How cultural learning and cognitive biases shape religious beliefs

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Abstract

What explains the ubiquity and diversity of religions around the world? Widespread cognitive tendencies, including mentalizing and intuitive thinking, offer part of the explanation for recurrent features of religion, and individual differences in religious commitments. However, vast diversity in religious beliefs points to the importance of the cultural context in which religious beliefs are transmitted. Cultural evolutionary theory provides the basis of a unified explanation for how cognition and culture interact to shape religious beliefs, in ways that are uniquely adapted to local ecological pressures. These insights lay the groundwork for future research regarding how cultural learning interacts with other evolved aspects of human psychology to generate the recurrent and the diverse forms of religious commitments observed around the world.

Keywords: Religion, Cognitive biases, Cultural learning, Cultural evolution, Mentalizing, Intuition

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Religious belief is ubiquitous, yet in propensity, form, and content *immensely* diverse across cultures and throughout history [1]. How is it that human psychology gives rise to recurring features of religious beliefs and related phenomena, while also sustaining the theodiversity evident across the world? One approach argues that the *recurrent* features of religion can be explained as a by-product of evolved human cognition [2]; another approach argues that the *diversity* of religion can be traced to the role of cultural learning [3–5]. And yet, some have more recently questioned whether cognition makes *any* reliable contribution to religious beliefs across cultures, or after accounting for cultural learning [6*–8]. In this paper, we focus on religious beliefs as a central component of the complex amalgam of beliefs, rituals, sentiments, and values that we call "religion." We review and integrate the empirical evidence that religious beliefs can be partly explained by cognitive tendencies and cultural learning biases, that interact through the processes of cultural evolution to generate both regularities and diversity in religious beliefs.

1 Cognitive precursors of religious belief

Evolved cognition provides part of the explanation for religion's prevalence. Culturally-transmitted religious concepts are more likely to be accepted and retained when they fit with cognitive biases in how people perceive the world [2], thus making beliefs content-biased [9,10]. One key hypothesis from the cognitive perspective is that supernatural agents are often conceived of as social agents with mental states, which believers represent using the same capacities used to think about ordinary human minds. Consistent with this idea, thinking about or praying to God activates brain regions associated with mentalizing capacities [11,12] and individual differences in the tendency to mentalize also predict belief in a personal god [13–17].

Relatedly, the human compunction to engage in teleological reasoning about natural phenomena and to conceive of minds as fundamentally distinct from bodies likewise predicts variance in supernatural beliefs (i.e., in disembodied personified agents who create purpose and meaning in otherwise mundane life events [18–20]). Several studies have found that stronger religious belief is predicted by mentalizing tendencies, and non-religious individuals, compared to the religious or spiritual-but-not-religious, tend to score lower on a variety of social cognitive biases [14,15,21,22,22,23]. Moreover, consistent with dual-process models of human cognition, individuals who tend to engage in analytic thinking, and thus override their intuitions are less accepting of many religious beliefs (e.g., [6*,24–26], also Yilmaz, in this issue).

2 Cultural transmission of religious beliefs

Cognitive biases can therefore partially explain why some beliefs (e.g., supernatural agent beliefs) are so common across cultures, or why some individuals believe more strongly than others within a given cultural context. However, most individuals only believe in a subset of all possible religious beliefs, with patterns of religious devotion that are common in one location or historical time being absent in other locations and times [3]. For example, although there is a small but reliable inverse relationship between analytical thinking and belief in God across countries, additional large and unexplained variation in belief in God persists [6*]. Moreover, the specific abilities, traits, and preferences of various gods are highly variable within and across cultures [27*,28], alongside many other cross-cultural variations in religious psychology [29]. It is therefore abundantly evident that *context* matters for explaining the occurrence of specific forms of religious commitments across cultures.

People acquire religious beliefs through the same cultural transmission processes that support learning other norms and beliefs about unseen entities, and causal theories of the world,

and is therefore influenced by the same cultural learning factors. For instance, the historical spread of Christianity in Austronesian societies can be predicted by variables, like population size and political complexity, that make it easier for any cultural information to spread within a population [30**]. Individuals selectively adopt others' beliefs, especially when these beliefs are widely shared [conformist cultural learning], espoused by skillful cultural models (prestige-biased cultural learning), and backed up by credibility-enhancing displays (CREDs) – when cultural models make observable and costly sacrifices in line with their expressed religious commitments [31,32].

