

Soul Mates? Conflicts and Complementarities in the Evolutionary and Cognitive Sciences of Religion 

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Abstract and Keywords

This chapter aims to (a) provide a brief overview of the three primary approaches to the evolutionary study of religion (evolutionary psychology, human behavioral ecology, and dual-inheritance theory), (b) examine how the evolutionary and cognitive sciences of religion differ, and (c) explore areas of potential integration between these two scientific fields of inquiry. The chapter concludes that although the evolutionary and cognitive sciences of religion could continue as quasi-independent fields, they would both benefit from theoretical and methodological integration. The systemic approach, it is suggested, offers the most promising way forward.

Keywords: behavioral ecology of religion, cognitive science of religion, cultural evolution, evolutionary religious studies, systems theory, ritual

Introduction

THE cross-cultural prevalence and persistence of religious expression demands evolutionary investigation and explanation. It is thus unsurprising that evolutionary approaches to the study of religion have flourished in recent years. Although evolutionary theory has informed some work in the cognitive science of religion (CSR), the field in general has not fully embraced selectionist analyses.

We aim to (a) provide a brief overview of the evolutionary study of religion, (b) examine how the evolutionary and cognitive sciences of religion differ, and (c) explore areas of potential integration between these two scientific fields of inquiry. We conclude that although the evolutionary and cognitive sciences of religion could continue as quasi-independent fields, both would benefit from theoretical and methodological integration.

(p. 350) **The Evolutionary Study of Religion: A Brief History**

The evolutionary study of religion begins with Charles Darwin. Darwin, after all, offered a mechanism to explain evolutionary change—namely, natural selection. Yet, despite an illustrious founder, the beginnings of the evolutionary study of religion were not auspicious. Remarkably, Darwin thought the solution to the problem of the origin of religion was self-evident. In *Descent of Man, and Selection in Relation to Sex* (1871), he wrote: “As soon as the important faculties of the imagination, wonder, and curiosity, together with some power of reasoning, had become partially developed, man would naturally crave to understand what was passing around him, and would have vaguely speculated on his own existence” (Darwin, 2005; p. 678). In other words, once the human mind evolved, people needed answers to existential problems; religions, Darwin suggested, evolved to provide those answers.

Reading Darwin’s comments on religion is a mildly disturbing experience for those of us who hold him as one of our intellectual heroes. How could Darwin, who was so careful in his analyses of the hundreds of species he discussed throughout his writings, completely miss that the structure and form of religion cry out for explanation? Simply contemplating one’s existence does not lead one to build ornate cathedrals, undergo circumcision, forgo sex, or turn one’s dinner into charcoal for immaterial beings. And as anthropologists have long noted, unlike typical explanations of events, which seek to clarify and simplify, religious explanations make things more complicated (Evans-Pritchard, 1937). Religions, as Sperber (1985, p. 85) observes, “create relevant mysteries.” Darwin was correct that humans gravitate toward religious explanations, but he apparently did not appreciate the complexity of this process. As Hume famously commented, “explanation is where the mind rests”; but Darwin took us no further in understanding why the human mind so often rests on religious explanations.

Following Darwin, the evolutionary study of religion proceeded, by all measures, rather slowly. It was nearly a full century after Darwin’s initial thoughts before another biologist would seriously engage the study of religion. It was marine biologist and Oxford professor Sir Alister Hardy, who is most famous or, more accurately, infamous for his aquatic ape hypothesis—but he also had a deep interest in religion. He was invited to give the Gifford Lectures at Aberdeen University in 1963–1964 and 1964–1965, and he used them to offer an evolutionary explanation of religion. Hardy was impressed by the universality of religious experience and proposed that religion evolved because it was favored by natural selection. Hardy’s lectures were published in two volumes, regrettably entitled *The Living Stream* (Hardy, 1965) and *The Divine Flame* (Hardy, 1966). With these titles, these works were probably shelved next to books on new age spirituality and, not surprisingly, they have largely been forgotten. Although Hardy founded the Religious Experience Research Centre, for which he was awarded the Templeton Prize in 1985, his work did not jump-start the still embryonic evolutionary study of religion.

