

# Prosocial religions as folk-technologies of mutual policing

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## Abstract

What explains the ubiquity and cultural success of prosocial religions? Leading accounts argue that prosocial religions evolved because they help societies grow and promote group cooperation. Yet recent evidence suggests that prosocial religious beliefs are not limited to large societies and might not have strong effects on cooperation. Here, we propose that prosocial religions, including beliefs in moralizing gods, develop because individuals shape supernatural beliefs to achieve their goals in within-group, strategic interactions. People have a fitness interest in controlling others' cooperation—either to extort benefits from others or to gain reputational benefits for protecting the public good. Moreover, they intuitively infer that other people could be deterred from cheating if they feared supernatural punishment. Thus, people endorse supernatural punishment beliefs to manipulate others into cooperating. Prosocial religions emerge from a dynamic of mutual monitoring, in which each individual, lacking confidence in the cooperativeness of conspecifics, attempts to incentivize their cooperation by endorsing beliefs in supernatural punishment. We show how variants of this incentive structure explain the variety of cultural attractors towards which supernatural punishment converges—including extractive religions that extort benefits from exploited individuals, prosocial religions geared toward mutual benefit, and moralized forms of prosocial religion where belief in moralizing gods is itself a moral duty. We review cross-disciplinary evidence for nine predictions of this account and use it to explain the decline of prosocial religions in modern societies. Prosocial religious beliefs seem endorsed as long as people believe them necessary to ensure other people's cooperation, regardless of their objective effectiveness in doing so.

**Keywords:** religion; supernatural punishment; moralizing gods; policing, social control; evolutionary psychology; cultural evolution.

# 1. Introduction

Across societies, spirits, gods, and karmic forces are believed to punish immoral behaviors, such as theft, murder, adultery, and stinginess. They punish wrongdoers with disease, premature death, or eternal damnation in hell, and reward moral behavior in this life or the next. These beliefs in supernatural punishment form the cornerstone of what is often called “prosocial” (Norenzayan et al., 2016) or “moralizing” religions (Whitehouse et al., 2022), that is, religions centered around gods that deliver rewards and punishments according to how morally people behave towards other humans. Such beliefs characterize the widespread world religions, including Abrahamic cults (Bernstein & Katz, 2010) and karmic religions such as Buddhism and Hinduism (Purzycki & Holland, 2019; White, Norenzayan, et al., 2019), as well as Chinese and Japanese folk religions (Bellah, 2008; Bernstein & Katz, 2010; Clark & Winslett, 2011).

Prosocial religious beliefs recur across human groups. They long appeared confined to large-scale and socially complex societies (Baumard et al., 2015; Johnson, 2005; Norenzayan et al., 2016; Peoples et al., 2016; Roes & Raymond, 2003), but recent findings suggest otherwise. The idea that moralistic supernatural punishment is more frequent in large-scale societies was based on datasets biased toward under-detecting moralizing gods in smaller societies (Bendixen, Lightner, & Purzycki, 2023; Lightner et al., 2022a; Purzycki et al., 2023). More recent findings, including quantitative ethnographies (Purzycki, 2016; Singh et al., 2021; Townsend et al., 2020), surveys of the ethnographic record (Boehm, 2008; Watts et al., 2015), and psychological experiments conducted across 15 field sites (Bendixen, Apicella, et al., 2023; Purzycki, Willard, et al., 2022), show that beliefs in moralizing gods recur in small-scale societies, as well. Among Mentawai horticulturalists in Indonesia, for example, people believe that a crocodile spirit, *Sikameinan*, attacks people who fail to share meat within their clan (Singh et al., 2021). Among Ik hunter-gatherers of Uganda, similarly, a majority of participants answered that Earth spirits cause trouble to people who do not share with others (Townsend et al., 2020). Across fifteen field sites, from the Tyva Republic to the Hadza of Tanzania, respondents were more likely than not to answer that supernatural agents are concerned with sanctioning antisocial behaviors such as theft, murder, and deceit ( $N = 2,229$ ; Purzycki et al., 2022). Although these “small gods” often have weaker powers, more limited knowledge, and a narrower moral jurisdiction than the “big gods” of world religions (Boehm, 2008; Singh et al., 2021), they suggest that human societies everywhere tend to develop prosocial religious beliefs.

Why, then, are prosocial religions so culturally successful? Answers abound in cognitive-evolutionary research.

According to one family of theories—the “by-product” approach—beliefs in moralizing gods culturally evolve because they are cognitively attractive (Baumard & Boyer, 2013b, 2013a; Boyer, 2001). People, the argument goes, are predisposed to interpret misfortune as a retribution for past immoral behavior and good fortune as a reward for moral behavior (Banerjee & Bloom, 2017; Baumard & Chevallier, 2012; Callan et al., 2014). These intuitions about immanent justice may emerge as by-products of evolved fairness intuitions, favored by natural selection for rewarding cooperators more than cheaters in everyday cooperative interactions (André et al., 2022; Baumard et al., 2013; Starmans et al., 2017). As a by-product of this proper function, however, our fairness psychology would make attractive the idea that supernatural forces reward virtue and sanction bad people, making these beliefs particularly memorable and attention-grabbing (Baumard & Boyer, 2013a; White et al., 2021; White & Norenzayan, 2019), especially in populations where people invest heavily in extended prosociality (Baumard et al., 2015; Baumard & Chevallier, 2015; though see Baimel et al., 2022; Purzycki et al., 2018). This cognitive attractiveness would fuel a process of cultural attraction by which people convergently transform religious beliefs into more moralistic forms over the course of their cultural transmission (Baumard & Boyer, 2013a; Sperber, 1996).

As researchers have noted, however, a pure by-product approach to religion faces several problems (Norenzayan, 2015). Most strikingly, it doesn’t explain why moralizing religions exhibit markers of *functional design*. By definition, a by-product doesn’t serve any function. Yet prosocial religions do seem functional. That is, their recurrent features appear geared toward producing a specific outcome: enforcing cooperation (Johnson, 2016; Norenzayan et al., 2016; Wilson, 2010). This functional design manifests in several features.

First, moralizing gods sanction free-riding with severe punishments—from deadly illness to eternal damnation—which make wrongdoing sufficiently costly to counterbalance the benefits of behaving badly (Johnson, 2016; Norenzayan, 2013). Second, moralizing gods can spot cheaters even when humans would not (Purzycki et al., 2012), which conveniently fills the blind spots of secular social control (Johnson, 2011, 2016; Norenzayan, 2013). Third, unlike human punishment, gods’ motivation to punish is not compromised by the second-order free-rider problem—the individual temptation to let others pay the cost of punishment while not oneself contributing to curbing free-riding (Johnson, 2016; Norenzayan, 2013; Yamagishi, 1986). Fourth, rituals prescribed by moralizing gods seem well suited to cultivate prosocial motivations. They require believers to make

penance for their misdeeds (Coşgel & Miceli, 2018; Olivelle, 2011; Singh et al., 2021), to cultivate virtuous character traits (Fitouchi et al., 2022; McCullough & Carter, 2013), and to engage in collective rituals galvanizing group solidarity (Norenzayan et al., 2016). If prosocial religions are by-products, why do they seem so functional?

Another family of theories takes this apparent functionality seriously, proposing that prosocial religions are cultural adaptations for large-scale cooperation (Atran & Henrich, 2010; Henrich & Muthukrishna, 2021; Norenzayan, 2013; Norenzayan et al., 2016; Roes & Raymond, 2003). On this account, religious beliefs initially emerge as by-products of cognitive biases (e.g., mentalizing, teleological thinking; Banerjee & Bloom, 2014), with cultural group selection subsequently selecting the beliefs that provide group-level benefits (Norenzayan et al., 2016). Because they feared divine punishments and felt monitored by moralizing gods, groups with prosocial religious beliefs cooperated more. As a result, they expanded the scale of their cooperation beyond what kin-altruism and reciprocity can sustain, and outcompeted less cooperative groups in inter-group competition (Henrich & Muthukrishna, 2021; Norenzayan, 2013; Norenzayan et al., 2016). Through processes such as warfare (see also Turchin, 2016; Turchin et al., 2022), demographic expansion, and migration into successful groups, these groups and their culture proliferated, leading to the spread of moralizing religions (Norenzayan et al., 2016). Other adaptationist theories regard beliefs in supernatural punishment as genetic, individual-level adaptations for motivating individuals to cooperate and thus escape the costs of punishment by conspecifics (Johnson, 2009, 2016; Johnson & Bering, 2006; Schloss & Murray, 2011).

While theories based on cultural group selection explain the functional design of prosocial religions, they assume that beliefs in moralizing gods are objectively effective for making people more cooperative (Norenzayan, 2013; Norenzayan et al., 2016). However, evidence for this claim is currently mixed and still debated (for critical reviews, Bendixen et al., 2023; Bloom, 2012; Galen, 2012; Hoffmann, 2013; Kavanagh et al., 2020; Oviedo, 2016; Tsang et al., 2021). A range of psychological findings suggest prosocial effects of beliefs in moralizing gods (Lang et al., 2019; Pasek et al., 2023; Purzycki et al., 2016; Shariff, 2015; Shariff et al., 2016; Townsend et al., 2020; White et al., 2019; Yilmaz & Bahçekapili, 2016). But key findings, notably prosocial effects of religious primes in economic games, fail to replicate (Berniūnas et al., 2020; Billingsley et al., 2018; Gomes & McCullough, 2015; Purzycki, Henrich, et al., 2018; Willard, 2018). Along other mixed results (Purzycki & Kulundary, 2018; Stagnaro et al., 2022; Vardy & Atkinson, 2022), recent studies find small or null relationships between religious belief and cooperation when controlling for relevant variables (Galen et al., 2015; Ge et al., 2019; Major-Smith, 2023; Stagnaro et al., 2020),

and both lab experiments and large-scale surveys ( $N > 200,000$ ) even find *negative* associations between individual religiosity and propensities for large-scale cooperation (Galen et al., 2020; Jacquet et al., 2021). Most recently, pre-registered analyses of economic games with more than 1,000 participants across 15 field sites—including Yasawa (Fiji), Pesqueiro (Brazil), the Sursurunga (Papua New Guinea), and the Turkana (Northern Kenya)—conclude that “gods’ moral concerns do not play a direct, cross-culturally reliable role in motivating cooperative behavior” (Bendixen, Lightner, Apicella, et al., 2023, p. 1). While future research will shed light on this issue, the mixed evidence so far warrants doubting a key assumption of cultural adaptation models—that religious beliefs enhance cooperation sufficiently to cause differential success in intergroup competition. Accordingly, several researchers have recently called for a rethinking of the relationship between religion and cooperation in cultural evolution (Bendixen, Lightner, & Purzycki, 2023; Fitouchi & Singh, 2022; Jacquet et al., 2021; Kavanagh et al., 2020; Purzycki et al., 2022; Saroglou & Craninx, 2021). In what follows, we propose a model which, although compatible with the possibility that prosocial religions might promote cooperation, does not require this premise to explain their cultural evolution.

