

# Four advantages of a systemic approach to the study of religion

Archive for the Psychology of Religion  
2020, Vol. 42(1) 142–157  
© The Author(s) 2020  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/0084672420905019  
journals.sagepub.com/home/prj

**Richard Sosis** 

University of Connecticut, USA

## Abstract

There has been increasing interest in the evolutionary study of religion, but perfunctory fractionalization has limited our ability to explain how and why religion evolved, evaluate religion's current adaptive value, and assess its role in contemporary decision-making. To move beyond piecemeal analyses of religion, I have recently offered an integrative evolutionary framework that approaches religions as adaptive systems. I argue that religions are an adaptive complex of traits consisting of cognitive, neurological, affective, behavioral, and developmental features that are organized into a self-regulating feedback system. Here I explore four advantages of this systemic approach to religion: it avoids definitional problems that have plagued the study of religion, affords a contextual understanding of religious belief, informs current debates within the evolutionary study of religion, and provides links to both the natural sciences and humanities. I argue that the systemic approach offers the strongest potential for real progress and broad application of evolutionary theory to the study of religion.

## Keywords

Beliefs, complex adaptive systems, cultural transmission, religion, ritual

In *The Sorrow of the Lonely and the Burning of the Dancers* (1976), anthropologist Edward Schieffelin details the pervasive ethic of reciprocity among the Kaluli of Papua New Guinea. This ethic of reciprocity extends beyond the material realm into their emotional and ritual life. As Schieffelin (1976) notes, "Ceremonies are themselves transactions in a scheme of emotional and esthetic reciprocity" (p. 164). One of the central ceremonies among the Kaluli is the Gisaro dance in which neighboring villagers sing about the ancestors of their hosts. The performance, when successful, brings the hosts to tears. This sorrow, in the Kaluli worldview, must be reciprocated, so the hosts burn the dancers with torches. Schieffelin describes how an Australian administrator decided to ban the burning because of injuries and infections suffered by the dancers. Gisaro dances were permitted to continue, but hosts would poke dancers with unlit rather than lit torches, as a symbolic gesture. While the administrator had sought to minimize the brutality of the ritual, the "result was that of violence" (Schieffelin, 1976, p. 205). Fights broke out,

---

## Corresponding author:

Richard Sosis, Department of Anthropology, University of Connecticut, Storrs, CT 06269, USA.  
Email: richard.sosis@gmail.com

and rather than the controlled burning of the torches, hosts threw burning coals and logs at the dancers in order to relieve their sorrow. According to the Kaluli, to move a person deeply with song or dance and then forbid retaliation was unacceptable, even inhumane. Schieffelin (1976) observes that “to deny a person permission to attack the dancer is an assault on his fundamental self-image and the intelligibility of his life” (p. 204).

Most of us can appreciate the motives, as well as the actions, of the administrator. The story is of course part of that favorite genre among anthropologists that recounts the inevitable misunderstandings between Westerners and indigenous peoples (e.g. Sahlins, 1995). While such stories typically emphasize the naiveté of the colonizers, what is often overlooked is that cultural traits are part of a system. The Gisaro dance is not an isolated ritual; rather, it reflects a broad ethos among the Kaluli and is connected to other Kaluli religious practices and beliefs. Because the Gisaro is integrated within a larger system, it cannot be easily altered and remain functional, and changes that do manifest will have impacts on other parts of the system in which it is embedded. While the Australian administrator may have been naïve, religious leaders themselves often have difficulty anticipating the impacts of changes they impose on their congregations and adherents. For example, reduced seminary enrollments and attendance rates at Mass are well-documented unintended, and obviously unwanted, consequences of the changes instituted by the Second Vatican Council (Stark & Finke, 2000). Religions are complicated dynamic systems, and if we wish to understand how they work, they must be studied accordingly.

Yet, despite a few exceptions (e.g. Czachesz, 2014; Sørensen, 2004), scientists who study religion rarely examine it as a system. The primary approach of these researchers is to fractionate religion, that is, break it down and scrutinize its elements. For example, scientists who study ritual maintain that we need to isolate (in experimental labs) the various common components that constitute ritual, such as body movement, synchrony, singing, and attire (e.g. Whitehouse & Lanman, 2014). The fractionalization strategy is vital to advancing our understanding of religion and it has already shown remarkable progress. But reductionism is just a first step in any analysis of complex phenomena. Ultimately, the pieces must be put back together, and therefore, drawing implications about religious systems from the results of analyses that focus on one corner of the system can be misleading. Even more problematic for fractionalization, however, is the strong possibility that religious systems exhibit emergent properties (Sosis, 2016). If so, then religion cannot simply be broken down and studied in isolated fragments with the hope that by understanding the constituent parts we are gaining insight into the workings of the whole system (Purzycki et al., 2014; Sosis, 2009a; Sosis & Kiper, 2014).

Over the past decade and a half, I have proposed with my colleagues Candace Alcorta, Benjamin Purzycki, John Shaver, Jordan Kiper, and Connor Wood an alternative approach to the study of religion that focuses on religion as a complex adaptive system (CAS; see Sosis, 2019, for review and references). We have argued that religion may best be understood as an adaptive complex of traits incorporating cognitive, neurological, affective, behavioral, and developmental elements. These traits, we maintain, derive from pre-human ritual systems and were selected for in early hominin populations because they contributed to the ability of individuals to overcome ever-present ecological challenges of resource acquisition and production. By fostering cooperation and extending the communication and coordination of social relations across time and space, these traits served to maximize the potential resource base for early human populations. The religious system, we have suggested, is a complex adaptation that serves to support extensive human cooperation and coordination, and social life as we know it.

Here I consider four advantages of this approach to the study of religion. Specifically, I argue that the CAS approach to religion avoids definitional problems that have plagued the study of religion, affords a contextual understanding of religious belief, informs some current, yet arrested,

