual traditions and ceremonies sometimes appear aligned with conservation and fair distribution of resources, such as ritualized burning of land among Australian Aborigines (Bird et al., 2013) and North American Indians (Connors, 2000), water temples in Bali (Lansing et al., 2017), and ritual markings of the beginning and end of seasonal harvesting and foraging taboos (see Rogers, 2020, for a formal treatment of the dilemma involved in harvesting too early), for instance among traditional peoples of Tanna, Vanuatu (Bonnemaison, 1991; Flexner et al., 2018; Kouha, 2015), North America (Connors, 2000; Murdock, 1934, p. 293), and Siberia (Jordan, 2003, ch. 8).

Spirits are conceived as “social actors” who care about the going-ons in the local community and desire people to adhere to local social norms and taboos (Bird-David, 1999; McNamara et al., 2021; Rossano, 2007; Shaver et al., 2017). For instance, among the Batek of Malaysia, a nomadic hunter-gatherer society with few formal hierarchical institutions, many moral transgressions are perceived as sanctioned by supernatural forces (Endicott and Endicott, 2014). Likewise, to the Birhor of mainland India, an egalitarian people with limited formal leadership, violations of communal sharing norms evoke supernatural punishment, and the afterlife rewards ethical living (Adhikary, 1999). In recent cross-cultural studies using both free-listing (Bendixen et al., n.d.b) and item response scales (Purzycki et al., 2022), all investigated deities were attributed moral concern to some noticeable degree.

Above and beyond moral behaviors, supernaturally enforced taboos also often pertain to other critical aspects of survival and reproduction prescribing that people forego short-term caloric and reproductive opportunities (e.g., food and sexual taboos; see Boehm, 2008; Brown, 1952; Meyer-Rochow, 2009) which may support long-term and community-wide interests. For instance, violations of incest taboos are supernaturally punished among the Jahai of Malaysia as are failures to share with the needy (van der Sluys, 1999). Menstrual taboos among the Dogon of Mali (Strassmann, 1992) and religious veiling (Pazhoohi et al., 2017) have been suggested to increase paternity certainty and therefore paternal investment. Among some North American Indians, spirits are angered by food storage, perhaps because individual food hoarding obstruct the maintenance of collective sharing norms (Brightman, 1993, p. 367-368). Among the Mentawai on Siberut Island, Indonesia, a local spirit punishes people for not sharing food, particularly meat; however, the spirit can be appeased by hosting ceremonies that involve costly food sharing, along with publicly apologizing for not having shared and committing to do so in the future² (Singh et al., 2021). Further, adhering to costly sacred taboos might signal in-group commitment, loyalty, and trustworthiness (Atran and Henrich, 2010; Meyer-Rochow, 2009).

This applies too, even when deities are mostly concerned with apparently arbitrary social and behavioral conventions with little to no cost to anyone. For instance, the concerns of Fijian ancestor spirits include rules of etiquette such as “call before you enter a house” and “do not wear a hat in the village” (Shaver et al., 2017). Despite their seemingly mundane nature, observing local rules of etiquette becomes a potential god-problem if observing local etiquette helps coordinate a community’s behavioral patterns in decisive ways, for instance by enabling “reliable social prediction” among community members (Shaver et al., 2017, p. 14) or by symbolically signaling group-membership, respect for tradition, and the social order (McNamara and Purzycki, 2020; Purzycki and McNamara, 2016; Richerson and Henrich, 2012).

Appeals to spiritual concern and sanctions also sometimes involve ritual performance and displays of good will on locations of strategic importance, such as territorial borders or patches of

²A host of norms prescribe when sharing should take place, often following communal projects such as house- or canoe-building, rituals or collaborative hunts. However, the Mentawai are also supposed to share in case of personal windfall, such as after successful solo hunts. As Singh et al. (2021) note, private windfalls are particularly vulnerable to exploitation, as people can hide or lie about their own gains while accepting a share of their neighbors’ spoils. In contrast, sharing meat following communal projects is easier to monitor by tracking each others’ reputation and record of reciprocity. This case therefore takes a classical game-theoretic structure, where the collective is better off with everybody cooperating but individuals are tempted to free-ride, and supports the god-problem criteria that appeals to the supernatural should often be invoked in social dilemmas when non-supernatural alternatives are impractical (e.g., monitoring neighbors’ private windfall).

natural riches (e.g., Bonnemaïson, 1984, p. 126; Murdock, 1934, p. 545, Purzycki and Arakchaa, 2013) potentially reducing instances of property raiding and resource exploitation, or in economic transactions, as was the case for certain gods of antiquity (Silver, 1995, p. 5), perhaps contributing to honest exchange of goods and services (see Norenzayan et al., 2016). Similarly, ethnographic reports suggest that supernaturally enforced truces prevent escalation of disputes into cycles of violence (Rappaport, 1968; Tibenderana, 1980; Tuzin, 2001, p. 98-100, 141).