Both the pure by-product approach and cultural adaptation models seem to overlook that people routinely use supernatural beliefs to achieve instrumental ends, often strategic ones. Take a concrete example. Among the Selk’nam hunter-gatherers (Tierra del Fuego), the men told the women that a punitive spirit, *Shoort*, punishes wives who disobey their husband (Chapman, 1982, pp. 113–114). To make women believe that *Shoort*’s punishment is a real threat, men disguised themselves as *Shoort* during religious ceremonies and attacked “those women whose behavior has not conformed to the model of subservient wife” (Chapman, 1982, p. 113). The man disguised as *Shoort* may “frighten [a woman] by shaking her hut violently... But he may also stab her with a stick, or even beat her and tear down her dwelling” (Chapman, 1982, p. 113). This example captures two insights at the core of our model. First, beliefs in punitive gods don’t need group competition in order to emerge or stabilize: they can arise because some people have a within-group self-interest in communicating them. In this case, men have a fitness-interest in controlling women’s behavior. Second, religious beliefs are more than by-products: they do *serve a function*, in the sense that people use them to achieve instrumental goals. In this case, their function is to encourage women to submit to men’s will.

*Shoort* isn’t a prosocial god. He doesn’t punish violations of cooperative norms such as theft, murder, or stinginess, but rather controls women’s behavior for the exclusive benefit of men. But similar mechanisms, we will argue, can also explain prosocial forms of punitive gods. People have

fitness-interests in incentivizing others to cooperate—either because this benefits them directly, or because they gain reputational benefits from doing so. Moreover, people believe, based on folk-psychological inferences, that other people would be less likely to cheat if they felt watched over by punitive gods (sect. 2.1). As a result, we argue, people endorse and communicate beliefs in moralizing gods to manipulate others into cooperating (sect. 2.2 and 2.3.). Prosocial religions emerge as the macro-level cultural products of these micro-level strategic interactions, iterated over cultural evolution. As people cumulatively refine religious culture to control each other’s behavior, they shape religious technologies that become intuitively better at promoting cooperation (sect. 2.5). Prosocial religions end up with functional design-features despite unclear evidence that they actually promote cooperation. What matters is that people perceive them as useful for achieving regular goals.

In the following, we lay out the foundations of the mutual policing theory at the biological, psychological, and cultural evolutionary levels, and derive key predictions from this account (section 2). Section 3 reviews historical, psychological, ethnographic, and cross-cultural evidence for these predictions, showing the central role of policing motivations and folk-psychology in shaping religious culture. We then use the mutual policing model to explain the decline of prosocial religions in modern societies (section 4) and conclude by considering implications for cultural evolution more generally (section 5).

## **2. The mutual policing theory**

Prosocial religions, we argue, culturally evolve as people design and selectively retain supernatural beliefs they perceive—based on their intuitive psychology—as likely to manipulate others into cooperating. This model assumes that people intuitively believe that, if other people believe in the supernatural punishment of antisocial behaviors, they will be more likely to cooperate (sect. 3.1.); that people, as a result, try to implant these beliefs in others’ mind to deter them from cheating (sect. 3.2.); and that recipients are motivated to endorse those beliefs to avoid reputational costs (sect. 3.3.). Because people can police both for their own self-interest or for mutual benefit, policing incentives generate both extractive beliefs that serve selfish interests and prosocial beliefs that serve the common good (sect. 3.4).

### **2.1. People believe that believing in punitive gods makes people more cooperative**

While much of previous research has been guided by the idea that religion promotes cooperation, we propose to turn the reasoning on its head. While scholars still debate whether beliefs in punitive gods *objectively* facilitate cooperation (sect. 2), a less contested finding is that *people believe* that these beliefs motivate cooperation. Across 34 countries of 6 continents, survey data show that a median of 45% of people consider believing in god as “necessary to be moral and have good values” (Tamir et al., 2020). Experimental evidence demonstrates that, across 13 societies with Hindu, Buddhist, Christian, Muslim, and non-religious majorities, people intuitively perceive religious believers as less likely than atheists to commit immoral acts—such as serial murder or animal torture—and perceive religious believers as more trustworthy (Gervais et al., 2017; Gervais, 2013, 2014; Gervais et al., 2011; Tan & Vogel, 2008).

This converges with historical and ethnographic evidence for this folk-psychological belief. Among the Mentawai horticulturalists of Indonesia, respondents spontaneously suggested that fear of the local punitive spirit deters people from wrongdoing (Singh et al., 2021, p. 66). A Kazakh proverb similarly taught: “Fear him who does not fear God, but do not fear him who fears God” (Grodekov, 2010, p. 239). Long before the Roman Empire adopted Christianity, Cicero (1<sup>st</sup> c. BCE) saw a social utility in prosocial religious beliefs: “Who will deny that such beliefs are useful when he remembers...how many persons are deterred from crime by fear of divine punishment” (Liebeschuetz, 1989, p. 49).

These beliefs—about the prosocial effects of belief in moralizing gods—are likely grounded in intuitive folk-psychological inferences. From early in development, the human theory of mind intuitively represents other people as utility maximizers who seek to maximize their expected benefit and minimize the costs they suffer, given their beliefs about the payoff structure of their environment (Jara-Ettinger, 2019; Jara-Ettinger et al., 2016, 2017; Liu et al., 2017; Sher et al., 2014). We should thus expect that humans will intuit that, if other people believe that free-riding is punished by supernatural forces, those people will be less likely to free-ride, as they will desire to escape the cost of supernatural punishment. Accordingly, the perceived effect of religion on a target’s trustworthiness has been found to be mediated by participants’ belief that “people behave better when they feel that God is monitoring their behavior” (Gervais et al., 2011).

## **2.2. People communicate beliefs in moralizing gods to control conspecifics’ behaviors**

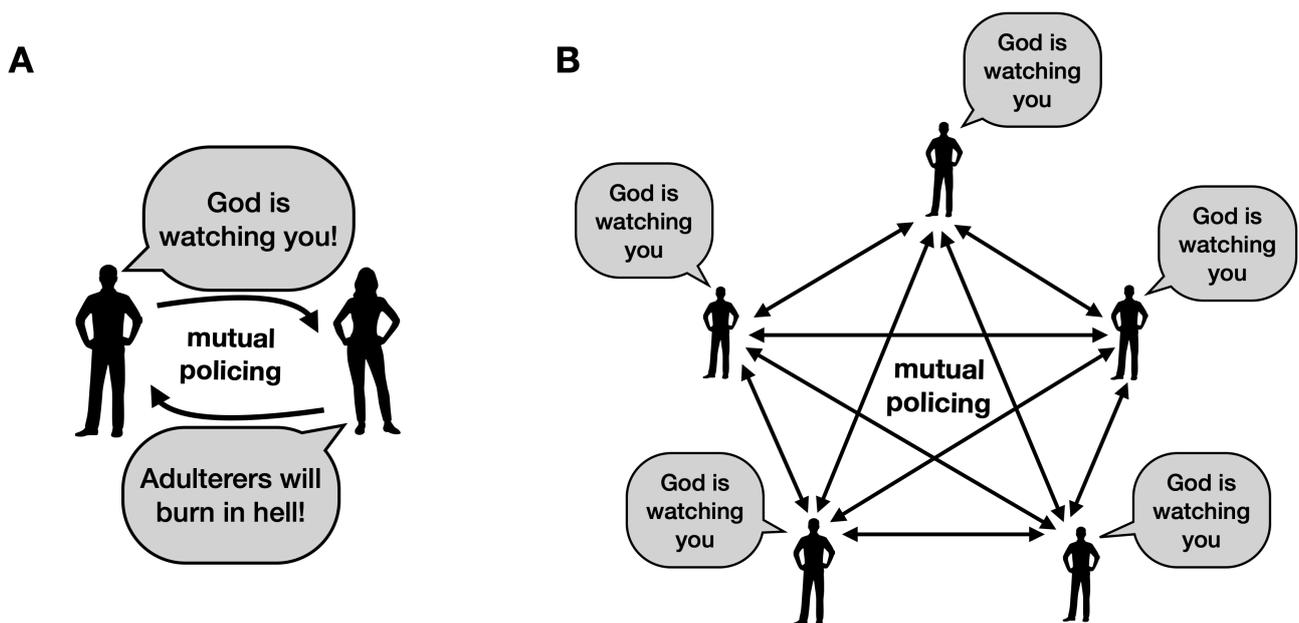
Because they benefit from others' cooperation, humans benefit from incentivizing others to cooperate by investing in the monitoring, punishment, and deterrence of selfish behaviors. Policing behaviors are adaptive when the inclusive fitness benefits the policer gets from their partners' increased cooperation outweighs the costs of the policing that generates this increase in cooperation (El Mouden et al., 2010; Frank, 1995, 1996, 2003; Singh & Boomsma, 2015). Given these fitness benefits, policing behaviors evolve in many social species, including social bacteria (Manhes & Velicer, 2011), eusocial insects (Ratnieks & Wenseleers, 2005; Sun et al., 2020), mongooses (Cant et al., 2014), macaques (Beisner & McCowan, 2013; Flack et al., 2005; Flack et al., 2006), and vervet monkeys (Arseneau-Robar et al., 2016, 2018). A well-studied example is mutual policing among worker honeybees, which prevent each other from reproducing at the expense of the colony by destroying worker-laid eggs or aggressing reproducing workers (Ratnieks, 1988; Ratnieks & Visscher, 1989). Social scientists have long noted that humans across cultures (Black, 1984; Boehm, 1999, 2000, 2012; Hechter, 1988) and early in development (Yang et al., 2018; Yudkin et al., 2020) also attempt to increase their conspecifics' level of cooperation. This social control takes various forms, from the ostracism (Boehm, 1999, 2012), public criticism (Boehm, 2012; Wiessner, 2005), and institutional regulation of antisocial behaviors (Leeson, 2009; Lienard, 2014; Ostrom, 1990) to coordinated corporal punishments going as far as execution (Boyd et al., 2010; Molleman et al., 2019; Wrangham, 2019).

Monitoring and punishing selfishness, however, is often highly costly to the policer, who must invest time and energy in monitoring others and can experience retaliation and reputational damages (Arai et al., 2022; Guala, 2012; Raihani & Bshary, 2019; Wiessner, 2005). By contrast, communicating beliefs in supernatural monitoring and punishment is less costly for at least two reasons. First, telling a cheater that the gods will punish them is cheaper than spending time and energy actually policing their behavior. Second, appealing to supernatural punishment allows the policer to shirk responsibility for reproofing the cheater's behavior—"it's god who punishes you, not me!". This makes retaliation by the cheater unjustifiable and allows the policer to avoid the reputational damage that punishers sometimes experience (see Arai et al., 2022; Wiessner, 2005). People, then, likely perceive communicating beliefs in supernatural punishment as a cost-effective strategy for policing, allowing them incentivize others' cooperation while avoiding the costs of real-world policing.

In fact, people routinely try to manipulate others' beliefs about the likelihood of detection and punishment to encourage them to cooperate. Studies of "parenting by lying" show that parents in various cultures regularly communicate false beliefs to their children—saying, for example, that the

police will come punish them—when other means of controlling children’s behavior prove ineffective (Brown, 2002; Heyman et al., 2009, 2013). Parents also tell their children that Santa Claus won’t bring them any present if they misbehave (Goldstein & Woolley, 2016; Heyman et al., 2013). Across cultures, people narrate stories that emphasize the dangerous consequences of behaving selfishly, and the long-term benefits of behaving cooperatively, likely in the hope of encouraging prosocial behaviors in listeners (Du Toit 1964; Dundes 1962; Smith et al. 2017; Thompson 1946; see also Wiessner 2014).