Children learn about religious beliefs from the testimony of their caregivers [33]. As a result, children's religiosity reflects their parents' religious commitments [34]; the unique cultural discourses surrounding religion and science support children's confidence in the existence of unobservable religious and scientific entities [35*,36]; and children tend to distinguish God's mind more from human minds when their parents hold a less anthropomorphic view of God [37]. Adults' religious beliefs are strongly predicted by recollection of their childhood caregivers' religious CREDs, such as whether their parents attended religious services and engaged in religious charity work [38,39*], and atheists who initially believed in God as a child tended to abandon belief earlier in life when not exposed to religious CREDs [40]. Moreover, cross-national data indicates that the odds of an individual believing in God increases dramatically when that individual has a religious upbringing *and* lives in a country where the majority of the population regularly attends religious services [4].

3 The cultural evolution of religion

The capacity for cumulative culture is a hallmark of humanity [41]. Religious beliefs are no exception; like other components of culture, religious beliefs are adopted, modified, and

retained in response to the particular selective pressures operating in a given social and environmental ecologies. Religious beliefs and behaviors that favor success for individuals and groups—greater survival in a particular ecological niche, greater rate of reproduction, greater intragroup cooperation and success in intergroup competition—are more often retained and survive over historical time [5]. This cultural evolutionary account is distinct from another evolutionary perspective that seeks to explain cultural variation as the result of *phenotypic plasticity*, sometimes called "evoked culture" [42], through which different environments trigger particular psychological responses in individuals, with only a limited role for cultural transmission.

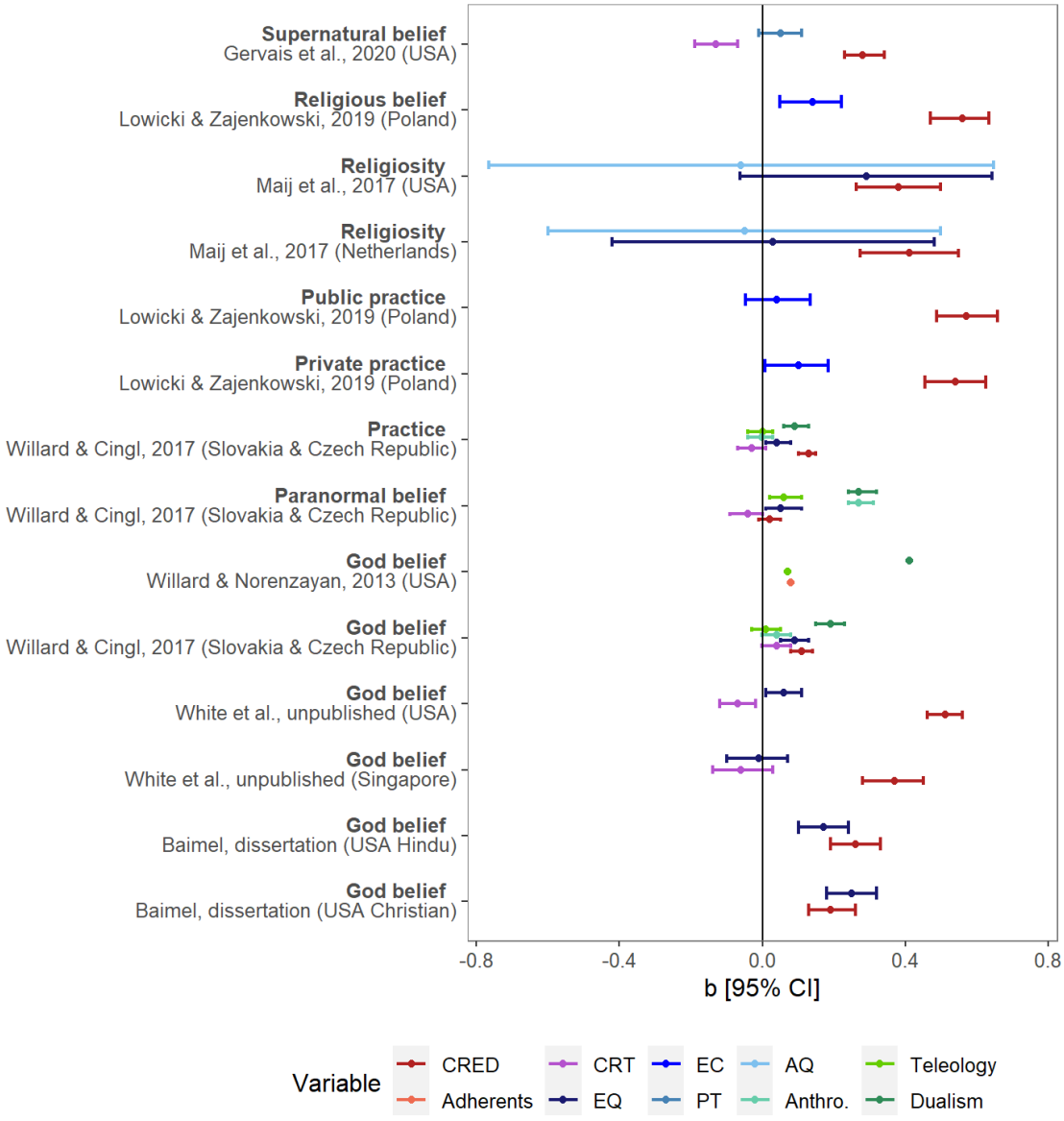
Consistent with cultural evolutionary accounts, substantial research has documented that certain religious beliefs and behaviours can foster stable cooperation among large groups of unrelated individuals. Large cross-cultural studies have documented that belief in morally-concerned gods is implicated in prosocial behaviour between strangers [43**,44], and participation in religious rituals signals prosocial qualities that garner greater prosociality from other community members (e.g., [45,46]). Beliefs about moralizing, punitive gods are more widespread in ecological conditions of environmental harshness [47], in the presence of intergroup conflict and ongoing warfare [48,49], and when the need to police interpersonal morality cannot be met my human punishers in increasingly large, complex groups [5]. For example, in Austronesian societies, supernatural punishment beliefs [50] and religious rituals such as human sacrifice [51] predict sustained historical increases in societal complexity by virtue of their ability to encourage cooperation, legitimate social stratification, and motivate deference to political authorities. Cognitive accounts, on their own, cannot explain these cross-cultural patterns in religious beliefs.