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(p. 351) A decade later, however, the evolutionary study of religion began showing signs of life. The eminent Harvard entomologist, E. O. Wilson, included a chapter on religion in his award-winning *On Human Nature* (1978). Wilson proposed that successful religions were those that enhanced the survivorship and reproduction of populations. Motivated by Wilson's writings, biological anthropologist Vernon Reynolds and sociologist Ralph Tanner (1983) collaborated on an innovative study entitled *The Biology of Religion*, in which they argued that religion was a "handbook of parental investment." They showed that in economically poor environments, whose populations experienced high mortality rates, religions were generally pronatalist; whereas in areas of greater health and wealth religions were antinatalist. Their findings were important because they suggested that religion was not irrational or impervious to external forces such as economics and the environment; rather, religions adapted to their local ecologies. Indeed, Reynolds and Tanner (1995) retitled the revised version of their book *The Social Ecology of Religion*.

The rest of the 1980s and most of the 1990s remained notably stagnant for the evolutionary study of religion. But by the mid- to late 1990s, an avalanche had begun, and suddenly a spate of books and articles by well-known academics applied evolutionary theory to the study of religion. For example, the renowned scholar of Greek religion and myth Walter Burkert (1996), examined Greek religion through a Darwinian lens in *The Creation of the Sacred*. And another prominent scholar, Cambridge zoologist Robert Hinde (1999), published *Why Gods Persist*.

It is not until biologist David Sloan Wilson published *Darwin's Cathedral* (2002), however, that the evolutionary study of religion appears to have crossed the Rubicon. Wilson argued that religion had evolved because it benefits groups. In other words, religion is a group-level adaptation. Despite Wilson's reliance on group selection as an explanatory mechanism, an approach that elicited great skepticism among evolutionary researchers who were studying human behavior at the time, the book did catalyze the evolutionary study of religion. It would probably be overstating the impact of *Darwin's Cathedral* to say that Wilson was the founder of the contemporary evolutionary study of religion, but his work is surely one of the major influences in the field. Although evolutionary anthropologists Lee Cronk (1994) and William Irons (1996) had pursued pioneering adaptationist analyses of religion in the 1990s, it was Wilson's work, and subsequent collaborations, that gave the adaptationist approach to religion visibility, and introduced the evolutionary study of religion to religious studies and other humanities-based scholars.

It is worth noting that prior to *Darwin's Cathedral*, research in the cognitive science of religion was not completely devoid of evolutionary thinking. Several landmark studies by scholars who focused on religious cognition, such as Guthrie's (1980, 1993) work on anthropomorphism, relied on evolutionary frameworks to support their theories. But it was not until the early 2000s that the evolutionary and cognitive sciences of religion began to cross-pollinate. The early 2000s saw the publication of seminal books in the cognitive science of religion by two cognitive anthropologists: *Religion Explained* by Pascal Boyer (2001), and *In Gods We Trust* by Scott Atran (2002). Both volumes, whose impact on the cognitive science of religion can hardly (p. 352) be overstated, drew from evolutionary

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psychology and treated religion as an evolutionary byproduct. However, as we will see, by defining religion as a byproduct, an analytical dead end, they were not well positioned to contribute to subsequent evolutionary analyses of religion.

Evolutionary Approaches to Religion

The efforts to apply evolutionary theory to the study of religion do not represent a single unified endeavor or research program. Some of the differences, as we discuss below, are disciplinary and methodological in nature. Other differences, however, have deep theoretical roots. Among evolutionary scholars of religion, two of the most salient areas of disagreement concern (a) whether religion is a cognitive byproduct or a manifestation of adaptive behavioral plasticity, and (b) whether individual- or group-level selection processes have been a more potent evolutionary force in shaping the significant features of religion. The first of these disagreements has also been a topic of considerable debate between adaptationists and cognitive scientists of religion.