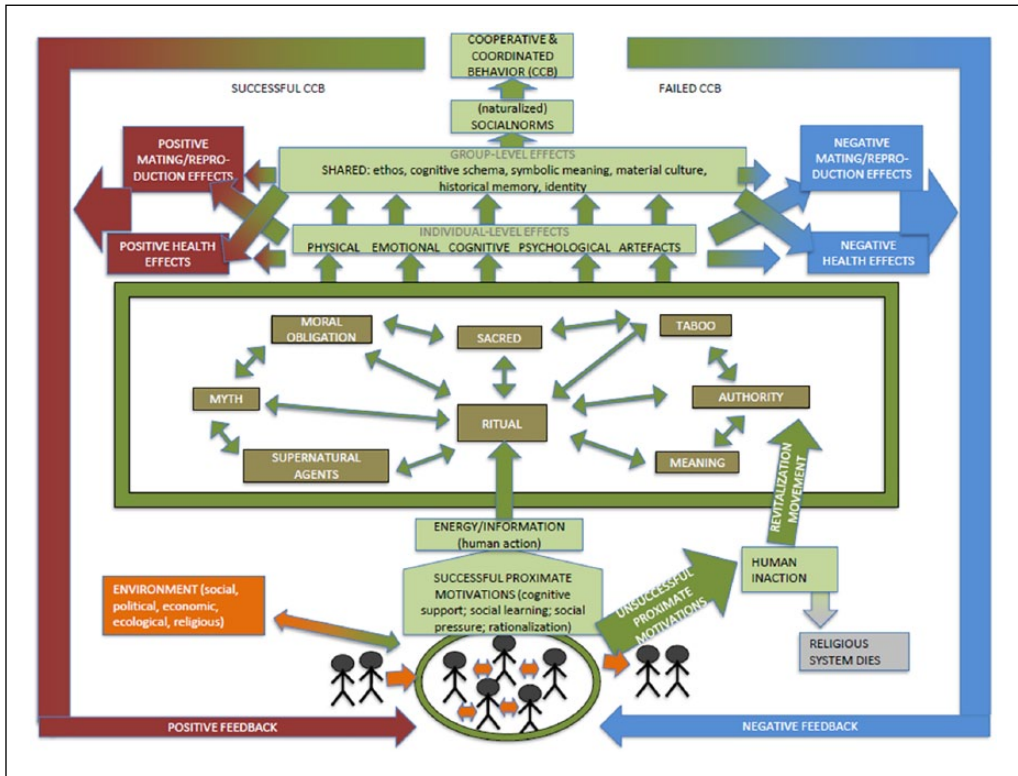


Figure 1. The religious system.

debates within the evolutionary study of religion, and provides links to both the natural sciences and humanities. Before turning to these advantages, I offer a brief sketch of religions as adaptive systems. Further details about the structure, operation, complexity, and adaptability of religious systems can be found in Sosis (2016, 2019) and references therein.

### Religious systems

The systemic approach posits that religious systems typically maintain eight core elements: authority, meaning, moral obligation, myth, ritual, sacred, supernatural agents, and taboo. The core structure of religious systems consists of interactions between these eight core elements. While all elements may not interact with each other directly, they do all interact with and through ritual, which lies at the center of religious systems (Figure 1).

Each of these core elements is most usefully conceived of as a unique category that may have an independent phylogenetic history, even though within religious systems they are inherently interconnected to the other elements within the system. These elements are likely universal across religious systems, but they are not core elements because of their universality; there are other universal features of religions that are not core elements (e.g. the creation of alternative worlds, symbolization). Rather, these features are core elements and universal because they each appear to play a distinct and integrative role within religious systems. Other features of religion are common, such as music, spirit possession, afterlife beliefs, prophecy, superstition, and pilgrimage, but they

are not *essential* to the working of the religious system; they are better understood as secondary forms of one of the fundamental components identified above.

Religious systems are born from a group of socially engaged individuals. Like all communities, religious groups are influenced by external factors including the social, political, economic, ecological, and religious environment in which the group is situated. Notably, however, religious groups are not simply influenced by their external conditions, they actively shape them (Bulbulia, 2012; Purzycki & Sosis, 2013). These external factors, as well as the internal social dynamics of the group, motivate human action in the form of ritual behavior. Like all systems, religious systems require energy and information to function. Ritual performance introduces social information about the state of performers (Rappaport, 1999), as well as energy in the form of calories, into the religious system. All systems transform energy and information; similarly, the religious systems transform the energy and information of human ritual behaviors into human cooperative and coordinated behaviors.

Once energy and information enter the religious system through ritual behaviors, the elements that constitute the system interact with ritual behavior in feedback loops. For example, ritual behaviors become associated with supernatural agents, which can take on various roles in ritual performance, such as the recipient of aromas or the object of petitionary prayers. But whether supernatural agents are seen as receivers, creators, enforcers, or targets of a ritual performance, once such agents become linked to a ritual, desires to please or thwart the agents can proximally motivate the ritual performance. Indeed, the human action that emerges from the social group, which provides the seeds of the system, will be transformed into what we recognize as religious ritual once it interacts and incorporates the elements of the religious system.

While religious systems generate diverse social norms through ritual, the norms that sustain religious systems involve community-level cooperation and coordination, which is ultimately the energetic output of these systems. It is worth bearing in mind that religious systems are a stunningly convoluted way to produce such behavioral responses. Other social organisms have devised ways of achieving collective goals that are less complicated and mysterious. Selection, however, operates on available traits, and the religious system was built on the existing cognitive and behavioral foundation. Also, human language has necessitated complex solutions for sustaining cooperation and coordination. As Rappaport (1999) observes, the symbolic nature of language means there is always the possibility of deceit and lying since the relationships between signs and their significata are arbitrary. Thus, ultimately, actions (i.e. rituals) speak louder than words (Barker et al., 2019).

The religious system is cybernetic in the sense that feedback is inherent to its structure. Successful cooperation and coordination support the group through the successful acquisition of energy, which feeds back into the system. Unsuccessful cooperation and coordination also feed back into the group, and this lack of energetic input informs the group of failure and warns them about impending resource challenges. In addition to these energetic feedbacks, information about health, mating, and reproductive effects also feed back into the group, informing them about group vitality and offering proximate cues about the value of engaging in ritual behavior.

Ritual performance, within religious systems, can be understood as a barometer for the health of the community. Rituals that are well integrated with the core elements of the system are more likely to be performed, supporting the religious system with the necessary energy and information it needs to be sustained. However, when rituals are not well integrated, there is little proximate motivation for performance, which will drive the system toward either extinction or religious revitalization. Obviously, most religious systems spend much of their existence fluctuating between periods of success, stasis, failure, and revitalization. But ultimately, religious systems either die or transform beyond the recognition of the old system.

## Defining religion

I regularly teach an introductory course on the anthropology of religion. At the beginning of each semester, following some brief introductory comments, I ask the students how they would define the term “religion.” Although this is a seemingly innocuous question, and an obvious place to commence any course on religion, I know from years of teaching that in fact I have opened Pandora’s Box. My query invariably leads to a heated discussion about what constitutes religion.

