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# Religious Concepts as Necessary Components of the Adaptive Religious System

Abstract: The majority view of cognitive scientists of religion holds that religious concepts are merely byproducts of evolved minds. However, religious concepts exhibit patterned socioecological variation, suggesting that they may be responsive to local selective pressures. Concepts worthy of religious devotion are intriguing, emotion-triggering, and framed in such a way that makes them relevant to one's wellbeing. As such, these concepts are more likely to be transmitted and therefore shared. It is their perceived sharedness and the effects of entertaining supernatural agent concepts in particular which motivate individuals to participate in costly rituals. These rituals indicate shared models and their costs signal devotion to the community. As ritual behavior—when rationalized with religious concepts—sustains cooperative relationships, we maintain that such concepts are a necessary component of the adaptive religious system.

## 1.  Introduction

Scholars have devoted a significant amount of attention to the question of whether or not religion is adaptive (Bulbulia et al. 2008). Regarding the adaptiveness of religious beliefs in particular, the view that pervades most evolutionary explanations is that religious concepts are

byproducts of psychological mechanisms that evolved for other functions (Atran 2002; Boyer 2001). Religious concepts consist of violations of our default inferences about objects in the world, and because of these violations, they are easier to retain (Sperber 1996; Boyer & Ramble 2001). Such a view has now entered popular scientific portrayals of religion as well (Dawkins 2006; Dennett 2006). Thus, the majority view of religious concepts is that they have little to no role in adaptive human behavior.

Research that focuses on the structure of supernatural agent concepts, however, has yet to examine how these concepts fit into the *religious system* and whether or not the system elicits adaptive responses for its adherents. Answering the question of the adaptiveness of *any* trait, however, relies on an understanding of the context in which the trait provides a selective advantage for the individual who bears it. One does not explain the adaptiveness of the porous nature of blood cell membranes, for example, without addressing the internal requirements and constraints of the cell and the external context in which the cell exists. Moreover, one does not explain the adaptiveness of the circulatory system without addressing the internal requirements of the organism that possesses it. Likewise, one cannot explain the adaptiveness of religious beliefs without addressing the internal mental structures of the individuals who entertain them as well as the external conditions under which there is pressure to do so. We argue that the religious system or "niche" (Bulbulia 2008) consists of complex interrelations between necessary components that ultimately function to provide benefits for individuals. Here, we primarily focus on the interrelationship between ritual performance and supernatural agent concepts and contend that both are essential components of the adaptive system we call "religion".

Engaging in costly rituals requires socially accepted, expected, and articulated rationalizations (i.e. beliefs) to motivate behavior. Moreover, the social environment delimits the range in which costly behavior and concomitant supernatural concepts are collectively deemed appropriate. The present approach attempts to account for religious variation with particular reference to evolved minds and the necessity of entertaining religious concepts from an adaptationist perspective. Here, we situate beliefs in their proper socioecological context and argue that beliefs are not merely by-products of evolved minds, but are necessary constituents of an evolved religious system. If religion's adap-

tive function is to facilitate cooperation (Alcorta & Sosis 2005; Bulbulia 2004; Irons 2001; Norenzayan & Shariff 2008; Sosis 2003; Sosis & Alcorta 2003), then appeals to collectively-held religious concepts ought to maximize the likelihood that individuals will participate in costly religious rituals. Religious beliefs evolved and have stabilized in populations because they provide a shared rationalization and an intriguing motivation to engage in costly ritual behaviors. Such concepts are regularly invoked as a means to communicate sharedness with others. Once this sharedness, coupled with a ritual behavior that is difficult to fake is recognized by a receiver, individuals are more likely to engage in future cooperative endeavors that affect survivorship and reproduction.

## 2.  The Internal Context of Religious Beliefs

### 2.1.  Mental Organs

While the roots of the cognitive science of religion are embedded in the modular conception of the mind, there is little consistency across scholars in their conceptualizations of cognitive modules (see Anderson 2007; Barrett & Kurzban 2006; Chomsky 1980; Fodor 1983; 1998; 2000; 2005; Pinker 2005a,b) or our basic, evolved ontological domains (see Atran 1989; 2002: 96; Boyer 1994a,b; 2001; Keil 1989; Sperber 1985; 1996:131; see especially Pyysiäinen 2004, p. 39-52 for detailed accounting of these inconsistencies). Present models assume a set of basic ontological categories (e.g. PEOPLE, ANIMALS, PLANTS, ARTIFACTS). These models suggest our minds are equipped with *templates* that consist of inferences about various entities in the world. For example, PEOPLE and ANIMALS have mental states, ANIMALS have an essential and immutable species membership, PLANTS are immobile, and ARTIFACTS have an essential function (Boyer 1996; 2001, Boyer & Ramble 2001; Keil 1996). Templates' primary utility is that they provide us with predictions about objects in the world with little, if any, explicit instruction.