Researchers' focus of study strongly influences how they interpret the effects of natural selection on religion. When, for instance, researchers concentrate on the cognitive requirements of religious thought, they typically conclude that religious beliefs are merely byproducts of psychological adaptations that were designed for other purposes (e.g., Boyer, 2001; Guthrie, 1993). But when researchers examine the social consequences of ritual behavior, the adaptive benefits of religion become salient (e.g., Alcorta & Sosis, 2005). When research emphasizes individual variation in religious behavior, it is obvious that these adaptive benefits are not equally achieved; some benefit more than others (Cronk, 1994; Shaver, 2015; Shaver & Sosis, 2014). However, research that has focused on group-level dynamics reveals that some religious groups are more successful than others. Scholars who study these dynamics argue that religious groups function as adaptive units that are subject to cultural group selection (Norenzayan, 2013; Wilson, 2002).

These differences in research foci roughly correspond to three relatively distinct evolutionary approaches to the study of human behavior: *evolutionary psychology*, *human behavioral ecology*, and *dual inheritance theory* (Smith, 2000). We will describe how each of these evolutionary subfields has approached the study of religion.

Before proceeding, and by way of disclosure, we mention that the first author's background and training is primarily, but not exclusively, in human behavioral ecology. The coauthors, however, have broader training in all the evolutionary subfields. Moreover, we have collectively pursued research in all three subfields (e.g., Kiper & Sosis, 2016; Shaver, 2015; Shaver & Sosis, 2014; Wildman & Sosis, 2011) and in the cognitive sciences (e.g., Purzycki et al., 2012). Elsewhere, we have argued that viewing these evolutionary approaches as complementary, rather than contradictory, offers the greatest potential to explain the complex phenomenon of religion (Shaver et al., 2016). Since evolved (p. 353) cognitive faculties, memory and its organization, behavioral expression, interpersonal social psychological responses, and the social and natural environments are all at

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play in the formation of religious systems, diverse approaches are necessary if we wish to uncover the evolutionary origins and development of religion.

Evolutionary Psychology of Religion

Evolutionary psychologists use the theory of natural selection to generate hypotheses about pan-human psychological design; they contend that the human mind consists of several cognitive systems that were designed to solve specific adaptive problems that ancestral human populations faced (Tooby & Cosmides, 1992). Because the human brain consists of cognitive adaptations that are designed to solve ancestral problems, and because modern environments often differ substantially from ancestral ones, cognitive adaptations can produce thoughts and behaviors that are neutral, maladaptive, or even unrelated to the problems they arose to solve. Indeed, the majority of evolutionary psychologists of religion hold that the human tendency toward supernatural belief is an evolutionary byproduct of cognitive systems that were originally meant to solve adaptive problems unrelated to religion (Kirkpatrick, 2006, 2008). That is, the human proclivity to believe in the supernatural is the result of an evolved pan-human psychological design; but the cognitive architecture that supports supernatural belief did not arise because belief in supernatural agents was itself adaptive.

The theoretical stance of evolutionary psychologists motivates their research questions, which include questions about the developmental trajectories of the cognitive abilities that are assumed to contribute to supernatural belief, their presence in adults, and their cross-cultural prevalence. Evolutionary psychologists generally test their assumptions in laboratory and field experiments, as well as survey research. Cognitive scientists of religion who rely on evolutionary thinking have primarily allied themselves with evolutionary psychology. Indeed, the cognitive science of religion considers many of the researchers employing evolutionary psychology in the study of religion, such as Guthrie, Boyer, and Bering, as part of their intellectual community.

Evolutionary psychologists of religion assume that several cognitive systems contribute to our propensity to believe in the supernatural. Notably, Guthrie (1993) argues that the human tendency to anthropomorphize arose as a result of selection pressures that favored the ability to perceive agents and agency in the environment, and that these abilities contribute to the human propensity to interpret events in terms of supernatural agency. He suggests that perceiving agents, even when there are none, is advantageous because *not* detecting harmful agents that are present would be deleterious. Although this promiscuous agency detection did not emerge for purposes relating to religion, and though the evolutionary roots of this capacity run deep, it is nonetheless the ability to perceive unseen agents that gives rise to religious perceptions and explanations of the mysterious (Barrett, 2004; cf. Andersen, 2019; Van Leeuwen & van Elk, 2018). Furthermore, perceptions of spirits, demons, gods, and other supernatural agents are (p. 354) the natural byproduct of such a sensitive system. Humans explain the world in terms of agency, and frequently believe that events are caused by supernatural agents.