Typically, some students suggest that belief in God characterizes religion, while other students correctly remind these students that some people believe in many gods, and they are in turn informed by others that followers of some religions, such as religious naturalists and humanists within the Abrahamic traditions, ostensibly do not believe in any gods. The discussion is then likely to move toward a characterization of religion as a set of beliefs, but this ultimately proves to be a dead end since the students are unable to agree upon what precise beliefs distinguish religion from other social institutions in which “belief” seems important, such as human rights or believing in the power of the Force. The students will then explore topics like meaning, salvation, afterlife, and ritual to see whether these concepts hold the key to defining religion.

The discussion within my classroom is a microcosm of the conversation that scholars of religion have been engaging in for at least a century about how to define religion. Many religious studies scholars claim that there is no such thing as “religion,” as J.Z. Smith (1982) famously asserts:

Religion is solely the creation of the scholar’s study. It is created for the scholar’s analytic purposes by his imaginative acts of comparison and generalization. Religion has no independent existence apart from the academy. (p. xi)

Many anthropologists agree, noting that most traditional cultures possess no word in their lexicon for religion and make no conceptual distinction between religious and secular life as we do in the West (e.g. Klass, 1995). Influential theorists in the cognitive science of religion (CSR), such as Boyer (2001), Atran (2002), and Barrett (2017), also concur. This position, however, has significant implications for how we study the evolution of religion; if religion does not exist, it is hard to understand how it could evolve. As CSR advocate Luther Martin (2008) maintains, “‘religion’ is a Western academic (and political) category and not a ‘natural kind’ with any independent existence that might be presumed to have evolved” (p. 349).

Not surprisingly, evolutionary researchers generally contest this view of religion (Dunbar, 2017; Johnson, 2016; Sosis, 2009a; see also Bellah, 2011). While I recognize religion as a Western category created for analytical purposes that is absent in many languages, I agree neither with Smith’s conclusion that religion is merely the product of academic imaginations nor with Martin’s claim that religion is not something that could have evolved. Even if religion is simply a Western construct, it *is* a collection of cognitive processes and behaviors that form an appropriate unit of evolutionary analysis. Specifically, religions are adaptive systems, similar to—but no less complex than—the respiratory, circulatory, or immune systems, all of which are also Western constructs and probably lacking in the lexicon of traditional populations, yet no less interpretable through an evolutionary lens.

Recognizing religions as systems offers a lifeline out of the definitional quagmire that has plagued the study of religion. Rather than trying to capture the concept of religion in a sentence or two, it is more productive to define religion as constituting the dynamic interaction of core interdependent elements that serve as the building blocks of a system, as described above. This would not eliminate debate, as scholars would surely argue about how religions systems operate. But even if there was universal agreement about the nature of religious systems, religion would remain a

fuzzy category as there are always human activities on the fringes that will defy strict definitional boundaries. Nonetheless, breaking the social category of religion down into its more easily definable core elements has at least five advantages.

First, and most importantly for the evolutionary study of religion, the systemic approach clarifies the questions that need to be addressed by an adaptationist analysis. By considering the basic elements that constitute religious systems, it becomes obvious that these elements did not evolve together. Ritual, for example, has antecedents in many other species (Alcorta & Sosis, 2005; D'Aquili et al., 1979) and presumably has a much deeper evolutionary history in our lineage than many other core elements, such as myth. Therefore, asking when religion evolved—what many would consider the starting point of any evolutionary inquiry into religion—is a misleading question because it assumes that religion just “appeared” at some point in our evolutionary history. But this is not the case: religion comprises cognitive and behavioral processes that evolved first for other purposes, as CSR theorists have repeatedly argued (Atran, 2002; Boyer, 2001; McCauley, 2011). Yet CSR theorists have not taken the next analytical step and acknowledged that although these elements evolved separately and for other functions, at some point in our evolutionary history they began to coalesce regularly. With regard to timing, then, the appropriate question is, “When did the features of religion begin to coalesce?” At the moment, we do not have a clear answer to this question, and it raises additional questions, such as “How did the features of religion begin to coalesce?” “How is their coalescence sustained?” and “How do the features of religion interrelate?” We know surprisingly little about the dynamic interrelationship between the core features of religion and the proximate mechanisms involved in their coalescence. Of course, understanding why these features coalesce as they do should provide us with insights about *when* they began to do so. Thus, although evolutionary scholars isolate and study specific core elements of religion in order to understand their fitness effects and how they function (Shaver et al., 2016), this is only the initial stage of analysis; it is the religious system itself—the coalescence of these elements—that is the ultimate focus of an adaptationist analysis.

A second advantage of the systemic approach to defining religion is that it avoids essentialism. Many of the classic definitions of religion—consider Tyler, Frazer, James, Marx, and even Durkheim—define religion according to one or two key features, such as supernatural beliefs, feelings of transcendence, or moral commitments (see Pals, 2014). Such descriptive definitions of religion will always fail because religion is a fuzzy concept (i.e. its borders are not rigid) that cannot easily be captured within a few sentences.

Third, defining religion according to its core elements avoids endless disputes—often on display in my classroom—about whether quasi-religious phenomena, such as science, patriotism, UFO cults, and sports fandom, are religions. It is clear that religions share some core elements with all of these cultural institutions, and the systemic approach clarifies that most of religion’s core elements are not unique to religion. Ritual, myth, and taboo, to consider a few examples, are also manifest in other cultural institutions including politics and sports.

Fourth, the systemic approach facilitates comparative research by directing researchers toward differential emphases that religious systems place on their core elements. The Hua, for example, evidently have few, if any, beliefs in supernatural agents (Meigs, 1984). Their religious system primarily involves rituals and taboos surrounding food and sex. Sanctity and myth play a vital role in sustaining this system. The Kwaio religious system, in contrast, centers on beliefs in their ancestor spirits. According to Keesing (1982), the Kwaio neither ask existential questions nor do they possess myths that explain where they came from. Kwaio myths are about the origins of their rites, not their own origins. For other groups, myth is critical for defining a community’s place in the world and essential for the functioning of the religious system. The Ilahita Arapesh, for example, are so enveloped in myth that the arrival of an anthropologist was perceived as a fulfilled mythic

prophecy (Tuzin, 1997). The critical point here is that the systemic approach advances cross-cultural comparative analyses within an empirically grounded theoretical framework that highlights differences and similarities in the ways that fundamental features of religious systems are manifest across populations.

Finally, and relatedly, while belief in the supernatural is an important feature of religion, the systemic approach clarifies that religion is much more than supernatural belief. We now turn to how such beliefs are understood within the context of religious systems.