People, we argue, do exactly the same with supernatural beliefs. Beliefs that “God is watching you,” “selfishness brings bad karma,” and “adulterers will burn in hell” stabilize in human populations because people perceive them (not necessarily consciously) as likely to inspire cooperation in others by increasing the perceived cost of free-riding. They emerge from a dynamic of mutual policing, in which each individual, lacking confidence in the spontaneous cooperation of conspecifics, attempts to incentivize their cooperation by endorsing beliefs in supernatural punishment (**Figure 1**).



**Figure 1.** Policing interests stabilize beliefs in supernatural punishment in a population. **(A)** Mutual policing through supernatural punishment in dyadic cooperation. **(B)** Mutual policing through supernatural punishment in n-person collective action.

A key point here is that people do not passively acquire religious beliefs from others, but rather actively use and shape religious traditions to advance their fitness-interests (Boyer, 2022; Fitouchi & Singh, 2022; Micheletti et al., 2022; Moon et al., 2019; Moon, 2021; Moon et al., 2022). Take how people used supernatural explanations of misfortune strategically in a village of Central Serbia

(Jerotijević, 2015). Jerotijević (2015) reports that when informants explained their own misfortunes, such as their illness or money problems, they attributed them to attacks by witchcraft, implying that “they did not deserve all the bad things that happened to them” (Jerotijević, 2015, p. 270). In contrast, “when something bad happened to someone else...people believed that the person was being punished by God...Their aim is to ‘warn’ wrongdoers and cheats that ‘this is what happens to sinners’” (Jerotijević, 2015, p. 270). People’s beliefs, in other words, were responsive to the incentive structure they faced.

### **2.3. Why should recipients accept the beliefs?**

Humans have evolved cognitive mechanisms of epistemic vigilance, by which they assess the reliability of communicated beliefs to protect against manipulation (Mercier, 2017, 2020; Sperber et al., 2010). They are less likely, for example, to adopt beliefs transmitted by people who have a self-interest in deceiving them (Mills & Keil, 2005; Reyes-Jaquez & Echols, 2015; Street & Richardson, 2015). If people communicate prosocial religious beliefs to manipulate others into cooperating, why should recipients accept those beliefs, rather than rejecting them to avoid being manipulated, which could stop their cultural transmission?

#### ***2.3.1. Recipients need not accept the beliefs for them to seem widespread***

One possibility is that recipients don’t accept the beliefs. In many cases, beliefs in supernatural punishment might seem widespread in a population despite nobody actually believing them. The appearance of belief can result from policers endorsing the beliefs to manipulate recipients and from recipients pretending to accept the beliefs to avoid being harmed by policers. Take again the Selk’nam foragers, mentioned in the introduction. Men told women that a punitive spirit, *Shoort*, “will punish them if they were negligent wives or mothers” (Tierra del Fuego: Chapman, 1982, p. 114). Men invested time and energy trying to convince women of the reality of this punishment. During religious ceremonies, they disguised themselves as *Shoort* to “make his presence felt and to select for punishment those women whose behavior has not conformed to the model of subservient wife” (Chapman, 1982, p. 113). To make the belief even more credible, they pretended that men, too, were punished by *Shoort*. They faked being attacked by making scary noises and screams from the site of the ceremony from which the women were kept away (Darmangeat, 2009, p. 132). Despite all these efforts, according to anthropologist Anna Chapman, women were not naive and “knew the secret”—they simply didn’t reveal “their knowledge of the secret to the men...for fear of arousing aggression” (Chapman, 1982, p. 153; see also Bridges, 1948).

### ***2.3.2. Beliefs in supernatural punishment provide hard-to-falsify explanations of misfortune***

In many cases, however, recipients might accept beliefs in supernatural punishment. We argue that this is due to policers iteratively shaping, over cultural evolution, beliefs that they perceive as more likely to bypass recipients' epistemic vigilance. Such winnowing explains several design-features of supernatural punishment.

First, policers exploit uncertainties about the causes of misfortunes. Across cultures, people are more likely to accept supernatural beliefs when trying to explain events that are fitness-consequential (e.g., deadly illness) yet difficult to explain by natural causation (Barrett & Lanman, 2008; Hong, 2023; Singh, 2021). This includes explaining why someone suddenly became ill or why a fatal accident happened to this particular person at this particular time (Boyer, 2019; Evans-Pritchard, 1937; Legare et al., 2012; see also Jackson et al., 2023). When such misfortunes happen, people consider many cognitively plausible explanations, several of which do not involve supernatural punishment (Singh et al., 2021). If Maria is seriously ill, the reason may be that she has been attacked by sorcery (Singh, 2021), or that she has violated a non-moral taboo (Hong, 2023), or that she has failed to perform the appropriate sacrifices to some capricious ancestor spirit (see Boyer, 2022). Another possible explanation, however, is that Maria's illness is a supernatural retribution for her previous failures to cooperate—an explanation which, as by-product theories put forward, accords with immanent justice intuitions (see sect. 1; Banerjee & Bloom, 2017; Baumard & Boyer, 2013; Baumard & Chevallier, 2012; Callan et al., 2014).

In this context, we argue, policers exploit uncertainties about the causes of misfortunes, as well as immanent justice intuitions, to push the moralistic explanation (supernatural punishment) over the non-moralistic ones (e.g., violation of a non-moral taboo). Among the Yaghan foragers, for example, “upon the death of an own child or a near relative, the neighbors point to the mourner with the expression: ‘Watauinéwa is punishing him!’” (Tierra del Fuego: Gusinde & Schütze, 1937, p. 961). Similarly, after the great fire of London, “preachers of every denomination exhorted Londoners to repent for the many varieties of iniquity that had provoked God into torching the city” (McCullough, 2020, p. 198; see Tinniswood, 2004). And among the Ojibwa, “any serious illness is associated with some prior conduct which involved an infraction of moral rules... ‘Because a person does bad things, that is where sickness...starts’, is the way one informant phrased it.” (North America: Hallowell, 1961, p. 410).

A second way to bypass epistemic vigilance is to make the belief unfalsifiable. As Schneider put it, a supernatural sanction which “specifies that the criminal's left arm will fall off at noon on the third

day following the crime cannot be maintained for long” (Schneider, 1957, pp. 798–799). That’s because if noon passes and nothing happens—which is most likely—the recipient will downgrade their evaluation of the plausibility of supernatural punishment in light of the countervailing evidence (for a formal analysis, see Leeson, 2014). By contrast, “a supernatural sanction which specifies that someone will die can be maintained because the probability that someone will die is equivalent to certainty” (Schneider, 1957, pp. 798–799). When death will happen, there will be no way to know if it happened because of supernatural punishment or because it would have happened anyway (see Leeson, 2014). Another way to make supernatural punishment unfalsifiable is to make it unobservable, such as by postponing it to the afterlife (Leeson, 2014). This explains why beliefs in supernatural punishment take the form either of vague assertions about events that will happen anyway (“cheaters will die or get sick!”) or of precise assertions about unobservable events (“sinners will be thrown into a snake pit in hell!”).

Third, policers can exploit cognitive mechanisms of threat-detection in recipients. Beliefs about threats can bypass epistemic vigilance because the cost of a false positive (accepting that the threat exists when in fact it doesn’t) is greater than the cost of a false negative (rejecting that the threat exists when in fact it does; Boyer, 2018, 2021; Johnson et al., 2013). Consistent with this logic, experimental evidence shows that people intuitively ascribe a higher probability to threats than to positive predictions (Fessler et al., 2014; Hilbig, 2009, 2012), are more willing to transmit threatening beliefs and to ask for additional information about them (Blaine & Boyer, 2017), and perceive senders of those beliefs as more competent (Boyer & Parren, 2015). Accordingly, beliefs in supernatural punishment seem concocted to be threatening: they insist on the severity of the suffering that awaits sinners, be it an awful death, fatal disease, or being tormented by demons for eternity.

### ***2.3.3. Recipients endorse beliefs in supernatural punishment to avoid reputational costs***

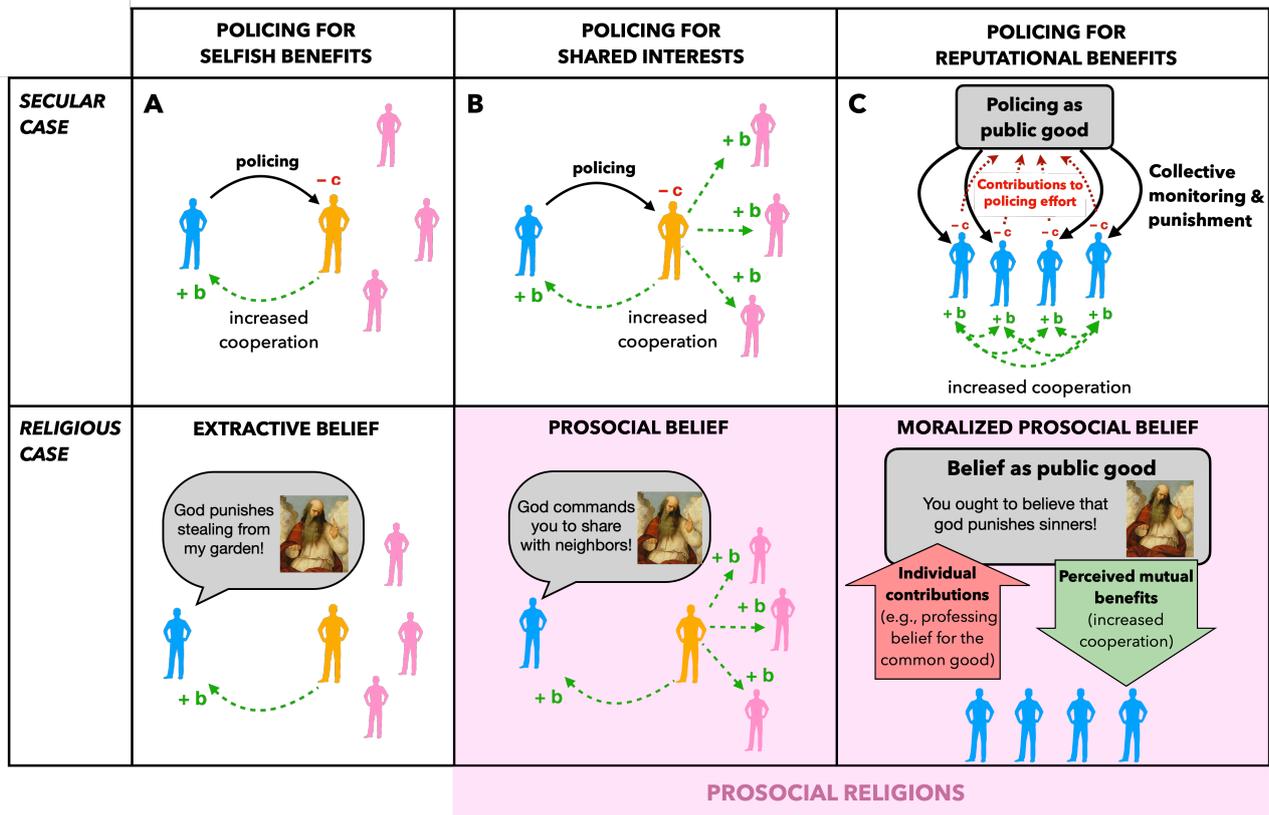
Aside from this epistemic logic, we argue that acceptance of beliefs in supernatural punishment is further facilitated by reputational incentives. These incentives emerge from the same folk-psychological belief that makes supernatural punishment useful for policing others, namely the belief that believing in supernatural punishment makes people more cooperative (sect. 2.1). Because people believe that believing in punitive gods incentivizes others to cooperate, individuals who do not believe in punitive gods are perceived as more likely to cheat (Gervais, 2013; Gervais et al., 2011; Tan & Vogel, 2008), and thus tend to be avoided as cooperative partners (Abrams et al., 2020) and provided with fewer benefits in cooperative interactions (McCullough et al., 2016). Thus, people who don’t endorse belief in punitive gods run the risk of failing to attract other people’s

cooperation. This further compels recipients to adopt beliefs in punitive gods to secure a good reputation as a cooperative partner.