A "minimally counterintuitive" (MCI) concept is an idea that consists of either a violation of default expectations (e.g., a plant that levitates) or the application of an assumption from one template to that of an object in another domain (e.g., a plant that thinks). MCIs are interesting because they violate some of our most basic assumptions about agents

and objects that fall into these domains. Boyer and Ramble (2001) demonstrated that such domain-level violations are recalled at a significantly better rate than intuitive concepts (such as "spruce tree that requires sunlight and water to grow"). However, statements with too many violations ("maximally counterintuitive") are not retained as well as MCIs (Norenzayan et al. 2006). This approach, however, fails to account for intra- or inter-cultural variation in religious concepts.

*Schemas*, like templates, are informational structures that shape, reflect, and inform perception, but they are more specific in content and flexible in structure than templates. Schemas are often socially constructed categories that allow us to navigate our ways through diverse socioecological environments. We have schemas for "favorite movies" just as we might have schemas for "surrealist painters" and "unanswerable questions". Schemas are quite flexible and often in flux (see Bechtel & Abrahamsen 2002, p. 15; Brewer 2000; D'Andrade 1995, p. 142; Strauss & Quinn 1997, p. 48-84). As such, they change and allow individuals to acclimate to new environments, connect new conceptual structures to extant schemas, and readily create novel associations. While we have a PLANT template we also have a "willow tree" schema, for instance. Because willow trees are categorized as plants, we know that when they move, it is because of something external rather than internal, their species membership is immutable and internal, and things cannot pass through them. Such inference-making is systematic, predictable, likely statistically universal and possible by virtue of our templates. However, because we possess schemas, we recognize that willow trees have long tendril-like branches, typically grow in sandy soils, and can grow to great heights. Such concepts require observation and experience. The concept of a "fluorescent pink willow tree", for example, violates only our willow tree schema, and not the PLANT template. While such counterschematic notions (Barrett 2008; Purzycki 2006) may be the stuff of fables (i.e. giant beanstalks and people), very seldom do they form beliefs worthy of our devotion and rarely are they used to rationalize religious behaviors. The concept of a "river of chocolate", for instance, is not likely to be a religious concept because it is merely a schematic violation (i.e. empirically verifiable). On the other hand, the notion of a sacred "river that listens to people" consists of an MCI as it transfers agency to a feature of the natural environment. Such a concept would qualify as a religious concept as it violates deep assumptions we have about objects in the world. The notion of a "river that knows your future", however, not only consists of an ontological

violation, but violates our schema of "accessible knowledge," making otherwise inaccessible information highly salient to individuals who accept its truth. Variation in sects or denominations of the same tradition can be explained in terms of schematic differences.

Successful religious concepts are intriguing to potential believers because they challenge deep assumptions we have about objects in the world, but successful religious concepts are also emotionally salient. Ghost concepts are not scary because they violate the PERSON template (i.e. a bodiless mind); they are scary because of their harmful intentions. The ghost's violation of the PERSON category grabs our attention and the emotional response effectively serves to provide an automatic judgment about the stimulus (e.g., if afraid, then avoid; see Frank 1988). Counterontological and counterschematic concepts that elicit emotional responses are the best candidates for religious concepts. Indeed, Purzycki (2006) found that humorous (i.e. emotion-triggering) statements with both template *and* schema level violations were recalled significantly better than statements with only one or neither type of violation. Emotion-triggering MCIs are not only easier to retain, but also motivate others to take the initiative to transmit them (see Heath et al. 2001). Nairne et al. (2009) found that words are better retained when treatments were framed as fitness-relevant (e.g., hunting, gathering) than when framed as fitness irrelevant. These results suggest that transmitting emotion-triggering religious concepts (e.g. the spirits know if you are honest) which are framed in terms of fitness effects (e.g. you will be punished if you are dishonest) may be maximally retainable. It is the transmission of these concepts that alters the nature of individuals' interactions with each other.