## **Contextual understanding of religious belief**

Religious studies scholars have long recognized that “belief” has been overemphasized in the academic study of religion. As Wilfred Cantwell Smith (1964) observed, Western scholars have “been liable to ask about a religious group other than their own, ‘What do they believe?’ as though this were the primary question, and certainly were a legitimate one” (p. 163). Sociologist Robert Bellah (1991, p. 220) refers to such conflation of religion and belief as “the objectivist fallacy,” which he argues is prevalent in traditions influenced by Greek thought, notably Christianity and Islam. The priority of belief in the academic study of religion has been widely attributed to a legacy of Protestantism within the academy. As many have noted, including Smith and Bellah, Protestantism’s concern with what its adherents believe is unusual from a comparative perspective. Graham Harvey (2013), for example, claims that “Christianity is unique in promulgating the centrality of believing” (p. 56). He provocatively suggests not only that “[n]o other religion is properly defined in terms of beliefs or believing,” but also that “[t]his means that either Christianity is the only religion, or it is not a religion at all” (Harvey, 2013, p. 43).

Rather than excluding Christianity from the academic study of religion, I think it is more productive to consider it as situated at one end of the religious landscape. Indeed, as discussed above, one benefit of approaching religion as a recurrent set of core elements is that it facilitates comparative analyses; Christianity simply gives the articulation and display of supernatural agent commitments more weight than most, if not all, other religions. Moreover, the systemic approach is a useful corrective to research biases that overstate the role of belief in other religions, as it underscores that supernatural belief is only one element within the religious system, and not always the most important one.

When we consider religious beliefs in an evolutionary and historical context, it appears that belief increases in prominence as religions developed and transformed from tribal, chiefdom, and archaic level religions to contemporary world religions. Belief is rarely a concern of tribal religions. As early 20th-century ethnologist Robert Marett (1914) discerned concerning tribal religions, “it is something not so much thought out as danced out” (p. xxxi). Although stated in an entirely different context, Isadora Duncan’s famous quip seems particularly apt: “No, I can’t explain the dance to you; if I could say it, I wouldn’t have to dance it!” Indeed, while tribal religions offer rich mythologies and intricate ritual displays, they are not concerned with articulated dogma or systematically developed theologies. Ritual theorist Catherine Bell (1992) suggests that adherents of most religions lack “a coherent belief system” and “have no grasp of theological conceptions.” Religions “are little more than ‘collections of notions’” (p. 185). Anthropologist Roy Rappaport (1999) argues that because religions are designed to solve problems of commitment and norm naturalization, their central concern at all phases of historical development is acceptance—that is, public displays that obligate individuals to the norms of the community—rather than belief.

The early overemphasis on belief in the academic study of religion has seemingly had an impact on current endeavors and emerging fields within the scientific study of religion. CSR, for example, was initiated by scholars seeking to understand the cognitive mechanisms that underlie religious

belief (see Guthrie, 1980). CSR researchers have posited mechanisms, such as the hyperactive/sensitive agency detection device (Barrett, 2000; Guthrie, 1995), and examined other cognitive features, such as theory of mind and mind–body dualism, to uncover the proximate roots of religious belief (Barrett, 2004). Foundational theoretical work in CSR, such as minimally counterintuitive (MCI) theory, was developed to explain the form and structure of supernatural agent beliefs (Boyer, 1994; see below).

The systemic approach suggests that even if CSR theories about religious belief are correct (see Purzycki and Willard, 2016; Sosis and Kiper, 2018; Watts and Turner, 2014, for critical assessments), the underlying cognitive structures of religion comprise only the seeds that provide the potential for the religious system itself. After all, theory of mind, mind–body dualism, and other cognitive features might be necessary to produce religion, but they are not sufficient. To be sustained across the life course and across generations, religious beliefs require reinforcement, and religious behaviors require practice. Adherents throughout the world believe in their gods and not other people’s gods, regardless of exposure, because adherents perform rituals for their particular deities (Alcorta & Sosis, 2005). In other words, while humans possess the cognitive machinery to believe in gods, the particular gods that humans commit to require cultivation. Belief in this regard is not instinctive but rather achieved through ritual behaviors, such as supplications to a particular god, ritual presentations of myth, ascetic practices, and healing ceremonies, all of which instill an experience of what religious persons would call the “sacred” (Sosis & Shaver, 2015).

In terms of cultivating religious experience, religious ritual is universally used to identify the sacred, and in so doing separate it from the profane (Durkheim, 1912/1995). But, as noted by Rappaport (1999), ritual does not merely identify that which is sacred—it *creates* the sacred. For instance, holy water is not simply water that has been discovered to be holy or water that has been rationally demonstrated to have special qualities; it is rather water that has been *transformed* through ritual. This is because the sanctifying ritual of holy water collectively alters the participants’ cognitive schema of water itself, rendering them with a template for differentiating holy water from profane water. Most importantly, from a behavioral perspective, the emotional significance of sacred and profane water is quite distinct: not only is it inappropriate to treat holy water as one treats profane water, it is also emotionally repugnant to do so. The central point can thus be summarized. While religious adherents differentiate sacred and profane things, their cognitive discrimination would be empty without having an emotional reaction to the sacred (Alcorta & Sosis, 2005). For it is the emotional significance of the sacred that underlies belief, and it is ritual participation that invests the sacred with emotional meaning. Furthermore, the religious system’s other core elements, especially myth, taboo, and authority, help to internalize and reinforce religious beliefs.

Returning to my classroom, the importance of understanding religious beliefs as embedded within a religious system is driven home every time I lecture on “religious experience,” historically one of the fundamental areas of investigation within religious studies (Wildman, 2011). I generally inform students that if they have never had a spiritual experience—not necessarily a religious one—there are concepts, such as numinosity and altered states of consciousness, that will be difficult to interpret. I explain that their understanding will be like one who reads a review of an album, but never listens to the music. A music critic can write about the tempo, musicianship, and moods the music evokes, but without ever hearing the album—in other words, genuinely experiencing it—it is impossible to fully comprehend the music. Bellah (2011) similarly observes,

One can be instructed verbally or by diagrams as to how to tie a knot, but one doesn’t know how to tie a knot until one has practiced the knot, until one’s body, one’s sensorimotor system, has learned the knot. (p. 19)



Indeed, as is clear in the systemic approach, religious beliefs are achieved through performance and they are not designed by selection—or any other forces—to be understood outside of the lives enacting them. This does not mean that academics (and students) cannot study and gain some understanding of the mechanisms and selective pressures that produce and maintain religious beliefs, but it does mean that to evaluate their veracity as independent propositional claims about the world—as is common among both so-called “new atheists” and philosophers of religion—is missing an important point. Religious belief, as an element of a larger religious system, cannot be analyzed independently of the system in which it is embedded (Geertz, 1967/1973). To do so is like evaluating a symphony when a listener can hear only one instrument. Moreover, similar to a symphony, religious systems have emergent properties, and thus religious beliefs cannot be reduced to propositional claims. Adherents assess the truth of religious beliefs by breathing life into them—in other words, living them—through ritual performance, recitation of myths, adherence to taboos, emotional valancing of symbols, and partaking in religious discourse. This notion is aptly expressed by Karen Armstrong (2009):

Religious discourse was not intended to be understood literally . . . People were not expected to “believe” in the abstract; like any mythos, it depended upon the rituals associated with the cult of a particular holy place to make what is signified a reality in the lives of participants. (p. 15)

That is to say, religious practices are technologies that are critical for performers to understand and experience their community’s shared religious outlook. Ethnographic work shows that this is true among populations as diverse as Balinese animists (Geertz, 1967/1973), Brazilian Candomblé practitioners (Wafer, 1991), Israeli Orthodox Jews (Sosis, 2009b), and American Evangelicals (Luhmann, 2012).