At the proximate level, does this mean that people only pretend to believe in supernatural punishment to protect their reputation? That may be the case in some situations. Psychological and sociological evidence indicates that atheists often hide their lack of belief through socially desirable responding, especially in more religious environments (Gervais & Najle, 2018; Hadaway et al., 1993). However, the ultimate, reputational function of believing in supernatural punishment is also compatible with people *genuinely* believing at the proximate level. Genuinely believing in God, in fact, might be the most efficient way to convince others that you believe in God—and thus that you’re a trustworthy cooperative partner (see von Hippel & Trivers, 2011). In other words, as many have noted, ultimately social incentives can translate into sincere epistemic states at the proximate level (Funkhouser, 2017; Kurzban & Aktipis, 2007; Williams, 2021). Consistent with this idea, meta-analytic evidence indicates that people who engage more in reputation-management exhibit higher levels of *intrinsic* religiosity—a construct related to sincere religious belief and lifestyle (Sedikides & Gebauer, 2010).

## **2.4. The varieties of religious policing: from extractive to prosocial religion**

Now, we can refine the central tenet of the mutual policing model—that people endorse supernatural punishment to control others’ behavior—by looking at the precise fitness interests people have in policing others. If people use beliefs in supernatural punishment to police others, they should shape slightly different beliefs depending on their policing goals. In this section, we argue that the variety of fitness-incentives behind policing behaviors explains the variety of forms that supernatural punishment takes across contexts and cultures (**Figure 2**). Prosocial religions—in which gods encourage cooperative behavior—evolve *as a particular case* of the use of supernatural punishment for policing others. When people police to serve selfish interests, this results in *extractive* forms of supernatural punishment (sect. 2.4.1). *Prosocial* forms of supernatural punishment emerge when the policers have an immediate self-interest to incentivize behaviors that benefit the group (sect. 2.4.2), or when they gain reputational benefits for policing for the public good (sect. 2.4.3).



**Figure 2. Types of policing behaviors and their religious counterparts. (A)** Selfish policing provides exclusive benefits to the policer while imposing costs on the recipient, and having neutral or negative effects on by-standers. **(B)** Policing based on shared interests functions to benefit the policer, yet happens to benefit by-standers by incidentally increasing cooperation toward them as well. **(C)** In reputation-based policing, individuals cooperate to police cooperation. Each individual pays a cost to contribute to the policing effort to promote higher levels of mutually beneficial cooperation in the group. When based on the promotion of beliefs in supernatural punishment, each of these policing strategies generates a particular type of punitive religious belief documented in human societies—here labelled “extractive beliefs,” “prosocial beliefs,” and “moralized prosocial beliefs.”

#### 2.4.1. *Selfish policing results in extractive supernatural punishment*

A central distinction in social evolution theory is that between selfish and cooperative behaviors (Hamilton, 1964; West et al., 2007, 2011, 2021). Selfishness refers to any behavior that provides fitness benefits to the actor while inflicting costs on the recipient (+/-) (Hamilton, 1964).

Cooperation, by contrast, refers to any behavior that provides benefits to another individual than the actor (+/+ or -/+) (Hamilton, 1964; West et al., 2007, 2011). Policing is selfish when it aims at providing exclusive benefits to the policer while inflicting costs on the recipient and having neutral or negative effects on by-stander (**Figure 2A**). This is the case, for example, when a slave owner controls the behavior of his slaves to ensure that they work hard enough for him. Because people believe that supernatural punishment can influence others’ behaviors (sect. 2.1.), they should sometimes use those beliefs for selfish policing goals. This should result in beliefs designed to

exclusively benefit their promoters at the expense of other individuals. In those beliefs, gods should be said to punish behavior that harm the promoter's own self-interest, rather than to punish uncooperative behaviors that harm the group at large (**Figure 2A**).

This helps to explain why, although punitive gods often encourage cooperative behavior, they also often appear extractive in many contexts. In world religions, the very same gods that prescribe charity, kindness, and turning the other cheek also have an extractive facet. The Muslim god commands women to obey men (Dickemann, 1981; Strassmann et al., 2012); the Hindu *Law of Manu* demands that a “virtuous wife should constantly serve her husband like a god, even if he behaves badly, freely indulges his lust and is devoid of any good qualities” (Doniger, 2014, p. 259); and the doctrine of the “divine right of kings” in medieval Europe held that any opposition to the king was against God's will (Bentzen & Gokmen, 2022; see also Cronk, 1994; de Aguiar & Cronk, 2011).

In small-scale societies, too, supernatural punishment is often extractive. Among the Siriono of Bolivia, young people were warned that they will get sick if they don't “give their game and fish to the old people” (Priest, 1966, p. 1246). Among the Hadza, women and children were warned that they could suffer supernatural sanctions, such as serious illness, if they approached *epeme* meat—the most prized parts of the largest animals and the exclusive privilege of adult males (Marlowe, 2010, pp. 57–58; Woodburn, 1979, p. 254). Among the Enga of Papua New Guinea, young men from around puberty were said to be married to a “spirit woman” who forbade them from having sexual relations with human women (Wiessner & Pupu, 2021; Wiessner & Tumu, 1998). If they were to cheat on the spirit woman, she would punish them by inhibiting their growth into beautiful and intelligent men (Wiessner & Pupu, 2021). By excluding young males from the mating market, the belief seems conveniently designed to reserve women for the polygynous marriages of older men (see Wiessner & Pupu, 2021).

Note that selfish policing can occur in the absence of power asymmetries. In the secular case, when people deter neighbors from robbing them, for example by installing surveillance cameras in their homes, they are protecting themselves from being attacked without incentivizing cooperation in the group at large. The same holds in the religious case. On many Polynesian islands, families placed taboos on their own fruit trees and vegetable gardens, thereby signaling to potential thieves that supernatural forces would punish the theft of their property with illness, death, or shark attacks (Williamson, 2013, pp. 134-136; see also Bell, 1953; Hogbin & Malinowski, 1934; Wright, 2009).

Such beliefs that supernatural forces punish, not theft in general but theft from the promoter of the belief specifically, seem to originate in selfish policing.

Thus, a critical prediction of the mutual policing model is that beliefs in supernatural punishment should emerge, not only under prosocial forms that punish uncooperative behaviors, but also under extractive forms that serve selfish interests. This contrasts with theories according to which punitive gods evolve because they increase cooperation, which predict that punitive gods should mostly be concerned with group cooperation (e.g., Johnson, 2016; Norenzayan et al., 2016). In our framework, prosocial religious beliefs evolve as a *particular case* of the use of supernatural punishment for policing others, where the policer benefits from encouraging cooperation in the group at large (sect. 2.4.2 and sect. 2.4.3).

#### **2.4.2. Policing with shared interests results in prosocial supernatural punishment**

As long noted by social evolution theorists, policing often generates public good benefits for individuals other than the policer (El Mouden et al., 2010; Singh & Boomsma, 2015; Sun et al., 2020). This is the case when, by monitoring and punishing a recipient, you induce the recipient to increase her level of cooperation, not only towards you, but also toward other individuals (**Figure 2B**). In pigtailed macaques, for example, dominant individuals directly benefit from policing within-group conflicts, yet thereby also benefit other individuals as a by-product, by decreasing conflict rates (Flack, de Waal, et al., 2005; Flack et al., 2006; Flack, Krakauer, et al., 2005). In these cases, policing is *cooperative* behavior in the sense that it provides benefits to individuals other than the actor (West et al., 2007).

Among cooperative behaviors, however, one must distinguish between cooperation based on *shared interests* (or “by-product cooperation”) and cooperation based on reciprocity and reputation (West et al., 2007, 2011, 2021). Cooperation for shared interests refers to behaviors that benefit other individuals only as a by-product of being already in the actor’s direct self-interest (Leimar & Connor, 2003; Leimar & Hammerstein, 2010; West et al., 2011). Unlike reciprocal and reputation-based cooperation, this form of cooperation does not imply a free-rider problem, since the benefits that the actor receives from their cooperative behavior are not dependent on recipients or third parties providing benefits to the actor in return.

Many policing behaviors belong to this category (**Figure 2B**). The term “mutual policing” was originally coined in the animal literature to refer to such policing behaviors that generate by-product benefits for other individuals despite being in the direct self-interest of the policer (Cant et al., 2014;

Frank, 1995; Ratnieks, 1988; Sun et al., 2020). For example, in the mutual policing of worker honeybees, each worker has an inclusive fitness interest in preventing other workers from reproducing (El Mouden et al., 2010). However, when a given worker  $W_1$  polices another worker  $W_2$ , this happens to benefit all the other workers ( $W_3, W_4, W_5, \dots, W_n$ ) because they all have the same interest: none of them wants  $W_2$  to reproduce (Ratnieks, 1988; Ratnieks & Visscher, 1989; Ratnieks & Wenseleers, 2005). All workers end up policing each other, with no incentive to free-ride on each other's policing, because each worker's contribution increases the benefit she receives from policing sufficiently to be worth the cost regardless of whether other workers are also policing.

Beliefs in gods that punish uncooperative behaviors, we argue, can emerge from a similar incentive structure where the policer's interests align with the interests of other individuals. Take the punitive spirit *Sikameinan* among the Mentawai horticulturalists, believed to attack people who fail to share meat within their clan (Singh et al., 2021). Each clan-member has an interest in incentivizing other clan-members to share meat with him or her. To this end, it is useful to communicate the belief that *Sikameinan* will punish failure to share with clan members (“Share with the clan or you'll get sick!”). By appealing to *Sikameinan*, however, each individual generates by-product benefits to other clan-members by increasing the probability that meat will be shared with them as well (**Figure 2B**). All clan-members end up policing each other by appealing to *Sikameinan*, with no incentive to free-ride on each other's policing, because appealing to *Sikameinan* is cheap enough to be worth the cost regardless of whether other individuals are also policing.

Similarly, among the Kiowa bison hunters (North America), killing or taking revenge on someone after publicly reconciling with them was said to be followed by *taido* (Richardson, 1940). *Taido* was a supernatural sanction “whereby the killer was pursued to the end of his days with bad luck in hunting, herding and warfare, resulting in poverty, sickness and death” (Richardson, 1940, pp. 36, 11, 61). Ethnographic evidence indicates that everyone among the Kiowa had a strong shared interest in preventing cycles of killing and counter-killing (Fitouchi & Singh, 2023; Hoebel, 2009; Richardson, 1940). Indeed, these destructive cycles of revenge could end up harming everyone in the group, not just the disputants themselves (Richardson, 1940). Thus, we suggest that everyone had a shared interest in trying to deter intratribal killing and revenge by endorsing the belief in *taido*, in particular given the low cost of communicating the belief.