## 2.2. Types of Religious Concepts

Sperber (1997) and Barrett (2004) distinguish between *reflective* and *nonreflective* beliefs. Reflective beliefs are those generated by way of conscious weight assignment and distribution, debate, and deliberation. Nonreflective beliefs are those generated by our mental modules and templates with little reflection. Barrett discusses these distinctions in light of religious thought: "God exists as three persons" is an example of a reflective religious belief, whereas "God has desires" is an example of a nonreflective belief. That agents have desires is an intuitive computation generated by our theory of mind mechanism (Baron-Cohen 1995). Agents think, feel, and perceive. On the other hand, the idea

that agents without bodies can do these things violates our nonreflective understanding of agents (i.e. PEOPLE and ANIMALs).

For the present analysis it is useful to distinguish between two types of reflective beliefs: *assumed* and *invoked*. Assumed beliefs are presuppositions that provide the foundation for other propositions. To believe that God loves you and can answer your prayers, one must first believe God exists. Invoked reflective beliefs, on the other hand, are propositions which are communicated between individuals. They can signal ideological solidarity or affiliation (e.g., "God knows that you are lying to me" or "the spirits don't like to be disturbed") and serve to rationalize one's behavior (e.g., "I drink this wine to be one with Christ"). Invoked religious concepts vary widely in content and frequency across populations and can adapt quickly in fluctuating social environments. As such, they are largely the schematic elements of religious concepts. Assumed reflective beliefs, on the other hand, are necessary to convey invoked beliefs (e.g., "God wants you to behave"). Assumed beliefs should last significantly longer through time as they are not as readily available to scrutiny as reflective beliefs. Schemas allow us to readily conceive of new associations (e.g., "God wants a lollipop" or "God wants another day off"), but the expectations of our social environment constrain the public acceptance of such novel associations.

To summarize, the best candidates for religious concepts are composed of domain-level ontological violations as well as emotion-triggering counterschematic elements. While schemas are flexible, allowing one to effectively navigate multiple socioecological contexts by creating novel conceptual models and associations, templates provide necessary inferences about objects in the world. Domain-level inferences are nonreflective, whereas schematic representations are necessarily reflective so they can be readily invoked in appropriate social contexts. Typically, however, in order to communicate religious claims, such invoked concepts require the shared presupposition of other notions and premises.

We argue that an ultimate function of articulating invoked reflective beliefs in a religious context is to communicate solidarity in order to stimulate cooperative behavior. Why do churchgoers repeatedly tell each other that God loves them but not that God exists? Why do Christians constantly remind each other that Jesus died for their sins? These are not reminders, of course, but rather they are acts of recognizing

and reinforcing group-membership. Perceived sharedness in belief and/or behavior is necessary to reap the benefits of the religious system. In order to be of any adaptive utility, one's worldview—religious and secular—must have an appropriate degree of compatibility with others' in contexts where a) such compatibility or lack thereof has fitness consequences, b) a demonstration of sharedness and commitment is expected, and c) such demonstrations have costs. As we can not directly see peers' models and motivations, behaviors must have particular costs in order to demonstrate commitment to such models, regardless of belief. Ritual contains these qualities (Alcorta & Sosis 2005; Sosis 2005; 2006). However, how does the relationship between beliefs and behaviors produce adaptive outcomes? To answer this we will examine various supernatural agent beliefs and their corresponding behavioral practices.

## 3. The External Context of Religious Beliefs

### 3.1. Universal Features of Bodiless Minds and Socioecological Variation

Supernatural agent concepts are found in all human societies (Brown 1991, p. 139), and many researchers have argued that belief in supernatural agents is the *sine qua non* of religious life (Atran 2002, p. 59-63; Barrett 2004; Dennett 2006, p. 11; Guthrie 1980; 1993; Sosis & Alcorta 2003). Studies have shown that social and ecological variables (e.g., water availability, degree of specialization) can explain some of the cross-cultural variation in such concepts (Johnson 2005; Roes & Raymond 2003; Snarey 1996; Swanson 1960; Wallace 1966). Humans are primarily concerned with supernatural agents' *minds* rather than other attributes (Boyer 2001, p. 144). Not only are supernatural agents attributed mental states, but the *contents* of those states are conceived of as socially strategic. Boyer (2000) defines "strategic information" as knowledge pertinent to the maintenance of social behaviors and relationships. Elsewhere, Boyer (2002, p. 75) argues that supernatural agents' access to socially relevant information makes such beliefs cognitively prominent. What is crucial for any evolutionary account of religious concepts, however, is determining what motivates individuals to invoke them. It is the human propensity to confirm sharedness which motivates us to engage in prosocial behavior and can often function to regulate resource exploitation, a point to which we now turn.