## Informing debates in the evolutionary study of religion

The systemic approach outlined here can inform, and may help resolve, some current debates in the evolutionary study of religion between CSR researchers and cultural evolutionists. I will focus on two current debates in the literature: (1) whether or not religion is “natural,” and (2) how religious ideas are transmitted within and across generations.

### *Naturalness of religion thesis*

The *naturalness of religion thesis* claims that because religion is part of the phylogenetic and ontogenetic history of human beings, it is natural to humanity. This thesis, which emerges from experimental findings in CSR (e.g. Bering & Bjorklund, 2004; Kelemen, 2004), suggests that “religious expression in beliefs and practices is nearly inevitable in most populations and the majority of individuals in those populations” (Barrett, 2018, p. 67).

McCauley (2011) characterizes natural cognition as “fast, (mostly) unconscious, automatic, effortless, intuitive thought” (p. 4). “Natural cognition,” McCauley (2011) affirms, “is what comes to all of us easily. It takes little, if any, work” (p. 13). Or as Barrett (2018) explains, naturalness refers to “thought processes or behaviors that are characterized by ease, automaticity, and fluency” (p. 68). McCauley (2011, 2013) and Barrett (2018) distinguish between two basic types of naturalness: maturational and practiced naturalness. Maturational naturalness requires little environmental input and arises as a natural consequence of normal development, such as learning to walk. Practiced naturalness, on the contrary, arises not through the normal course of physical and

psychological development, but rather through repeated practice and training, such as learning to play a musical instrument.

CSR researchers argue that religion lies toward the maturational end of the naturalness continuum (e.g. De Cruz & De Smedt, 2014, 2016). To defend this view, they rely on empirical studies suggesting that core elements of religious expression—such as supernatural agent beliefs, teleological reasoning, and afterlife beliefs—are the natural outcome of normal cognitive development. Cultural evolutionists, on the contrary, emphasize that religious expression is socially learned (Gervais & Henrich, 2010; Newson & Richerson, 2014; Richerson & Boyd, 2005). These researchers acknowledge that cognitive structures may make some ideas more memorable and intuitive than others, but ultimately these ideas are inherited culturally and they are subject to the unique dynamics of cultural evolution (Henrich, 2016). They thus maintain, in Barrett and McCauley's terms, that religion lies toward the practiced end of the naturalness continuum.

The systemic approach similarly places religion toward the practiced end of the naturalness continuum. It recognizes that the cognitive structures that produce religious concepts—hypersensitive agency detection device, theory of mind, mind–body dualism, and so forth—are indeed proximate mechanisms that underlie religious thoughts and behaviors (Barrett, 2004). These are essential ingredients of the religious system. But the underlying cognitive structures of religion comprise only the seeds that provide the potential for the system. After all, theory of mind, mind–body dualism, and other cognitive features are necessary but not sufficient to produce religion. Religious expression requires cultural inputs and cultivation, not just cognitive potential. As the cultural evolutionists insist, whether one believes in Zeus, Vishnu, or Allah will depend on the cultural environment in which one is raised. The systemic approach, however, also emphasizes that belief is not automatic—through social learning or cognitive development—but rather is achieved through ritual performance, meaning-making, engaging with myths about these supernatural agents, and adhering to taboos that purportedly originate from these agents. Therefore, without further qualification, it is doubtful that religious behaviors are “nearly inevitable,” as CSR theorists contend, or merely socially learned, as cultural evolutionists propose.

Nonetheless, while the systemic approach emphasizes the importance of cultivation in the development of religious beliefs and commitments, it does not claim that religious expression is at the far practiced end of the naturalness continuum, which is inhabited by activities such as science, chess mastery, and statistical reasoning. These are activities that seem to be at odds with our natural cognition, given the immense effort they require, and are clearly different from religious cognition. Whereas science and statistics, for example, require overriding or circumventing normal cognition, religion requires moderate cultivation to nurture underlying cognitive propensities. This is witnessed by the fact that religious systems nearly everywhere involve the same modes of human cognition, such as the penchant for beliefs in the afterlife, magical causation, and supernatural agents (Pyysiainen, 2004). At any rate, although religion may not be at the far practiced end of the naturalness continuum, the systemic approach stresses that it still requires repeated articulation and performance to manifest itself in human communities.

### *Transmission of religious ideas*

There is also considerable debate between CSR researchers and cultural evolutionists concerning the transmission of religious beliefs and the relative importance of content and context biases. While cognitive scientists of religion have focused on how successful religious ideas exhibit particular forms that are memorable (Barrett, 2000; Boyer, 1994), cultural evolutionists have emphasized the importance of local environments in explaining the transmission of particular religious

beliefs (Gervais & Henrich, 2010). One key insight that emerges from the CAS approach is that the success of religious traits will be related to how well they are integrated into the religious system.

As noted above, religious beliefs cannot be understood in isolation; they are only one element within a complex system. Their emergence and maintenance is not simply the result of ecological pressures or cognitive mechanisms that generate supernatural beliefs but rather the product of cultivation and the interaction of multiple elements within the religious system in which they are embedded. The systemic approach predicts that religious beliefs interconnected to other elements within the religious system, such as myth and ritual, are more likely to be transmitted to the next generation than religious beliefs that are not connected, or lose their connection, with other elements within the religious system.