In other words, beliefs in prosocial supernatural punishment—gods that by punish uncooperative behaviors such as murder or stinginess—can arise from self-interested motivations to police when the policers' interests coincide with the common interest.

### ***2.4.3. Reputation-based policing results in moralized supernatural punishment***

Humans also engage in forms of policing that are cooperative in a stronger sense. Given their capacity for reciprocal and reputation-based cooperation (Clutton-Brock, 2009), they engage in collective actions aimed at promoting cooperation in their group, even when the individual cost of participating in policing is greater than the marginal benefit each individual receives from his participation (Lie-Panis et al., 2023; Yamagishi, 1986). Ostrom (1990), for example, famously reviewed how many small-scale communities have collectively organized to control free-riding by, for example, hiring specialized monitors to watch over common pool resources (see also Greif, 1993; Greif et al., 1994). As they require costly contributions, these cooperative interactions imply a second-order free-rider problem: individuals have an incentive to benefit from the increased cooperation that policing generates without themselves paying the cost of contributing to policing (Hechter, 1988; Heckathorn, 1989; Ostrom, 1990; Yamagishi, 1986).

Cooperative policing can be stabilized by social incentives such as reciprocal rewarding and reputational dynamics, which allow individuals to overcome the second-order free-rider problem (Ostrom, 1990; Ozono et al., 2016; Pal & Hilbe, 2022). Evolutionary models, experimental evidence, and ethnographic data show that individuals are motivated to pay costs to police cooperatively when they gain reputational benefits for doing so (Barclay, 2005; Glowacki & von Rueden, 2015; Jordan et al., 2016; Lie-Panis et al., 2023; Ostrom, 1990; Pal & Hilbe, 2022). In the communities surveyed by Ostrom (1990), for instance, “The individual who finds a rule-infractor gains status and prestige for being a good protector of the commons” (Ostrom, 1990, p. 96). Another mechanism to incentivize cooperative policing is to reward policers conditionally on whether they police for the public interest (see also Ozono et al., 2016; Sasaki et al., 2015; Wang et al., 2018). In Ostrom’s case studies, for instance, monitors were rewarded by payments if they did their job well, and fired by the community if discovered slacking off (Ostrom, 1990, pp. 88, 96).

Importantly, when policing is the object of such a collective action, contributing to policing becomes a moral obligation at the psychological level (on moral obligation, see André et al., 2022; Tomasello, 2020). Taking the benefits of others’ costly investments in policing, while not yourself paying the cost of policing (e.g., by cheating on the taxes that pay for policemen), amounts to cheating your cooperative partners—the typical kind of behavior that people judge morally wrong (André et al., 2022; Curry et al., 2019; Graham et al., 2013). Just as people moralize free-riding in other collective actions (Cubitt et al., 2011; Delton et al., 2013; Levine et al., 2020; Mathew &

Boyd, 2014), people who free-ride on others' contributions to policing are perceived as moral violators (Mathew, 2017).

These collective actions for policing cooperation, we argue, also have a religious counterpart (**Figure 2C**). When people perceive that the erosion of beliefs in supernatural punishment could jeopardize people's motivation to cooperate, resulting in social disorder (Israel, 1995, p. 373; Jones, 1980), the maintenance of religious belief in society becomes a public good to which everyone ought to contribute. Everyone has a duty to pay costs to stabilize punitive religious beliefs in the group, to ensure that everyone will benefit from an acceptable level of cooperation and social harmony (**Figure 2C**). In this moral contract, people ought to educate their children religiously, to publicly endorse belief in divine punishments, and to abstain from behaviors that could undermine other people's belief, such as blasphemy, defamation of religion, and public renunciation of faith (see Grim, 2012; Jones, 1980; Nash, 2007). And people who cheat in the collective action for maintaining faith—apostates, blasphemers, and other preachers of sacrilegious ideas—earn a bad moral reputation for threatening the stability of cooperation in the group. In medieval and early modern Europe, for example, blasphemy was condemned as a threat to the “public-order” and the “moral and material safety of the nation,” because it could “alienate the mind of others from the love and reverence of God” (Nash, 2007, pp. 3–5; see also Jones, 1980). In the early years of the Dutch Republic (16<sup>th</sup> c.), similarly, political thinkers feared that “if parents...fail to instill veneration for the Church and ‘fear of God’ into their offspring, then morality, and with it the social order, would surely collapse” (Israel, 1995, p. 373).

This helps to explain why many prosocial religions not only feature beliefs in prosocial supernatural punishment (sect. 2.4.2.), but also make it a *moral duty* to endorse, spread, and protect these beliefs. The Christian Church, for example, requires people to publicly and regularly profess their belief in heaven and the judgement of the dead in the afterlife (e.g., by reciting the Apostles' Creed: Cross & Livingstone, 2005; Lindbeck, 2020). More generally, as of 2014, about 26% of the world's countries and territories had anti-blasphemy laws or policies, and 13% had laws or policies sanctioning apostasy—the public renunciation of faith (Theodorou, 2016; see also Grim, 2012). While these laws may be in part favored by the self-interest of rulers (see sect. 2.4.1. and 3.5.), psychological evidence shows that many ordinary people also see atheism, blasphemy, and sacrilegious ideas as morally wrong (Ritter et al., 2016; Royzman et al., 2014; Schein et al., 2016).

Finally, the notion that religious belief is an object of collective action also helps to explain why many prosocial religions institutionalize (see Vlerick, 2020). Just as people develop secular policing

institutions to promote cooperation—with guards, policemen, and justice courts—people also organize institutional arrangements for stabilizing religious belief in society—with priests, churches, and religious schools, each endowed with a special role in the dissemination of religious belief in society (**Figure 2C**). Just as communities entrust specialized monitors with the protection of common goods (Ostrom, 1990), people entrust clerical institutions with the special task of preaching prosocial commandments and punitive religious beliefs for the public interest.

#### **2.4.4. *Interim summary***

In sum, because mutual policing can be underpinned either by selfish interests, shared interests, or reputation-based cooperation, it provides a unifying explanation for why beliefs in supernatural punishment are sometimes extractive, sometimes prosocial, and sometimes moralized. Of course, this typology only aims to capture ideal-typical design-features of beliefs, not to classify existing religions (such as “Islam” or “Christianity”) into clear-cut categories. Actual religions often mix many of these features, given the variety of incentive structures from which they emerge. Medieval Christianity, for example, arguably mixes extractive beliefs (e.g., the divine right of kings), prosocial beliefs (e.g., turning the other cheek), and the moralization of belief (e.g., profession of faith).

## **2.5. The technological evolution of prosocial religions**

While religious culture is often seen as fundamentally different from technological culture (Jagiello et al., 2022), we argue that religious evolution can be understood as a special case of technological evolution. When developing technical artifacts (e.g., hammers), people design variants that they perceive, based on technical reasoning, as efficient for achieving a given goal (e.g., hammering nails) (Osiurak et al., 2021, 2022; Osiurak & Reynaud, 2020). After observing the effectiveness of different variants, people iteratively tweak existing variants to increase their efficiency, and retain those they perceive—potentially wrongly—as the most efficient (Singh, 2022).

Recent work suggests that many religious traditions are no different (Singh, 2022). Just as people design effective-seeming hammers based on technical intuitions, they also design, based on intuition and trial-and-error, supernatural practices that they perceive to be effective in achieving some goal—such as making rain fall or warding off misfortune (Hong et al., 2021; Hong & Henrich, 2021; Singh, 2021, 2022). They craft divination techniques to reveal inaccessible information (Hong & Henrich, 2021); design shamanistic interactions with spirits as effective-seeming ways to manage misfortune (Singh, 2018); and perform magical rituals to influence otherwise uncontrollable outcomes, such as illness or crop failure (Hong et al., 2022; Singh, 2021).

Our account extends this approach to prosocial religions. Just as people craft magical techniques for making rain fall (Hong et al., 2021), they selectively retain beliefs in supernatural punishment they perceive—based on their folk-psychology—to be effective in influencing others’ behaviors. As with any cultural tool, people can tweak, improve, and elaborate on existing variants to better satisfy their policing goals, driving the cultural evolution of prosocial religions. And just as in technological evolution, this process can be cumulative when iterated over generations (Mesoudi & Thornton, 2018). Individuals in one generation may inherit beliefs in supernatural punishment from the previous generation. To better achieve their policing goal, they may tweak this belief into a form that seems more effective at encouraging cooperation, such as by refining the gradation of afterlife retribution. This might involve inventing a new place in the afterlife for intermediate levels of punishment, such as the purgatory (Le Goff, 1986), to convince moderate sinners that they’re not yet condemned to hell and that it’s still worth behaving better.

This cumulative improvement in perceived efficiency helps to explain why prosocial religions end up with apparently functional design-features, intuitively well suited to promote cooperation, despite unclear evidence that they have strong prosocial effects (see sect. 1). In our model, the ultimate driver of their cultural evolution is the folk-psychological intuition that they deter selfishness (sect. 2.1.), not objective adaptive benefits they would provide by actually increasing cooperation. Of course, people’s subjective perception of efficacy may stem from prosocial religions truly being effective. But it need not be: Often, people (even professional policy-makers) are wrong when making causal inferences about human behavior and design ineffective interventions when attempting to instill behavioral change (Cameron et al., 2021; Hoffman et al., 2022; Ott & Santelli, 2007). In the same way that erroneous perceptions of usefulness stabilize many ineffective public policies (Cameron et al., 2021), prosocial religions may stabilize because people wrongly perceive them as efficient social technologies. Just as ineffective folk medicines develop the world over as people try to cure diseases (Miton et al., 2015), ineffective folk social technologies may develop everywhere as people do their best to make each other more cooperative.

### **3. Cross-disciplinary evidence**

The mutual policing theory generates at least 9 predictions for the cultural design, cross-cultural variations, inter-individual differences, and psychological mechanisms of prosocial religions and beliefs in supernatural punishment. In this section, we derive these predictions and review historical, psychological, cross-cultural, and ethnographic evidence that support them.

**Prediction 1.** People should invest more in punitive religious beliefs when they are more motivated to police each other. We thus expect that:

*Prediction 1a.* Individuals desiring higher levels of social control should be more likely to endorse punitive religious beliefs.

*Prediction 1b.* Societies with stricter social norms and greater disapproval of deviance (i.e., greater “cultural tightness”: Gelfand et al., 2017) should be more likely to exhibit punitive religious beliefs.

*Prediction 1c.* Lower trust in others should be associated with greater endorsement of punitive religious beliefs.

**Prediction 2.** People should invest more in punitive religious beliefs when they perceive them to be effective in motivating others to cooperate.

**Prediction 3.** People should invest more in punitive religious beliefs when they perceive an added value of supernatural policing over secular means of policing others’ behaviors. We thus expect that:

*Prediction 3a.* People should invest more in punitive religious beliefs when their desired level of social control is harder to achieve by secular means.