In many cases, supernatural agents are thought to reside in, or are, features of natural and artificial landscapes. This serves to conceptually isolate these areas so that resource exploitation can be regulated efficiently. Tuvans, for instance, believe that some locally-bound spirits will bring good or bad fortune depending on how they are treated (Levin 2006, p. 34; Van Deusen 2004, p. 57). Such agents are embedded in the land, and such landmarks are marked with offerings and prayer flags tied to tree branches in the area. Land is seen as common property, and pastoral Tuvan families move along migration routes to various locations throughout the year with their herds (Vainshtein 2009). Such sacred sites may serve as functional landmarks for families and the locally-bound spirits which are alleged to dwell there may facilitate cooperative behaviors between families otherwise competing for grazing land. Lansing's (1991) study of Balinese water temples demonstrates that the religious system can effectively prevent resource overexploitation and avoid the "tragedy of the commons" (Hardin 1968). Supernatural agents in these societies vary in form as well as the roles they play in human affairs. Despite obvious differences, agents in each society are *concerned* with proper human conduct. Of course, empirically demonstrable repercussions for improper conduct are not meted out by spirits, but by one's peers. On the other hand, when things go unexpectedly right or wrong, we often interpret such events in terms of a supernatural agent's involvement. If models motivate us to behave (D'Andrade 1992; D'Andrade & Strauss 1992), then religious beliefs serve a number of proximate functions such as rationalizing one's behaviors and demonstrating allegiance with others. In order for both functions to operate successfully, individuals must not only share cognitive models and their concomitant motivations, but also behave appropriately and interpret the behavior of others appropriately.

Why would members of one population believe that there is only one all-knowing and all-powerful bodiless agent whereas others see agency in rivers, mountains, and streams? Many have suggested that the answer is sociological as there are strong correlations between type of society and type of religion (Rappaport 1999; Sanderson 2008; Swanson 1960; Wallace 1966). In small-scale societies, there is apparently no adaptive value in believing in one supreme moralizing supernatural agent as social behavior and deviations from norms are easily monitored and sanctioned. In larger societies, conditions of anonymity favor all-knowing supernatural agent concepts as these are more likely to ensure prosocial behavior. If a Big God or "Big Brother" is watch-

ing, one might reconsider defecting from a social contract, only if it is believed that this agent can enforce some punishment. Many have recently argued that belief in supernatural agents with access to strategic information evolved to foster prosocial behavior (Johnson & Bering 2006; Rossano 2007; Shariff & Norenzayan 2007). In experimental studies, believing that supernatural agents are present alters the way we make moral decisions (Bering et al. 2005) and influences our conduct in economic transactions, as people have been found to be more generous with their money when primed with a mere drawing of two eyes (Haley & Fessler 2005). This research primarily attempts to understand the relationship between the generosity of individuals and their detection of the presence of a supernatural agent. However, the perceived sharedness of religious concepts also motivates prosocial behavior between individuals.

## 3.2. Religious Communication

Peirce (Houser & Kloesel 1992, p. 225-228) considers three types of signs: symbols, icons, and indices. Symbols are established by convention, such as most words, which have no intrinsic meaning but are conventionally associated with objects, qualities, and actions. Icons are signs that physically indicate what they represent, such as a map or phallus. An index is a reliable cue which indicates a particular state that is affected by its referent, such as a rash which directly indicates poison ivy. There is a three-way relationship between signs, their referents, and our minds:

> "the sign is related to its object only in consequence of a mental association, and depends upon a habit" (Houser & Kloesel 1992, p. 225).