I have evaluated this prediction by examining the historical trajectory of demonic beliefs across Jewish communities (Sosis, in press). The Talmud contains discussions and descriptions of numerous spirits and demons (e.g. *Niddah* 17a, *Pesachim* 110–113) that are no longer entertained by Jewish communities, even those for which Talmudic study is a daily practice. But not all demons have lost their potency and significance. Most notably, *ruach ra'ah*, literally “evil spirit,” remains relevant in many observant Jewish communities today (Angel, 2009). In these communities, it is believed that the *ruach ra'ah* clings to one’s hands upon awakening, thus requiring a ritual washing to cleanse or, more accurately, purify one’s hands. Interestingly, the rabbis have offered various reasons for the hand-washing ritual, known as *negel vasser*, performed immediately upon awakening. These reasons include that one’s hands likely became dirty during the evening by incidentally touching one’s genitals, the Kohen washed his hands before his service at the Temple in Jerusalem and therefore one should also wash before prayer, and that upon arising it is as if an individual becomes a new person and therefore washing is appropriate. However, for many religious Jews, the most compelling rabbinical rationalization for *negel vasser* is that the *ruach ra'ah* clings to one’s hands upon awakening.

Cognitive scientists of religion suggest that concepts such as *ruach ra'ah* will be particularly salient and memorable, and thus successful, because of their MCI structure (Boyer, 1994). MCI theory, however, cannot explain why the *ruach ra'ah* rather than the dozens of other demons discussed in the Talmud survived, since they all possessed MCI features. Moreover, believing that an evil spirit inhabits humans when they sleep, and that a trace of their presence remains upon awakening that a ritual washing can remove, are not ideas that naturally spring to human minds. Such beliefs are learned, culturally shared, and require social cultivation, as cultural evolutionists would insist. However, cultural evolutionary theory also does not provide a complete explanation for the disappearance of all but one Talmudic demon. For instance, while cultural evolution models (e.g. Henrich & Gil-White, 2001) provide important insights on why Jews adopted medieval Christian demons when they settled in Europe, given the relative status and power of Christians, a systemic approach seems necessary to explain why beliefs in these Christian demons were not sustained. Presumably, as foreign demons they were not well integrated into the Jewish religious system.

*Ruach ra'ah*, however, was sustained precisely because it was fully integrated into the Jewish religious system. It is supported, endorsed, and evoked by (1) ritual hand washing that requires pouring a defined minimum amount of water in the proper order (first right, then left, then right, then left, etc.) and number of times (three each hand); (2) taboos on speech, movement, and touching; (3) mythical narratives (e.g. *Pesachim* 111a); (4) extensive *halachic* (Jewish law) discussions in the Talmud and Shulchan Aruch (indeed, there are too many associated laws to discuss them all here); (5) afterlife beliefs, as the *ruach ra'ah* is associated with death; (6) feelings of purity/impurity; and (7) authoritative endorsement by religious leaders (i.e. rabbis). Not only is the concept of *ruach ra'ah* elicited daily, but because water must be prepared in the evening before retiring to bed, observant Jews encounter the *ruach ra'ah* twice each day. All of these factors facilitate

internalization of belief in *ruach ra'ah* and highlight how the various elements of religion interact to support each other. Moreover, it illustrates the emergent qualities of a living religious system.

My historical analysis (Sosis, in press) was able to demonstrate the utility of a systemic approach to religion for understanding the survivorship and mortality of religious concepts, and especially the role of ritual in this process. Cognitive science (content) and cultural evolutionary (context) theories advance valuable insights about the cultural transmission of religious ideas, but the systemic approach offers a unifying framework that incorporates these insights and provides novel predictions about the success and endurance of religious ideas. Future work must evaluate these predictions in other contexts.

## Forming connections to the natural sciences and humanities

Complexity scholars (e.g. Holland, 1995, 2012; Miller & Page, 2007) have delineated many features that are deemed essential to all CASs, including emergence, self-organization, unconsciousness, decentralization, regulatory mechanisms, openness, amplification of random fluctuations, historical contingency, unpredictability of agents, nonlinearity, and disequilibrium. I have shown elsewhere (Sosis, 2016, 2019) how religious systems are characterized by these and other common features of CASs. Viewing religions as CASs is a powerful framework for analyzing the unwieldy phenomenon of religion, but scholars have yet to fully explore its potential (Cho & Squier, 2013). Part of its promise as a framework lies in the fact that the analysis of CASs is a transdisciplinary enterprise. Much work, not surprisingly, has been advanced by mathematicians and computer scientists (e.g. see the journal *Complex Adaptive Systems Modeling*). But complexity theory has also received attention in the social sciences, most notably in economics, sociology, political science, and linguistics, as well as the natural sciences, including physics, geology, and evolutionary and systems biology (Mitchell, 2009). This consilience across disciplines will enable the study of religion to benefit from the rich methodological and analytical techniques across the sciences, as well as the modeling sophistication of these fields.

For example, Wood and Sosis (2019) recently developed a system dynamics model to assess the validity of the CAS approach to religion. They found that stable societies in their experimental simulations tended to have higher legitimacy—that is, agents perceived institutions as credible—than unstable ones, and that higher legitimacy leads to greater cooperativeness. Simulated communities maximized their population growth by overexploiting their resource base, but this in turn led to a collapse of the community. Certain communities, however, showed greater longevity when they had strong leaders (specifically, the parameter aimed at characterizing religious authority was maximized). As Wood and Sosis note, religious charisma in the simulated social systems postponed community collapse, but crashes did eventually occur, and they were often more extreme than community crashes that lacked the intervention of a religious authority. The boom-to-bust patterns of these simulations, and the role that charismatic leaders had in prolonging and accentuating these dynamics, appear to have historical parallels to the Yugoslav Wars, where the decline in support for religious violence advocated by charismatic leaders was preceded by rising health threats and declining birth rates (Kiper & Sosis, in press).

In addition to the systemic approach's natural links to the sciences, it can also provide a connection to the humanities. The historical work on Jewish demons described previously was not an idiosyncratic erstwhile exercise. As noted above, CASs, including religions, exhibit nonlinearity, amplification of random fluctuations, and historical contingency. The systemic approach, in other words, not only recognizes the significance of history for understanding religion, it suggests that historical work is indispensable to explaining the evolution of religion. Indeed, it would be

impossible to understand why any religion takes the form it does without understanding the historical factors that shaped the religion accordingly.

Positive feedback loops direct CASs toward divergent historical pathways. In other words, small random changes that are not necessarily adaptive responses to environmental conditions can result in substantial differences across systems. Because interactions among agents are nonlinear, small fluctuations in input can have considerable impacts on output. This of course has significant consequences for understanding religious systems. For example, Jewish communities that I have visited in North America, South America, Europe, Africa, Middle East, and India display extraordinary religious diversity. Their differences in food preferences, dress, greetings, language, styles of prayer, and so forth are a product of the local sociocultural environment. But how and why communities initially settled in a particular area is often the result of a fortuitous decision of a religious leader, a ship simply landing where the winds took it, myths of golden streets, and countless other random factors that are not adaptive responses to environmental conditions. Yet these factors result in astonishing divergences between communities over time.