Moreover, in many societies lacking formal courts of law, including Medieval Europe (Leeson, 2012) and contemporary rural Liberia (Leeson and Coyne, 2012), adjudication is practiced through supernaturally enforced trials by ordeals, whereby usually the accused is given a choice of admitting to the crime or going through the trial (e.g., drinking poison, touching hot iron). Assuming widespread belief in the effectiveness of trials at correctly identifying a perpetrator and leaving an innocent suspect unhurt, whether the accused chooses to undergo the trial or not is valuable information: If the accused is truly innocent, they are more willing to undergo the trial in the belief that the spirits will exonerate them by not letting them get hurt during the trial—and vice versa (Leeson and Suarez, 2015).

In all of these cases—from resource preservation, general moral violations, paternity certainty, food sharing, and group loyalty to territoriality, economic exchange, truce-making, and adjudication—appeals to supernatural intervention revolve around costly and salient social dilemmas and hence sensibly constitute god-problems.

However, according to the god-problem criteria, when secular systems are in place to monitor and sanction violations of particular local laws and norms, notions of watchful and punitive deities that care for said laws and norms are less likely to evolve (see also Mauritsen and van Mulukom, present volume). There is ethnographic evidence for such a dissociative pattern. In a free-list study across eight diverse field sites, little overlap was found between what people say the local police is concerned with and what they say pleases and angers locally relevant spirits and deities Bendixen et al. (n.d.b), a finding that is corroborated by site-specific ethnographic observations. For instance, among the Mentawai, there is no overlap between transgressions that are supernaturally sanctioned (primarily failure to share meat and other foods) and laws that are enforced with fines and compensation, such as engaging in sorcery and violence (Singh et al., 2021; Singh and Garfield, 2021), suggesting a clear division of jurisdiction between the respective domains of the supernatural and secular law (Singh, pers. comm.). Similarly, among the Batak, sanctioning certain offenses (e.g., disrespect and over-exploitation of nature) is also exclusively the domain of the spirits (Eder, 1997, p. 11).

Consider, too, the Ammatoans of Sulawesi, Indonesia. Like many traditional societies, the Ammatoans view their relationship with their environment as reciprocal and the spirits as social actors (Maarif, 2015). But while the Ammatoans observe traditional rules regarding the use and misuse of the forest, violations of these rules appear not to be sanctioned by spiritual forces (Maarif, pers. comm.). Instead, a semi-secular system is in place, with community members and particularly the community leader acting as judge, jury, and executioner (Maarif, 2015). Likewise, the Chenchu of Southern India have democratic institutions and secular law enforcement (e.g., major crimes are reported to the police) and simultaneously lack fear in supernatural punishment (Turin, 1999).

Similarly for the Semang of the Malay Peninsula, where although local norms, customs, and laws are thought of as divine (Murdock, 1934, p. 94), the supreme deity does not punish crimes such as theft, adultery, or murder, but instead “such things as familiarity with one’s mother in-law, killing a sacred black wasp or certain tabooed birds, mocking a tame or helpless animal [...], and throwing a

spear in the morning quite permissible in the afternoon!” (Murdock, 1934, p. 103-104). Instead, in cases of crime, “the community as a whole exacts punishment”, which for serious offenses amount to compensatory fines or death (Murdock, 1934, p. 94). Among the !Kung Bushmen, Marshall (1962) reports that “[m]an’s wrong-doing against man is not left to [the supreme deity’s] punishment nor is it considered to be his concern. Man corrects or avenges such wrong-doings himself in his social context. [The supreme deity] punishes people for his own reasons, which are sometimes quite obscure³” (p. 245), hinting at a dissociation between supernatural punishment and secular law.

Another telling case concerns the traditional Samoans, who punish crimes secularly according to their severity. If the crime is minor, such as petty theft, the involved parties are expected to sort it out between themselves, and if the crime is major, such as murder, insults, or various offenses against the village or the chief, the community collectively intervenes to enforce a penalty. However, one class of offenses, namely theft of plantation crops, is not included in this secular system. Therefore, plantation owners, in order to detect and deter transgressors, resort to a set of supernatural appeals including taboos, curses, oaths, and ordeals⁴, which “impels the [transgressor] to make restitution, especially if he begins to feel ill” (Murdock, 1934, p. 62). Further, plantation crop theft is the “commonest crime” (Murdock, 1934, p. 61) making it a particularly salient offense.

These latter cases, then, highlight how supernatural attention is not attributed to every consequential aspect of local community life, but only to the subset of dilemmas that are particularly salient and frequent, where relevant secular systems are unavailable or less effective at restraining individualism, and where the pay-off structures are somewhat opaque⁵.