*Prediction 3b.* Punitive religious beliefs should preferentially target behaviors that are difficult to police by secular means.

**Prediction 4.** Punitive religious beliefs should preferentially target behaviors people are motivated to control in everyday life.

**Prediction 5.** Punitive religious beliefs should emerge, not only in forms that promote mutually beneficial cooperation, but also in more extractive forms that serve selfish interests.

**Prediction 6.** Aside from beliefs, the rituals promoted by prosocial religions should exhibit evidence of deliberate design for policing purpose.

### **3.1. People invest more in prosocial religions when they are more motivated to police each other**

If prosocial religions develop as cultural tools for individual policing strategies, people should invest more in prosocial religions when they are more motivated to police others’ behavior. This

prediction is unique to the mutual policing theory, as adaptationist theories predict that prosocial religion should be associated with greater *cooperation* (e.g., Johnson, 2016; Norenzayan et al., 2016), not with greater motivations to control conspecifics' behavior. Converging lines of evidence support this prediction.

First, individual-level religiosity is associated with greater motivations to control others' behaviors. Support for harsher punishment of criminal behavior (e.g., death penalty, corporal punishment) and greater motivations to punish norm violators predict endorsement of punitive religious beliefs (Bader et al., 2010; Bones & Sabriseilabi, 2018; Grasmick et al., 1993; Jackson, Caluori, Abrams, et al., 2021a). Across dozens of countries, individuals who report greater religiosity and stronger beliefs in supernatural punishment tend to also support tighter restrictions on individuals behaviors, namely by rating uncooperative and sexual behaviors as less justifiable (Atkinson & Bourrat, 2011; Jacquet et al., 2021; Weeden & Kurzban, 2013).

Second, many studies find that religiosity and belief in punitive gods are associated with lower social trust, not only across groups but also between individuals within a same cultural group, and whether trust is measured by questionnaires (Berggren & Bjørnskov, 2011; Jacquet et al., 2021; Mencken et al., 2009; Valente & Okulicz-Kozaryn, 2020; though see Dilmaghani, 2017) or by Trust Games (Galen et al., 2020; see also Purzycki et al., 2020). This makes sense if people invest in punitive religious beliefs as a means to police others' behaviors, as the less people trust that other people will spontaneously behave cooperatively, the more they support or invest in policing others' cooperation (Nettle & Saxe, 2021; Yamagishi, 1986, 1988). Supporting this interpretation, in more than 295,000 individuals in more than 100 countries, individual-level motivations to control others' (in particular sexual) behaviors mediate the relationship between low trust and religiosity (Jacquet et al., 2021).

Third, similar patterns emerge with society-level markers of social control motivations. In 86 non-industrial societies of the Standard Cross-Cultural Sample, societies with lower tolerance of deviance and more restrictive social norms (i.e., greater "cultural tightness") are more likely to exhibit beliefs in moralizing high gods (Jackson et al., 2020). Across 33 contemporary nations, tighter nations are more religious (Gelfand et al., 2011). Across more than 100 countries covering more than 90% of the world's population, low religiosity strongly correlates with "individual-choice norms" that oppose strong social control of individual lifestyles ( $r = -0.77$ ; Inglehart, 2020). Within the United States, state-level cultural tightness predicts participants' propensity to report believing in hell (Jackson et al., 2021a), and tighter Chinese provinces have more Taoist and

Buddhist temples, as well as churches and mosques (Chua et al., 2019). Moreover, historical increases in linguistic markers of cultural tightness between 1800 and 2000 have been found to predict, and to *precede*, historical increases in the punitiveness of religious beliefs, suggesting that increases in cultural tightness—indicating greater policing motivations—caused increased communication of punitive religious beliefs in the population (Jackson et al., 2021a).

Fourth, experimental evidence further suggests a causal role of policing motivations. Experimentally increasing participants' motivation to punish norm violators increases their endorsement of punitive religious beliefs (Jackson et al., 2021a; see also Stanley & Kay, 2022). Participants who experience a breach in trust—by being exploited by their partner in a Trust Game—are more likely than controls to attribute to God more punitive attitudes toward greed (Purzycki et al., 2020). Similarly, increasing people's perceptions of the prevalence of conflict and social disorder in their environment leads them to rate punitive gods as more important, this effect being mediated by support for tighter controls of individual behaviors (Caluori et al., 2020).

### **3.2. People invest more in prosocial religions when they perceive them useful for encouraging cooperation**

If beliefs in punitive gods develop as cultural tools for policing strategies, people should invest more in punitive religious beliefs, not only when they are more motivated to encourage others' cooperation, but also when they perceive punitive religious beliefs as efficient tools for doing so. Converging lines of evidence support this prediction.

First, ethnographic and historical evidence indicates that people endorse beliefs in punitive gods because they consider them efficient for inspiring cooperation in others. Take, for example, the Yahgan hunter-gatherers of South America, who believe in a “Supreme Being, who saw everything and who punish delinquents with shortened life and with the death of their children” (Cooper, 1946, p. 99). Yaghan informants reported deliberately instilling fear of this god in young people to scare them into cooperating:

It is good to implant the fear of him in the candidates! For now they will more faithfully follow all the teachings and will live as good, industrious human beings. That is why they are often threatened with this villain! (Gusinde & Schütze, 1937, p. 763).

In medieval China and Europe, similarly, “the state strove to propagate beliefs in divine retribution after death as a means of preventing crime” (Bernstein & Katz, 2010, p. 241). Charlemagne, King of the Franks and then Emperor (8-9<sup>th</sup> c.), “came to consider hell as a sanction that could reinforce

his own imperial view of the cosmos and the political order” (Bernstein & Katz, 2010, p. 222). Even the French revolutionaries (18<sup>th</sup> c.), who sought to weaken the Christian Church’s influence on society, nonetheless recreated a prosocial religion from scratch—the “Cult of the Supreme Being”—deemed necessary to ensure citizens’ compliance to Republican virtue (Desmons, 2009; Smyth, 2016; Vovelle, 2002). As Robespierre put it: “The concept of the Supreme Being and of the immortality of the soul is a continuous call to justice, which makes it both social and republican.” (Smyth, 2016, p. 22).

Second, using data from the World Value Surveys, Abrams et al., (2020) provide evidence that nations with stronger beliefs that religion is necessary for moral behavior are less likely to secularize over time. This supports the idea that the more people perceive religion as necessary for encouraging cooperation, the more they invest in religion—in the sense, here, of not abandoning religion. Importantly, this relationship is also observed at the individual level. People who report a greater belief that religion is necessary for moral behavior are less likely to abandon religion across their lifespan (Abrams et al., 2020). Moreover, these people also tend to feel greater *guilt* over abandoning religion (Abrams et al., 2020). This is consistent with the idea that people even construe religious belief as a *moral duty* when they perceive religious belief as necessary for maintaining cooperation for the public good (sect. 2.4.3). Indeed, guilt is the emotion that people feel when they perceive themselves to have violated a moral duty toward cooperation partners in reciprocal cooperative interactions (Fitouchi et al., in press; Tomasello, 2020). Thus, the fact that people also feel guilty about abandoning religion suggests that they construe investment in religion itself as a moral duty toward other people, consistent with the idea that people sometimes perceive themselves as engaged in a collective action to maintain religion in society (Section 2.4.3).

### **3.3. People invest more in punitive religious beliefs when they perceive an added value over secular means of policing**

If people use religious beliefs for everyday policing, they should rely on them more when they perceive them to add value beyond secular means of social control. We thus expect the following patterns.

First, the more people trust that secular policing institutions (e.g., the state) are sufficient to incentivize cooperation, the less they should rely on beliefs in punitive gods to deter uncooperative behaviors (*Prediction 3a*). Supporting this prediction, data from the World Value Surveys suggests that, across countries, religiosity decreases as societies develop stable and efficient political

institutions (Norris & Inglehart, 2004, 2011). Distrust of atheists, similarly, is lower in countries with strong secular rule of law (Norenzayan & Gervais, 2015). These group-level results may also be consistent with cultural adaptation theories, as it has been proposed that the group-level selection pressures for religion to promote cooperation may weaken when societies develop efficient political institutions (see sect. 4; Norenzayan et al., 2016). However, given its unique emphasis on individual perceptions and strategies, a distinctive prediction of the mutual policing theory is that similar relationships should also be found at the individual level, within the same cultural group. In line with this prediction, studies suggest that experimentally increasing individuals' perceptions of governmental instability increases people's endorsement of beliefs in a controlling God, this effect being mediated by participants' "need for order and control" (Kay et al., 2008; Kay et al., 2010). The mutual policing theory also uniquely predicts similar effects for extractive forms of supernatural punishment beliefs (see sect. 2.4.1). In medieval Christianity, for example, communities of monks appealed to supernatural punishment to protect their own property against intruders especially when they lacked the military means to do so and when government protection was unavailable (Leeson, 2014; Little, 1993).

Second, supernatural punishment beliefs should target behaviors that people struggle to police by secular means (*Prediction 3b*). As people reasoned in a draft of the Declaration of Rights of Man, "Since the law cannot reach secret crimes, it must be supplemented by religion" (art. 16; Edelstein, 2018, pp. 184–185). In line with this idea, world religions have been especially concerned with controlling private behaviors difficult to police by the state, such as "vicious habits" of drinking, gambling, and fornication whose punishment in hell was described in great precision, as well as "sinful thoughts" arising in the intimacy of individual conscience (e.g., lustful or violent thoughts), which could be controlled, for example, by confession to a priest (Cohen, 2003; Cohen & Rozin, 2001; Fitouchi et al., 2022; Tentler, 2015; on confession, see also sect. 3.6.1). Also in line with this logic, studies consistently find that individual-level religiosity across contemporary countries is more strongly associated with the individual-level tendency to condemn private behaviors such as sexual practices than with condemning uncooperative behaviors subject to legal enforcement, such as cheating on taxes (Jacquet et al., 2021; Moon et al., 2019; Weeden & Kurzban, 2013, 2016; see also Hone et al., 2020). In 17<sup>th</sup> century England, similarly, politicians explicitly appreciated this added value of religion over secular social control: they thought that people "are governed by the pulpit more than the sword in time of peace," that "no temporal government could have a sure support without a national church that adhered to it," and that "[r]eligion it is that keeps the subjects in obedience" (Hill, 2002, p. 76). This is not specific to world religions or large-scale societies. Among the Mentawai horticulturalists, the moralistic spirit *Sikameinan* specifically punishes one of

the few transgressions—failing to share meat (Singh et al., 2021)—that is not enforceable through secular justice (Fitouchi & Singh, 2023; Singh & Garfield, 2022).

### **3.4. Punitive religious beliefs target behaviors people are motivated to control in everyday life**

If beliefs in punitive gods emerge as people attempt to incentivize others' cooperation, punitive gods should punish behaviors that people are motivated to control in everyday life. In line with this prediction, a growing body of evidence suggests that the content of beliefs in punitive gods adapts, in a fine-grained manner, to the local policing problems people face in different ecologies (Bendixen, Apicella, et al., 2023; Bendixen & Purzycki, 2017; McNamara & Purzycki, 2020; Purzycki, Bendixen, et al., 2022).