Such considerations are also important for defining the appropriate parameters of adaptive analyses. While many religious beliefs and practices confer adaptive benefits (e.g. Shaver et al., 2019), the specific details of many religious acts, such as why one religious garment is worn instead of another, are simply the result of arbitrary circumstances. Why medieval Jews, for instance, adopted European rather than Chinese demons has little to do with the relative adaptive qualities of these respective demons; rather, it is a consequence of historically contingent factors. As others have noted (Lang & Kundt, 2020), the necessity of historical analyses for the systemic approach suggests it has the potential to offer that elusive bridge from the sciences to the humanities.

## Conclusion

I have sketched a model of religion as a CAS and argued that this systemic approach offers at least four advantages as a framework for the evolutionary study of religion: it avoids definitional problems that have plagued the study of religion, affords a contextual understanding of religious belief, informs some current debates within the evolutionary study of religion, and provides links to both the natural sciences and humanities. Debate within any academic field is healthy and usually productive. But current debates within the evolutionary study of religion are focused on the narrow details of specific isolated elements within religious systems, without attention to the context in which these elements are situated. To be clear, this type of fractionalization is essential to scientific advancement. However, the perfunctory fractionalization that currently pervades the scientific study of religion is directing us away from urgent questions about how the elements of religious systems interrelate, the selective pressures that have favored the coalescence of these elements across time and space, and the implications of this coalescence for the perdurance of religious thought and expression in our world today. The framework presented here not only raises these questions, but its connection to broader work in complexity theory points to the tools—phylogenetic, historical, cross-cultural, ethnographic, experimental, and modeling techniques—that can be employed to answer these questions and advance a more holistic and accurate study of religion. To conclude, this article has been one long argument that approaching religions as CASs offers the most promising framework for advancing the evolutionary study of religion. Now the real work must begin.


## Acknowledgements

I thank the James Barnett Endowment, Templeton Foundation, and Issachar Fund for support, and Fraser Watts and two anonymous reviewers for helpful feedback on an earlier version of this paper.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Preparation of this paper was supported by grant TRT 0153 from the Templeton Religion Trust to the International Society for Science and Religion.

## ORCID iD

Richard Sosis  <https://orcid.org/0000-0002-6838-881X>

## References

- Alcorta, C. S., & Sosis, R. (2005). Ritual, emotion, and sacred symbols: The evolution of religion as an adaptive complex. *Human Nature, 16*, 323–359.
- Angel, M. (2009). *Maimonides, Spinoza and us: Toward an intellectually vibrant Judaism*. Jewish Lights.
- Armstrong, K. (2009). *The case for God*. Random House.
- Atran, S. (2002). *In Gods we trust*. Oxford University Press.
- Barker, J. L., Power, E. A., Heap, S., Puurtinen, M., & Sosis, R. (2019). Content, cost, and content: A framework for understanding human signaling systems. *Evolutionary Anthropology, 28*, 86–99.
- Barrett, J. L. (2000). Exploring the natural foundations of religion. *Trends in Cognitive Sciences, 4*(1), 29–34.
- Barrett, J. L. (2004). *Why would anyone believe in god?* AltaMira Press.
- Barrett, J. L. (2017). Could we advance the science of religion (better) without the concept “religion”? *Religion, Brain & Behavior, 7*(4), 282–284.
- Barrett, J. L. (2018). On the naturalness of religion and religious freedom. In T. S. Shah & J. Friedman (Eds.), *Homo religiosus? Exploring the roots of religion and religious freedom in human experience* (pp. 67–88). Cambridge University Press.
- Bell, C. (1992). *Ritual theory, ritual practice*. Oxford University Press.
- Bellah, R. N. (1991). *Beyond belief*. University of California Press.
- Bellah, R. N. (2011). *Religion in human evolution*. Harvard University Press.
- Bering, J. M., & Bjorklund, D. F. (2004). The natural emergence of reasoning about the afterlife as a developmental regularity. *Developmental Psychology, 40*(2), 217–233.
- Boyer, P. (1994). *The naturalness of religious ideas*. University of California Press.
- Boyer, P. (2001). *Religion explained*. Basic Books.
- Bulbulia, J. (2012). Spreading order: Religion, cooperative niche construction, and risky coordination problems. *Biology and Philosophy, 27*(1), 1–27.
- Cho, F., & Squier, R. K. (2013). Religion as a complex and dynamic system. *Journal of the American Academy of Religion, 81*, 357–398.
- Czachesz, I. (2014). The evolutionary dynamics of religious systems laying the foundations of a network model. In A. Geertz & J. Sinding Jensen (Eds.), *Origins of religion, cognition and culture* (pp. 98–120). Routledge.
- D’Aquili, E. G., Laughlin, C. D., & McManus, J. (1979). *The spectrum of ritual*. Columbia University Press.
- De Cruz, H., & De Smedt, J. (2014). *A natural history of natural theology*. MIT Press.
- De Cruz, H., & De Smedt, J. (2016). Naturalizing natural theology. *Religion, Brain & Behavior, 6*(4), 355–361.
- Dunbar, R. I. (2017). What’s missing from the scientific study of religion? *Religion, Brain & Behavior, 7*(4), 349–353.
- Durkheim, E. (1995). *The elementary forms of religious life*. Free Press. (Original work published 1912)
- Geertz, C. (1973). Religion as a cultural system. In C. Geertz (Ed.), *The interpretation of cultures* (pp. 87–125). Basic Books. (Original work published 1967)
- Gervais, W., & Henrich, J. (2010). The Zeus problem: Why representational content biases cannot explain faith in gods. *Journal of Cognition and Culture, 10*(3–4), 383–389.
- Guthrie, S. (1980). A cognitive theory of religion. *Current Anthropology, 21*(2), 181–203.
- Guthrie, S. (1995). *Faces in the clouds*. Oxford University Press.
- Harvey, G. (2013). *Food, sex and strangers: Understanding religion as everyday life*. Acumen.