As thoroughly discussed by Rappaport (1999, pp. 65-68), the mental component in this relationship is an act of interpretation by an observer who interprets the weathervane's direction as an indicator of the direction of the wind. Likewise, there are encoded messages in religious rituals. Rappaport argues that in religious rituals, there are primarily two conveyed signals. One is indexical indicating the present physical and mental states of the participants. The other is canonical, which contains the moral rules of a community. All interpretations of the indexical and canonical meanings of rituals are schematic insofar as they are individually and culturally specific (e.g., "we *kneel* to remind our-

selves of the *suffering of Christ*" or "we *burn incense* to *greet our ancestors' spirits*"), but also have the obvious counterontological components (Christ's death and resurrection and the ancestor spirits). The differences between the indexical and canonical are described as follows:

> Whereas that which is signified by the indexical is confined to the here and now, the referents of the canonical are not. They always make references to processes or entities, material or putative, outside the ritual, in words and acts that have, by definition, been spoken or performed before. Whereas the indexical is concerned with the immediate the canonical is concerned with the enduring (Rappaport 1979, p. 179).

By participating, individuals are signaling that they accept the traditions (e.g., moral codes, social obligations, institutions, etc.) of the community and can be held accountable if these expectations are breached. Rappaport insightfully observed that whereas belief is a private, internal state, acceptance is a public, external state. Participating in a public ritual demonstrates acceptance of rites and the beliefs that underlie them and

> "*establishes an obligation* to abide by whatever conventions… that order represents. The force of acceptance is, thus, moral, for breach of obligation…is the one element present in all unethical acts" (1999, p. 395, italics in original).

In order to understand religious behavior, then, we must understand the relationship between the signal (e.g., eating a communion wafer), the referent or object of the index ("I accept this tradition and its adherents"), and the interpretation of the signal ("She is devoted to the tradition and therefore one of us"). Interpreters must encode participation appropriately ("the wafer is the body of Christ"), but there must be a collectively shared understanding of others' religious behaviors. In other words, such behaviors must indicate religious concepts which have the status of institutions (see below). It is religious beliefs' status as institutions that radically changes the dynamics of the religious system from one of personal reflection (i.e. belief) to that of acceptance of public mores. It is not necessary that an individual believe in order to accept. For example, one may be an observant participant in a religious tradition but believe the ideas are nonsense. However, if one expressed

contrary convictions or socially unacceptable motivations, then there would likely be social repercussions. Goody (1996) suggests

> "that in polytheistic [traditions] doubt often leads to a search for new cults, whereas in monotheistic religions (religions of the Book) the alternative may be exit rather than voice" (678).

If "exiting" or "searching for new cults" is possible, then one may take advantage of this bounty of religious specialization. However, if one is confined to one's small social group, rejecting one's tradition's religious beliefs and behavior are tantamount to rejecting one's social group.

### 3.3. Religious Behaviors as Indices of Shared Models and Motivations

Adherents often rationalize their religious behavior by referring to the will or interests of supernatural agents. For instance, Orthodox Christian firewalkers in Greece typically explain their behavior in terms of worshipping saints (Xygalatas 2008). Pleasing the spirits—bodiless agents—is a more likely candidate to stimulate risky behaviors (or behaviors perceived as risky) than a secular motivation if one reasons that the consequences (i.e. negative fitness effects) of *not* participating or *not* believing are caused by supernatural forces. In the spirit of Blaise Pascal, Guthrie (1993) argues that anthropomorphism and belief in supernatural agents is cognitively the "best bet" as the benefits reaped from interpreting the world in anthropomorphic terms outweigh the costs of not doing so. The same can be said for engaging in religious behavior. Xygalatas (personal communication) observes that some of the participants rationalize their behavior in terms of group identity and appeals to tradition (e.g., "My ancestors did this, and it is part of who we are"). Once secularized, however, such a potentially risky ritual is less likely to persist through time (Sosis & Bressler 2003; Sosis & Ruffle 2004). As one can easily honor one's ancestors in significantly less risky ways, one would more likely opt to do so. It is important to stress that the relationships between religious beliefs and behaviors is not necessarily unidirectional, but rather reinforce each other.