Growing research has therefore turned the spotlight on the cultural evolutionary pressures in shaping the content of religious beliefs, while accommodating the role of cognitive processes. (We note that cultural evolution also integrates the role of core motivations for meaning, control, and immortality [52], topics discussed at greater length elsewhere in this issue.) Yet surprisingly few studies have directly examined the relative contribution of culture and cognition to sustaining religious belief.

4 Quantifying the cognitive and cultural learning pathways to religious beliefs

One way to evaluate the importance of culture and cognition in the psychology of religion is to adopt an individual differences approach and compare the relative effect sizes of cognitive and cultural variables in predicting endorsement of religious beliefs. Figure 1 displays the results of studies that concurrently examined cognitive variables and cultural variables in the same samples (e.g., [7,16,53,54]; note that this is not meant to be a comprehensive meta-analysis, and there are also studies, such as [26,55] that collected this data but did not report results regarding both cognitive and cultural variables, so are not plotted here).

Figure 1. Results of studies that investigated how individual differences in cultural learning and cognitive tendencies concurrently predicted individual differences in religiosity, supernatural belief, and belief in God. Variables include religious credibility-enhancing displays during childhood (CRED), the number of religious adherent in one's vicinity (Adherents), analytic responding to the cognitive reflection task (CRT), mentalizing tendencies (EQ = empathy quotient; EC = empathic concern; PT = perspective taking; AQ = autism quotient), anthropomorphism (Anthro.), teleological reasoning about nature (Teleology), and dualistic views of minds (Dualism). Effect sizes are drawn from whichever analytic model was displayed in the papers, therefore different covariates are included in each case, but all effect sizes come from models including both cultural and cognitive predictors simultaneously.



As can be seen in Figure 1, the effect of cognitive variables is typically small compared to the effect of one cultural learning mechanism – CREDs. While this is interesting, it should be interpreted with caution, given that the typical method of measuring the contributions of 'culture' with the CREDs scale [38] overlaps in content with religious belief measures (e.g., "to what extent did your caregiver(s) attend religious services or meetings?"), and might therefore inflate these correlations. In contrast, no explicitly religious content is found in the measures that are typically used to tap into cognitive biases. Future research would surely benefit from employing alternative measures of cultural exposure to religion, such as direct measures of CREDs displayed by people in one's neighborhood (e.g., adherents' attendance at religious services, actual rates of charitable giving to religious causes, rather than recollected ones, see [19**]), and tracking parent's religious behaviours in longitudinal developmental research (e.g., [34]). A second limitation of the literature is that, with a few exceptions (e.g., [32,39*,56–58]), the majority of studies in this vein have capitalized on an individual difference approach to measure the relative contributions of cognitive biases and cultural learning. While valuable in many ways, the individual difference approach is limited in its ability to make causal inferences and may suffer from restricted range issues when administered to a monocultural sample. More experimental and cross-cultural research is needed to address the complex questions regarding the interplay of cognition and culture.