- Henrich, J. (2016). *The secret of our success*. Princeton University Press.
- Henrich, J., & Gil-White, F. (2001). The evolution of prestige. *Evolution and Human Behavior*, 22(3), 165–196.
- Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Addison-Wesley.
- Holland, J. H. (2012). *Signals and boundaries: Building blocks for complex adaptive systems*. MIT Press.
- Johnson, D. D. P. (2016). *God is watching you*. Oxford University Press.
- Keesing, R. M. (1982). *Kwaio religion*. Columbia University Press.
- Kelemen, D. (2004). Are children “intuitive theists”? Reasoning about purpose and design in nature. *Psychological Science*, 15(5), 295–301.
- Kiper, J., & Sosis, R. (in press). The systemics of violent religious nationalism: A case study of the Yugoslav Wars. *Journal for the Study of Religion, Nature, and Culture*.
- Klass, M. (1995). *Ordered universes*. Westview Press.
- Lang, M., & Kundt, R. (2020). Evolutionary, cognitive, and contextual approaches to the study of religious systems. *Method and Theory in the Study of Religion*, 32(1), 1–46.
- Luhrmann, T. M. (2012). *When God talks back: Understanding the American evangelical relationship with God*. Vintage.
- Marett, R. R. (1914). *The threshold of religion*. Cornell University Press.
- Martin, L. H. (2008). Can religion really evolve? And what is it anyway. In J. Bulbulia, R. Sosis, E. Harris, C. Genet, R. Genet, & K. Wyman (Eds.), *The evolution of religion: Studies, theories, and critiques* (pp. 349–355). Collins Foundation Press.
- McCauley, R. N. (2011). *Why religion is natural and science is not*. Oxford University Press.
- McCauley, R. N. (2013). Why science is exceptional and religion is not: A response to commentators on Why Religion Is Natural and Science Is Not. *Religion, Brain & Behavior*, 3(2), 165–182.
- Meigs, A. S. (1984). *Food, sex, and pollution: A new guinea religion*. Rutgers University Press.
- Miller, J. H., & Page, S. E. (2007). *Complex adaptive systems*. Princeton University Press.
- Mitchell, M. (2009). *Complexity: A guided tour*. Oxford University Press.
- Newson, L., & Richerson, P. (2014). Religion: The dynamics of cultural adaptations. In F. Watts & L. Turner (Eds.), *Evolution, religion, and cognitive science: Critical and constructive essays* (pp. 192–218). Oxford University Press.
- Pals, D. (2014). *Nine theories of religion*. Oxford University Press.
- Purzycki, B. G., Haque, O., & Sosis, R. (2014). Extending evolutionary accounts of religion beyond the mind: Religions as adaptive systems. In F. Watts & L. Turner (Eds.), *Evolution, religion, and cognitive science: Critical and constructive essays* (pp. 74–91). Oxford University Press.
- Purzycki, B. G., & Sosis, R. (2013). The extended religious phenotype and the adaptive coupling of ritual and belief. *Israel Journal of Ecology & Evolution*, 59(2), 99–108.
- Purzycki, B. G., & Willard, A. (2016). MCI theory: A critical discussion. *Religion, Brain & Behavior*, 6(3), 207–248.
- Pyysiainen, I. (2004). *Magic, miracles, and religion*. AltaMira Press.
- Rappaport, R. A. (1999). *Ritual and religion in the making of humanity*. Cambridge University Press.
- Richerson, P. J., & Boyd, R. (2005). *Not by genes alone*. University of Chicago Press.
- Sahlins, M. (1995). *How “natives” think: About captain cook, for example*. University of Chicago Press.
- Schieffelin, E. (1976). *The sorrow of the lonely and the burning of the dancers*. Springer.
- Shaver, J., Purzycki, B., & Sosis, R. (2016). Evolutionary theory and the study of religion. In M. Stausberg & S. Engler (Eds.), *The Oxford handbook of the study of religion* (pp. 124–136). Oxford University Press.
- Shaver, J., Sibley, C., Sosis, R., Galbraith, D., & Bulbulia, J. (2019). Alloparenting and religious fertility: A test of the religious alloparenting hypothesis. *Evolution and Human Behavior*, 40(3), 315–324.
- Smith, J. Z. (1982). *Imagining religion: From Babylon to Jonestown*. University of Chicago Press.
- Smith, W. C. (1964). *The meaning and end of religion*. Bantam Books.
- Sørensen, J. (2004). Religion, evolution, and an immunology of cultural systems. *Evolution and Cognition*, 10(1), 61–73.
- Sosis, R. (2009a). The adaptationist-byproduct debate on the evolution of religion: Five misunderstandings of the adaptationist program. *Journal of Cognition and Culture*, 9, 315–332.

- Sosis, R. (2009b). Why are synagogue services so long? An evolutionary examination of Jewish ritual signals. In R. Goldberg (Ed.), *Judaism in biological perspective* (pp. 199–233). Paradigm.
- Sosis, R. (2016). Religions as complex adaptive systems. In N. Clements (Ed.), *The brain, cognition, and culture* (pp. 219–236). Macmillan.
- Sosis, R. (2019) The building blocks of religious systems approaching religion as a complex adaptive system. In G. Y. Georgiev, J. M. Smart, C. L. Flores Martinez, & M. Price (Eds.), *Evolution, development & complexity: Multiscale models of complex adaptive systems* (pp. 421–449). Springer.
- Sosis, R. (in press). The last talmudic demon? The role of ritual in cultural transmission. *Philosophical Transactions of the Royal Society B*.
- Sosis, R., & Kiper, J. (2014). Religion is more than belief: What evolutionary theories of religion tell us about religious commitment. In M. Bergman & P. Kain (Eds.), *Challenges to religion and morality: Disagreements and evolution* (pp. 256–276). Oxford University Press.
- Sosis, R., & Kiper, J. (2018). Sacred versus secular values: Cognitive and evolutionary sciences of religion and religious freedom. In T. S. Shah & J. Friedman (Eds.), *Homo religiosus? Exploring the roots of religion and religious freedom in human experience* (pp. 89–119). Cambridge University Press.
- Sosis, R., & Shaver, J. (2015). How rituals elicit shared sacred values. *Interdisziplinäre Anthropologie*, 3, 75–81.
- Stark, R., & Finke, R. (2000). *Acts of faith*. University of California Press.
- Tuzin, D. (1997). *The Cassowary's revenge*. University of Chicago Press.
- Wafer, J. (1991). *The taste of blood*. University of Pennsylvania Press.
- Watts, F., & Turner, L. (2014). *Evolution, religion, & cognitive science: Critical and constructive essays*. Oxford University Press.
- Whitehouse, H., & Lanman, J. (2014). The ties that bind us: Ritual, fusion, and identification. *Current Anthropology*, 55(6), 674–695.
- Wildman, W. J. (2011). *Religious and spiritual experiences*. Cambridge University Press.
- Wood, C., & Sosis, R. (2019). Simulating religions as adaptive systems. In S. Diallo, W. Wildman, F. L. Shults, & A. Tolk (Eds.), *Human simulation: Perspectives, insights, and applications* (pp. 209–232). Springer.