The distinction between theological correctness and incorrectness (Barrett 1998; 1999; Barrett & Keil 1996; Slone 2004) suggests that there is an invoked type of religious thought necessary for communicating group

membership (e.g., "God knows everything and is everywhere") and a level of cognition that exhibits normal, real-time processing (e.g., "God couldn't help Lucy in Toledo and Fred in Wichita simultaneously"). Theologically correct concepts within religion, therefore, are external indexical badges of group membership. The fact that our stated beliefs are so dramatically inconsistent with how we think about deities in real-time suggests that our stated beliefs are useful signals of group affiliation and devotion. Communicated beliefs serving as signals must be publicly demonstrated, understood, and deemed appropriate enough for receivers if signalers are to reap benefits from sending such signals. It is this collectively-determined "cognitive palatability" that sets the parameters within which religious traditions operate over time. As such, invoking theologically incorrect versions (i.e. limiting God's abilities to human behaviors) of religious concepts are more likely to elicit sanctions on the part of one's community.

Searle (1997) defines institutions as the collectively held meaning ascribed to objects in the world. Institutions, according to Searle, are the transference of brute facts (X) to social facts (Y) in a particular context (C). In a Catholic service (C), for instance, a piece of bread (X) may represent the body of Christ (Y). "Catholic service" means the sum total of the thoughts, practices, institutional roles, and individuals participating in a ritual. Among Jews (C), a circular piece of woven material covering the head (X) may represent the fear of God (Y). Notice that there is individual variation in the acceptance Y; a Catholic may not take the sacrament literally just as Jews might associate wearing the kippah as a statement of religious affiliation rather than for the Talmudic (i.e., theologically correct) rationalization.

Religious beliefs and behaviors are institutional signals insofar as their expressions resonate with receivers' understandings of them. Speaking in tongues to demonstrate one's allegiance with the Holy Spirit at a Catholic Mass would not be a successful signal of acceptance of Catholic doctrine as glossolalia is not an acceptable practice among contemporary Catholics. The Pygmies of the Congo voluntarily engage in stressful initiation rites and those who do not participate are still treated as children and are not allowed to partake in adult affairs (Turnbull 1961:226). Consider the case of the Ainu. Outsiders to particular Ainu settlements needed permission from the headmen to use local resources. Watanabe (1972) observes that

> "[s]uch permission was usually (but not always) given on the
> performance of a ritual for local *kamui* deities, because as-
> surance was required that the fisherman or hunter would be
> faithful to the local *kamui* deities" (476).

Those caught trespassing were required to appear before the headman
and apologize to the spirits. Thus, collectively shared institutions pro-
vide the constraints within which an individual navigates social life
and the framework from which sanctions are prescribed for improper
behavior.

## 4.  The Adaptive Religious System

Among traditional Mongolian cultural groups, ritual performances of
epics were conducted—always at night—before hunting and war in
order to please the spirits. These spirits were believed to ensure a suc-
cessful hunt or battle. While one group, the Altai Urianghais, believed
that "epic performances during summer months would antagonize the
spirits", another group, the Baits, "believed that this restricted timing
applied only to certain epics" (Pegg 2001, p. 112). While the source of
such variation in these beliefs is unknown, it certainly had an effect on
when and which performances took place. Here we see schematic vari-
ation on the part of the individual participants as there were differenc-
es in understandings of the appropriate epics to perform and the times
to perform them. These variations are institutional insofar as they are
collectively held. Another factor which unites these traditions is the
fact that, "Knowing of the impending performance, everyone in the
area converged on the host's tent and food was served" (112), thus fa-
cilitating forms of prosocial behavior that evolutionary theorists of re-
ligious ritual have come to expect. If everyone is perceived to assist
the hunters and warriors in their success by being present (when they
could otherwise be doing something else) and pleasing the spirits, then
this signal of solidarity will allow them to reap the benefits of their de-
votion. These events were valued so highly among one group, that

> children were warned that falling asleep would be a sign of
> support for the epic's evil forces, and, more seriously, they
> would actually become the souls or spirits…of enemy soldiers.
> Onions were put on their eyelids to help them stay awake.

> During the performance, it was forbidden to drink fermented mare's milk or milk-spirit and silence had to prevail (p. 113).