5. Future directions

In this chapter, we reviewed current accounts of cross-cultural variation in beliefs about gods’ minds and introduced a cultural evolutionary account that includes a set of criteria for predicting the content of so-called “god-problems”—the set of concerns and interests that a given deity might be associated with in varying socioecological contexts. We evaluated—and found considerable support for—these criteria against a range of ethnographic cases. We close by pointing out avenues for future scientific inquiry into beliefs about and appeals to the minds of gods.

A set of testable predictions flows from the discussions of the present chapter. Overall, we predict that appeals to supernatural intervention (e.g., explaining instances of misfortune or illness with reference to spiritual punishment) revolve around locally salient and costly social dilemmas,

³Even such “obscure” concerns might still reflect central and salient features of the local socioecology. Marshall (1962) goes on to discuss how the supreme deity of the !Kung Bushmen is particularly angered by burning and disturbing honeybees. Honey is a central food source for many foraging societies, the !Kung included, and this might be why disrespect for honeybees becomes an object for supernatural attention. Among the Batak, abuse of bees and wasting honey, accidentally or not, is also supernaturally punished, which Eder (1997) argues is a resource management strategy.

⁴For discussion and formal treatment of similar cases of “rational” superstition, see: Leeson (2017); Leeson and Suarez (2015). For a more general treatment of “adaptive misbeliefs”, see McKay and Dennett (2009).

⁵Further ethnographic examples on how secular and supernatural sanctions might compete and interact can be found in Murdock, 1934, p. 175-176; 184-186; 210-211; 215; 285-287; 278-281; 336-337; 345-348; 377; 388-389; 431-433; 437; 439-442; 492; 499-500; 502; 533-534; 540-541; 545-546; 574-575; 584-587; 588. The general pattern seems to be consistent with the predictive criteria (i.e., that supernatural punishment arises when a violation is particularly salient and/or frequent and/or where relevant secular systems are unavailable), although the material awaits a systematic treatment.

that are either less feasible, less effective, or less convincing to (attempt to) solve by appeals to non-supernatural alternatives. On the other hand, when the consequences of widespread defection of some social problem are clear and obvious and if secular institutions are available to punish or deter norm deviation, such problems should be less likely to attract supernatural attention. Further, we should expect to see that religious traditions incorporate new local challenges to social life (Purzycki et al., 2020), and that when under threat by rival religious traditions or secular alternatives, gods and spirits demand continued mental and behavioral attention (Bendixen et al., n.d.b). This is so because gods that *do not* care about the most pressing local social challenges, and *do not* stress displays of devotion are likely outcompeted by more salient and persistent cultural strains.

Further, while we have argued that our tour of ethnographic reports on deities and their perceived concerns in smaller-scale societies lend support to the god-problem criteria, outside of the case studies reviewed herein, direct evidence that beliefs about and appeals to deities actually *solve* their corresponding social dilemmas is limited. This empirical lacuna calls for careful and rigorous future studies that specifically model and assess the psychological, social, behavioral, material, and ecological consequences—if any—of beliefs, appeals, and rituals devoted to the minds of gods⁶. Another outstanding area of future research pertains to how supernatural beliefs and appeals “compete”—cognitively, culturally, and evolutionarily—with beliefs and appeals to secular norm enforcement. For instance, while the god-problem criteria and our ethnographic tour suggest so, is it indeed generally the case that supernatural punishment is dissociated from non-supernatural alternatives?

More specifically, the cognitive and social processes involved in the cultural evolution of gods’ minds are mostly *terra incognita*, but we predict that various cultural evolutionary forces compete and interact (cf., Bendixen and Purzycki, 2020, 2021; Bendixen et al., n.d.a), including but not limited to: a) content-based biases (e.g., deities that care about morally and socially salient issues, can monitor and intervene in human affairs, and offer teleological explanations of threats and (mis)fortune are “cognitively attractive” and therefore more culturally retainable and transmittable), b) context-based biases (e.g., people learn about and commit to gods and their postulated concerns from parents, peers, role models, and specialists via verbal, symbolic, and behavioral displays of commitment), c) pay-off biases (e.g., people and groups of people are generally sensitive to local problems and their costs and benefits), d) manipulative signaling (e.g., people will appeal to the supernatural in order to align other people toward some individualistic or social goal and, because of their superhuman powers, spirits and gods are both difficult to disprove and potentially very costly to ignore making them less susceptible to skepticism), e) cultural-group selection (e.g., all else being equal, beliefs about and appeals to supernatural intervention in locally pressing social dilemmas contribute to cooperation and thereby the longevity of the cultural system, even if adherents are partly or wholly unaware of the causal mechanisms sustaining the system), as well as f) stochastic and historical contingencies. We imagine a combination of such forces are at work in the proliferation of religious appeals.

⁶For a discussion of the balance between claims and evidence when assessing the evolutionary rationales of cultural practices among smaller-scale societies, see Smith and Wishnie (2000).

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