Using a free-list method, Bendixen et al. (2023) asked participants from eight diverse societies (e.g., Fiji, Tanna, Mauritius, Marajo of Brazil, Hadza of Tanzania) to list behaviors disapproved by their local deities. They show that these behaviors correspond to locally salient social dilemmas people encounter in everyday life and which they often struggle to police by secular means. In the Tyva Republic, local spirits *cher eezi* especially dislike environmental pollution and overexploitation of natural resources—a salient social problem in this particular socioecology, difficult to police by secular means (Bendixen, Apicella, et al., 2023; Purzycki, 2011, 2016; Purzycki, Bendixen, et al., 2022). By contrast, in Tanna (Vanuatu), which relies on horticulture for subsistence, local gods punish violations of garden taboos, which likely contribute to proper cultivation and distribution of collective resources in this particular ecology (Bendixen, Apicella, et al., 2023). In other words, cross-cultural variation in the very content of supernatural punishment beliefs mirrors variation in the policing problems people face in everyday life, consistent with people tailoring supernatural punishment beliefs to specific policing problems they face on a regular basis.

### **3.5. Punitive religious beliefs emerge, not only under prosocial forms, but also under extractive forms that serve selfish interests**

Because people's policing agendas can be selfish as well as cooperative (sect. 2.4), the mutual policing theory distinctively predicts that beliefs in supernatural punishment should just as easily take extractive forms serving selfish interests than prosocial forms serving mutual benefit (see sect. 2.4.1). Three lines of quantitative evidence support this prediction.

First, rulers of Ancient, Medieval, and Early Modern states promoted beliefs in supernatural punishment to compel subjects into obedience—from Ancient Egypt and Mesopotamia to Medieval China and Europe (Bentzen & Gokmen, 2022; Bernstein & Katz, 2010; Cronk, 1994; Morris, 2015; Wright, 2009). In a sample of 1265 pre-industrial societies, Bentzen & Gokmen (2022) show that more stratified societies—where leaders have greater incentives to use religion to legitimize power—are more likely to develop beliefs in moralizing high gods, after controlling for social complexity and agricultural intensity. Using irrigation potential as an instrument for stratification among agricultural societies (Bentzen et al., 2017), they further show that exogenous variation in stratification leads to greater belief in moralizing high gods and greater institutionalization of religion, proxied by the prevalence of religious laws (Bentzen & Gokmen, 2022). These results support the idea that the cultural stabilization of supernatural punishment beliefs is partly driven by powerful individuals promoting these beliefs for selfish policing purposes (see Cronk, 1994; de Aguiar & Cronk, 2011).

Second, selfish supernatural policing recurs in small-scale societies. Take beliefs in supernatural punishment among the Dogon of Mali (Strassmann, 1992, 1996). Women are threatened with supernatural sanctions, such as famine and illness, if they refuse to segregate in menstrual huts during their menses (Strassmann, 1992, 1996). Genetic and ethnographic evidence shows that these taboos and supernatural threats allow males to police female sexuality and increase their paternity certainty by publicizing women's reproductive cycle (Strassmann, 1992; Strassmann et al., 2012). Third, a large body of evidence indicates that individuals with a monogamous reproductive strategy—people who invest in parental care and committed pair-bonds—use religion as a tool to police sexual promiscuity around them, in order to protect against cuckoldry or mate-poaching and facilitate familial stability (Jacquet et al., 2021; Kerry et al., 2022; McCullough et al., 2005; Moon, 2021; Moon et al., 2019; Weeden et al., 2008; Weeden & Kurzban, 2013, 2016).

### **3.6. Deliberate policing purpose in prosocial religious rituals**

If prosocial religions are shaped by policing goals, we should expect deliberate policing to shape not just beliefs in supernatural punishment but the associated rituals, as well (*Prediction 6*). Several lines of evidence support this prediction.

#### **3.6.1. Confession of sins**

Policing goals are apparent in confession rituals. Consider the Christian Church's decision to make confession mandatory for all at least once a year, from the 13<sup>th</sup> century onwards (Bériou, 1983; Tentler, 2015). In line with the mutual policing model, historians have argued that the Christian

hierarchy deliberately designed mandatory confession as a technology of social control (Little, 1981; Martin, 1983; Tentler, 1974, 2015). First, a huge number of manuals provided priests with very precise techniques about how to conduct confession, making clear that people construed confession as an instrumental technology:

this literature was practical. The *summas* and manuals for confessors were designed for use. A priest could find out what he wanted to know by consulting them because they were organized especially with that in mind. No better example of this practicality can be imagined than the creation of the alphabetical summa, which makes it possible to get information immediately on a specific topic (Tentler, 2015, p. 49; see also Little, 1981).

Second, confession appears grounded in the folk-psychological intuition that triggering guilt—by making people confess their sins—was an efficient way to make people more cooperative (Tentler, 2015, pp. 129, 130, 161-162, 345-347). Techniques of confession were “designed to make people understand concretely and feel acutely their own personal guilt” (Tentler, 2015, pp. 161–162). These design features are consistent with psychological evidence that people understand the prosocial effects of guilt and exploit this folk-understanding by strategically inducing guilt in others to nudge them into cooperating (Baumeister et al., 1994, 1995; Huhmann & Brotherton, 1997; Vangelisti et al., 1991; though see Cardella, 2016). The ecclesiastical hierarchy appears to have done just this, by designing confession as a “system of discipline primarily through guilt” (Tentler, 2015, p. 347)<sup>1</sup>.

### **3.6.2. Penance rituals**

Penance rituals—found in several prosocial religions (e.g., Hinduism: Olivelle, 2011; Christianity: Meens, 2014; Tentler, 2015)—also appear to be shaped by people’s policing goals. First, the community requires the penitent to publicly confess their crime (early Christianity: Tentler, 2015, pp. 4–9; Ancient India: Olivelle, 2011). This is used by many communities deploying high levels of social control, as public confession increases the reputational cost of cheating while decreasing policing costs by deterring observers from future cheating (Hechter, 1988, 1990). Second, penance requires wrongdoers to suffer hard treatments, such as ascetic abstinence or inflictions of pain, well suited to deter future wrongdoing by increasing its cost (Coşgel & Miceli, 2018; Tentler, 2015).

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<sup>1</sup> According to Tentler (2015), “In theory and practice, sacramental confession provided a comprehensive and organized system of social control... Moral and legal norms—which medieval religious authorities were disposed to believe were in agreement—had to be obeyed... the heart of the system is reliance on internal feelings of guilt. If the system is working, sinners will feel guilty outside of confession; and confession will help insure that guilt is elicited independently of the presence of any other human being. The institutions of forgiveness belong most decidedly to a religion of conscience and a system of discipline primarily through guilt” (pp. 345-347).

Third, penance requires culprits to credibly signal contrition and genuinely make amends for their fault—a necessary condition for being forgiven by the community (Tentler, 2015, p. 13). This is consistent with psychological evidence that people perceive sincere, costly apology as a necessary condition for cheaters to behave more cooperatively in the future (Ohtsubo & Watanabe, 2009; Watanabe & Ohtsubo, 2012).

Accordingly, historical studies of penance in early Christianity explicitly characterize them as a technology of mutual policing:

penitential institutions, developed in the first centuries of the ancient and medieval church...existed first of all to insure discipline, to exercise control. ...The willing recourse to excommunication; the public nature of exclusion, retribution, and reconciliation; concentration on the most serious crimes against marriage, property, and life; and the punitive nature of the system's sanctions: all of these harsh characteristics point to the prominent role played by the church in the maintenance of social order... it preserved order in a highly restricted local community, which expected strict obedience to its rules and, when there were failures, gave only one difficult chance for readmission to full privileges in that group... The first function of ecclesiastical penance then is discipline, or social control. (Tentler, 2015, pp. 12–13).

## **4. Explaining the fall of prosocial religions**

While prosocial religions are widespread across cultures (Lightner et al., 2022b), many societies have experienced a decline in religious belief and participation in the last centuries (Inglehart, 2020; Jackson et al., 2021b). As long noted, this fall of religion is strongly associated with economic development and modernization (Inglehart, 2020; Inglehart & Baker, 2000; Paldam & Gundlach, 2013). Virtually all societies secularize as they become richer (Herzer & Strulik, 2017; Inglehart & Baker, 2000; Inglehart, 2020; Norris & Inglehart, 2011), while societies that remain highly religious are the poorest and most ecologically insecure (Barber, 2011, 2013; Botero et al., 2014; Inglehart, 2020). Since Weber (1905) and Durkheim (1912), social scientists have sought to explain why economic modernity associates with secularization: Why do prosocial religions vanish in high-income societies?

A leading proposal—the existential security hypothesis—argues that abundant resources, social insurance, and secure healthcare make religion less attractive as a means to cope with existential threats (Barber, 2011, 2013; Immerzeel & van Tubergen, 2013; Inglehart, 2020; Norris & Inglehart, 2011). Consistent with this view, people across culture use supernatural practices to prevent misfortunes such as death, hunger, or disease (Boyer, 2019; Singh, 2018) and alleviate anxieties

over uncontrollable outcomes (Malinowski, 1924; Lang et al., 2020; Sosis, 2007; Sosis & Handwerker, 2011). Another longstanding hypothesis attributes the fall of religion to the rise of science and education, fueling a “disenchantment of the world” by which rationalist worldviews replace supernatural beliefs (Becker et al., 2017; Braun, 2012; Gifford, 2019; Hungerman, 2014; Weber, 2013).

While these accounts likely explain part of the secularization process, they focus on the fall of religion in general. Economic modernity, however, associates not only with a decline of supernatural beliefs in general, but also with a decreased appeal of the punitive, moralistic aspect of religion specifically (see Tromp et al., 2021). Many people in modern societies still hold supernatural beliefs—such as “spirituality without religion” or New Age beliefs broadly construed (Jackson et al., 2021b; Johnson et al., 2018; Lindeman et al., 2019; Lipka & Gecewicz, 2017)—while at the same time distancing themselves from the moralistic values of institutional religions (Houtman & Aupers, 2007; Houtman & Mascini, 2002; Wixwat & Saucier, 2021). Even people who remain religious, in fact, represent God less and less as a punitive figure and more and more as a loving, merciful, and forgiving agent (Fincham et al., 2019; Jackson et al., 2021b; Johnson et al., 2019; Shepperd et al., 2019; Silverman et al., 2016).