Here we see the shared understanding that epic performances influence the spirits. We also see schematic differences in understandings of standard protocol for epic performance, but shared belief in the causal force such a performance has. Participants engage in food sharing, and children are forced to stay awake. While applying onions to the eyes of a child might be rationalized as necessary to avoid supernatural sanctions or simply a matter of religious discipline, ensuring that one's child retains and appreciates this particular institution facilitates participation and ultimately yields the benefits of staying awake.
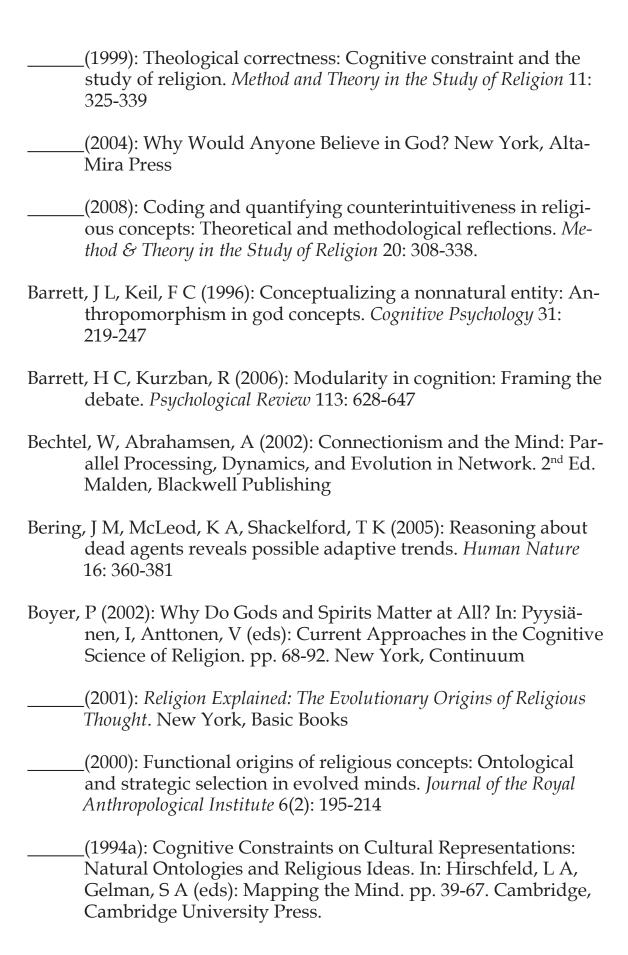
Religious concepts serve to motivate others to engage in costly rituals. Of course, humans engage in costly behaviors and rituals that are not rationalized with religious concepts, but the mystery inherent in religious concepts and fitness-relevant framing makes them cognitively salient and as such demands communication of acceptance. Just as engaging in costly ritual is a reliable demonstration of solidarity, communicating acceptance of religious concepts is a public demonstration of sharing worldviews and motivations. Many have argued that religious ritual behavior offers a mechanism to limit the free riding problem that is inherent in most forms of human cooperation, and thus may be adaptive under particular socioecological conditions (Alcorta & Sosis 2005; Bulbulia 2004; 2008; Bulbulia & Mahoney 2008; Sosis 2005; 2006; Sosis & Alcorta 2005; Sosis et al. 2007). Religious rituals serve as a signal that indicates commitment to one's group and acceptance, though not necessarily belief, in the group's doctrine. Costs help maintain the reliability of the signal, but costs vary across cultures and are reinforced by the institutional models within the communities that have them. The forms and rationalizations for such behaviors must be understood on the part of the receiver of the signal so such models must be shared. What make these rituals particularly salient and difficult to fake are the costly behaviors and the supernatural claims for which they are conducted. Participants at the Phuket Vegetarian Festival pierce their cheeks, Sufis force skewers through their bodies and swallow swords, and Fijians and Greeks walk on hot coals all to gain the favor of their respective supernatural agents. These processions are followed by feasting and other social engagements that maintain reciprocal relations and have lasting fitness effects.

Our species entertains religious concepts because our minds produce and retain concepts which are mysterious and emotion-triggering. Religious concepts are emotional, intriguing, and publicly proclaimed, which motivates others who would otherwise abstain from religious participation for lack of belief. Religion should be thought of as an adaptive system where each of its constituent parts comprises an ever-changing, adaptive amalgam of concepts and behaviors. Religious concepts are intriguing enough to be salient, and unverifiable enough to be worth the risk of engaging in physically and often materially taxing ritualized behaviors. Such behaviors are indices of shared mental models and serve as the impetus to maintain social cohesion, reducing doubt of potential defectors in the social order.

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