Further research is also needed among samples with greater range and diversity in cognitive and cultural variables, including extremely high or low levels of the cognitive tendencies presumed to underly religious beliefs (e.g., individuals on the autism spectrum, to better understand how mentalizing abilities predict beliefs, see [7,59]). Moreover, if conceptions of human minds affect beliefs about the mind of gods and other supernatural agents, then

valuable insight can be gained by comparing supernatural beliefs in populations that vary greatly in their conceptions of human minds, such as the degree to which other people's minds are perceived as opaque or intelligible, independent or socially-interdependent, separate from bodies or embedded in bodily experience, bounded from the outside world or porous to external influences (see efforts by, e.g., [60*,61]).

As is always the case, this literature would benefit from ethnographically-informed cross-cultural research to capture variation in religious beliefs that are untapped by the extant North American and European-centric (i.e., Western, Christian dominated) research. More fine-grained theorizing and empirical studies can explore whether cognitive variables differentially predict various supernatural beliefs, such as gods, karma, spirits, and witchcraft, and whether the cultural normativity of different supernatural beliefs explains this. For example, mentalizing (i.e., consideration of other people's thoughts and feelings) and cultural exposure to religiosity predict greater belief in gods, whereas anthropomorphism (the tendency to ascribe mental states to non-human entities) does not predict belief in gods, but does predict a variety of other paranormal beliefs and mystical experiences [19**–21]. Greater cross-cultural research could therefore reveal when, and to what degree, cognitive and cultural variables contribute to shaping particular supernatural beliefs in particular contexts [29].

5 Interactions between culture and cognition

There are also open theoretically-interesting questions regarding possible interactions between cognitive and cultural variables, rather than these being independent influences on beliefs. The evidence thus far seems to point towards their independent contributions. However, cultural factors may moderate the strength of the association between individual differences in cognition and religious beliefs: At low levels of exposure to credible commitments to religion,

belief may be extremely unlikely, and at high levels of such cultural exposure, beliefs may be extremely likely, regardless of an individual's cognitive predispositions towards belief; only at moderate levels of cultural exposure may individual differences in cognitive biases play much of a role in religious belief. Available evidence, however, has found inconsistent evidence against [16,25] and in favor of [6*,23,53] a moderating effect of culture on cognitive predictors of belief in God [see also Yilmaz, this issue]. Some evidence for an interaction may come from failures to replicate cognitive or cultural predictors of religious belief in countries with extremely low base-rates of religiosity compared to the rest of the world, like the Netherlands, Finland, and Denmark [7,26]. At the other end of the religiosity spectrum, cognitive variables have also failed to predict religious commitment in samples where religiosity is at ceiling and measured in highly devotional contexts, such as pilgrims travelling to Santiago de Compostela, one of the holiest pilgrimages in Catholicism [8].

Several studies have also indicated that cognitive biases theorized to predict supernatural belief fail to do so among individuals who lack explicit belief and/or situational reminders that these supernatural entities are real. For instance, promiscuous agency detection is heightened by a combination of religiosity and a supernatural prime [56], or expectations that one will encounter an agent [57], and teleological biases are expressed explicitly [not merely implicitly] among people who are highly religious [62], consistent with the perspective that cultural learning is necessary to make supernatural experiences seem plausible. There are ample opportunities for future research, utilizing a broader array of sampled populations and more clear consideration of the religious and ecological contexts in which they live to identify the ways in which cognitive variables predict belief differently in different cultural contexts.

6 Conclusion

Available evidence therefore supports theorizing about the large contribution of cultural learning to supporting religious beliefs, but also clearly shows some role for the cognitive foundations of religion. Future research using the best practices of the field, including high statistical power, more diverse samples, and deeper ethnographic insight of populations and their cultural contexts, will deepen our understanding of how cognition and culture interact to shape the propensity, content, and forms of religious beliefs found throughout the world.

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