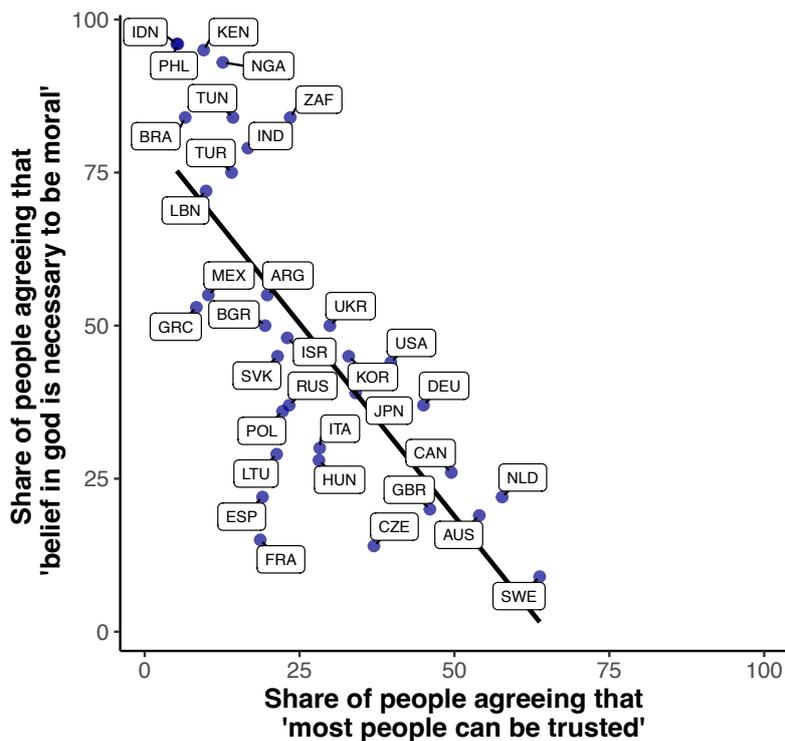
The mutual policing theory explains the fall of the moralistic aspect of religion. People in rich, modern environments exhibit especially high levels of social trust (De Courson & Nettle, 2021; Nettle, 2015; Petersen & Aarøe, 2015; Ortiz-Ospina, 2017), spontaneous prosociality towards strangers (Holland et al., 2012; Nettle, 2015; Silva & Mace, 2014; Zwirner & Raihani, 2020), and low rates of crime, violence, and homicides (de Courson et al., 2023; De Courson & Nettle, 2021; Radkani et al., 2023). In this context, we argue that people are less inclined to believe that the prospect of supernatural punishment is necessary to ensure other people’s cooperation. Rather, people trust others to behave prosocially without having to feel watched over by punitive gods (**Figure 3**).

This increase in social trust reduces the strategic value of prosocial religious beliefs in two ways. The first concerns the self-interested motivations for endorsing these beliefs (section 2.4.2). Since people think that others won't cheat anyway, whether they believe in divine punishment or not, they find it no longer useful to communicate beliefs in punitive gods. Indeed, it’s only when you believe that others would cheat if they weren’t monitored that it’s worth paying costs to incentivize their cooperation (Yamagishi, 1986, 1988; Nettle & Saxe, 2021). On the recipient side, the reputational

cost of disbelief (sect. 2.3.3) is also reduced, since other people think they can trust you anyway, whether you believe in divine punishment or not.

The second reason concerns the moral motivations for endorsing punitive religious beliefs (section 2.4.3). Since people trust that mutually beneficial cooperation won't collapse anyway, whether people believe in divine punishment or not, they think that supporting beliefs in punitive gods is no longer a moral duty because the cooperative maintenance of punitive religious beliefs in society is no longer worth it. Like any form of collective action that has become useless, the cooperative maintenance of punitive religious beliefs is no longer part of the social contract; and atheism, blasphemy, and apostasy, for example, are no longer considered morally wrong (see sect. 2.4.3). This also reduces the reputational pressure to endorse belief in punitive gods, since failing to do so no longer amounts to cheating your cooperative partners in the collective action for belief. These two forces, driven by the decline in the folk-psychological belief that religion is necessary for cooperation, lead people to abandon prosocial religions. This proposal generates the following predictions.

First, higher social trust should indeed decrease the perception that people need to believe in punitive gods to behave cooperatively. Consistent with this, across 34 countries, the share of people agreeing with the statement that “most people can be trusted” negatively correlates with the share of people who agree that “it is necessary to believe in God in order to be moral and have good values” ( $r = - 0.73, p < .001$ ; **Figure 3**). This converges with evidence that people in richer societies (where prosocial religions decline) not only trust other people more, but also disagree more with the idea that believing in God is necessary to be moral ( $r = - 0.86$ ; Tamir et al., 2020).



**Figure 3.** Relationship across 34 countries between social trust and share of people who agree or strongly agree with the statement “it is necessary to belief to be moral and have good values” ( $r = -0.73, p < .001$ ). Data from: *Our World in Data* (<https://ourworldindata.org/trust>) and Pew Research Center (<https://www.pewresearch.org/global/2020/07/20/the-global-god-divide/>). Code and dataset are available at: <https://osf.io/7fym5/>.

Second, the decline of prosocial religions should be part of a more general decrease in people’s motivation to police each other’s behavior. As people trust each other more, they should invest less in social control more generally, not just in social control through religious belief. Supporting this idea, across contemporary societies, people in materially safer environments are not only less religious, they also tolerate deviance more (Gelfand et al., 2011; Harrington & Gelfand, 2014), support individual freedom of choice and emancipation from strict norms (Inglehart, 2020; Welzel, 2013; Welzel & Inglehart, 2020), and are less supportive of other mechanisms of social control such as repressive legal systems (Miethe et al., 2005; Wenzel & Thielmann, 2006; Williams et al., 2019) and authoritarian governance (Nettle & Saxe, 2021; Norris & Inglehart, 2019; Safra et al., 2017). Diachronically, too, the secularization process has been associated with a decline in conservative moral values, traditional social controls (Inglehart, 2018; Inglehart & Baker, 2000), and the restrictiveness of social norms (Jackson et al., 2019). The decline of moralizing religions, in other words, appears as just one of the many facets of a declining culture of mutual policing.

A third prediction concerns whether the fall of religion is mostly driven by individual- or group-level dynamics. Group-adaptationist theories predict that group-level dynamics should be more

important. In that vein, proponents of CGS have interpreted the decline of religion in developed countries as consistent with their account: Once cultural groups have stabilized secular institutions that enforce large-scale cooperation efficiently, this would weaken the group-selection pressures that favor prosocial religions (Norenzayan et al., 2016). It remains unclear to us, however, how any of the modelled mechanisms of cultural group selection (CGS)—interdemic selection (Boyd & Richerson, 1988, 1990), payoff biased migration (Boyd & Richerson, 2009), or prestige biased group imitation (Boyd & Richerson, 2002)—can account for the changes observed. Interdemic selection seems to be too slow of a process (Soltis et al., 1995), given the particularly fast pace of secularization (Inglehart, 2020); and we know of no evidence that the decline of religion is attributable to more secular countries outcompeting the more religious ones among the developed countries. CGS by payoff biased migration and prestige-biased imitation are theoretically fast enough (Boyd & Richerson, 2002, 2009), yet there are few indications that secularization has been driven by large-scale imitation or migration either.

By contrast, the mutual policing theory predicts that the decline of religion should be mostly driven by a shift in individual-level motivations to control others' behaviors, as individuals with greater social trust, or a greater perception that secular policing institutions are sufficient (sect. 3.3), lose interest in punitive religious beliefs. In line with this logic, the relationship between high trust and low religiosity is not only observed between countries, but also between individuals within countries. Synchronically, within the same cultural group and among individuals governed by the same group-level political institutions, individuals of higher socio-economic status, who are known to exhibit higher social trust (Guillou et al., 2021; Nettle, 2015; Stamos et al., 2019), believe less that belief in god is necessary for moral behavior (Tamir et al., 2020), are less religious, and invest less in organized, moralistic religions (Houtman & Aupers, 2007; Houtman & Mascini, 2002; Silveus & Stoddard, 2020; Storm, 2017). Diachronically, too, time series data both within the United States and in European countries indicate that the fall of organized religions between 1981 and the 2000's is driven by younger cohorts rejecting the moralistic values of organized religions as these cohorts develop more individualistic values of emancipation from traditional social controls (Hout & Fischer, 2014; Houtman & Aupers, 2007; Houtman & Mascini, 2002; see also Houtman et al., 2009; Inglehart, 2020).

## **5. Concluding remarks**

The last four decades have witnessed the application of evolutionary and cognitive models to explain patterns in human culture. From magic to music, justice to visual art, monogamy to the rise of the state, sociocultural traditions long outside of the purview of naturalistic approaches have been

fruitfully analyzed as the emergent products of evolved psychologies interacting over cultural evolutionary time (Boyer, 2018; Henrich, 2020; Richerson & Boyd, 2005; Scott-Phillips et al., 2018). Given its importance in social life, religion has been among the most—if not *the* most—studied topic in this new science of culture (Boyer, 2001; Norenzayan, 2013; Purzycki & Sosis, 2022; Sosis, 2006; Whitehouse, 2004; Wilson, 2010). As such, it has served as a gauntlet to develop, test, and refine approaches that can then be applied to other cultural domains.

A longstanding tension in the naturalistic study of religion, and thus in the study of culture more generally, has been between by-product (Beck & Forstmeier, 2007; Bloom, 2007, 2009; Boyer, 2001, 2003) and adaptationist accounts (Bering, 2006; Johnson, 2016; Johnson & Bering, 2006). More recently, scholars have sought to reconcile these approaches, arguing that cultural group selection can select among beliefs that emerge incidentally from cognitive biases, resulting in prosocial supernatural punishment beliefs (Atran & Henrich, 2010; Norenzayan, 2013; Norenzayan et al., 2016). Still, such syntheses assume a group-adaptationist logic: Cultural products that are functional, widespread, and socially important—like prosocial religions—are argued to develop because they promote group fitness.

Here, we have not only proposed an alternative account of prosocial religion; we have also sought to demonstrate a new approach for studying much of human culture. Religious beliefs, as well as other “symbolic” domains like magic (Hong et al., 2021; Hong & Henrich, 2021), moral norms (Fitouchi et al., 2022), and justice institutions (Fitouchi & Singh, 2023), may develop not to promote group-level benefits, but because individuals craft them to satisfy instrumental goals (Singh, 2022). Notably, individuals are constrained by the limitations of their own psychologies. Just as they (erroneously) intuit that rain magic or voodoo dolls are effective for changing the weather and harming rivals (Hong et al., 2021; Singh, 2021), they intuit that beliefs in supernatural punishment will make their neighbors more cooperative, even if this isn’t the case. Our perception of utility, rather than objective utility, may often determine cultural success (Singh, 2022).

This approach to culture addresses features of cultural transmission sometimes overlooked by scholars advocating by-product or group-adaptationist accounts. The most important is individual motivation (André et al., in press; Boyer, 2020, 2022; Moon, 2021). Much of culture survives only as long as individuals perceive an interest in maintaining it. Magical practices survive as long as people use them. Stories exist as long as people tell them. Similarly, beliefs in supernatural punishment exist only as long as people endorse them. As we have shown, shifting the focus to individual motivations ends up providing a powerful lever for explaining cultural design:

Individuals not only decide to endorse, adopt, or reject beliefs; they also craft them into forms they deem useful.

This functional design of culture, either downplayed in by-product approaches, or a result of impersonal selection in cultural adaptation models, thus plausibly develops as people shape effective-seeming technologies for satisfying their goals. Importantly, these goals are not random. Given how natural selection has shaped reward functions in individual brains (Barrett, 2015; Tooby et al., 2008), people's goals often align with their fitness interests. Thus, as evolved minds shape culture to maximize fitness-good currencies—such as food, status, or moral reputation—they imprint on cultural stuff the functional requirements of their genetic interests. It's easy to accept that spears or harpoons develop through an endless instrumental winnowing aimed at achieving fitness-relevant goals, such as acquiring food or killing enemies. Supernatural punishment beliefs, we argue, may be no different. People's urge to control the conduct of groupmates—either for the selfish end of getting more food and sex, or for the moral goal of making the world less unjust—acts as a systematic force over cultural transmission chains, ending in beliefs in heaven, wrathful gods, and supernatural justice.

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