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Human social interactions require the ability to understand and appreciate what others are thinking and feeling. Indeed, human sociality is built on the cognitive ability to interpret other individuals as having their own distinct perceptions, desires, and beliefs. This capacity, known as theory of mind ([ToM]; Premack & Woodruff, 1978), arose for reasons unrelated to religion, but it now contributes to the human propensity to believe that supernatural agents have minds and their own wishes and desires. But perceiving and thinking about such entities would contribute little to human sociality unless it tapped into moral cognition as well (Gray et al., 2012). Some evidence suggests that it does (Purzycki et al., 2012), even when the gods are not thought of as concerned with moral behavior (Purzycki, 2013, 2016).

Other work suggests that humans are primed from an early age to accept teleological explanations. Deborah Kelemen, for example, has suggested that children are “intuitive theists,” who believe that things in the natural world have been purposefully designed (Kelemen, 2004). Her studies have shown that children readily assert that both natural objects and artifacts exist for a reason. Moreover, this bias is not limited to children; lesser educated adults show the same tendency (Casler & Kelemen, 2007), and under conditions of high cognitive load, even scientifically trained adults exhibit the same biases (Kelemen & Rossett, 2009). Although “promiscuous teleology” is thought to be the result of cognitive modules that evolved to reason about the biological world (e.g., Atran, 1995), it also renders belief in a creator intuitive, and leads to interpretations that events happen for a purpose—an interpretive framework that many religions share.

Although the mainstream view among evolutionary psychologists is that religious representations are evolutionary byproducts, a few scholars have proposed that selection processes have resulted in specific psychological adaptations for religion. For example, Bering (2006) has provided evidence in support of the contention that humans are intuitive dualists, and unless formally taught otherwise, they exhibit a tendency to conceptually separate minds from bodies. This propensity leads to the belief that minds and/or souls can continue to exist after death (Bering, 2006). Additionally, Johnson and Bering (2006) argue that the human tendency to fear supernatural punishment is an adaptation that arose because individuals who feared supernatural punishment were able to inhibit self-interested behaviors and social transgressions that would have been punished by other group members. Because god-fearing individuals were more successful at reaping the benefits of cooperation in ancestral environments, selection favored these propensities. Others argue that religions evolved, at least in part, to support mate discrimination or finding other individuals who prefer monogamous long-term relationships and high fertility (Slone, 2008; Weede et al., 2008). Indeed, several authors interpret the lower promiscuity and higher fertility levels of religious people as an outcome of such strategies (Blume, 2010; Bulbulia et al., 2015; Kaufmann, 2010).

The majority of evolutionary psychologists of religion speculate that religious beliefs and behaviors are a byproduct of cognitive systems that evolved to respond to selection pressures in ancestral environments (and that these selection pressures were unrelated to those that now motivate religious beliefs and behaviors). However, behavioral ecologists assume that selection has produced behavior-generating mechanisms that enable individuals to respond optimally to diverse environmental conditions, and that cross-cultural variation in behavior represents a manifestation of this behavioral plasticity. Contrary to the majority of cognitive approaches, behavioral ecologists begin their analyses by assessing how behaviors are adapted to current socioecologies. For the behavioral ecologist, determining adaptiveness means measuring the costs and benefits of a behavior, given available alternatives, in an effort to understand the selection pressures at work in any given environment. In general, behavioral ecologists of religion start by testing hypotheses derived from models that assume an individual's behavior is adaptive in its current environment. Human behavioral ecologists are typically anthropologists, who engage in long-term ethnographic research and use data derived from field experiments and systematic behavioral observation to test hypotheses. They attempt to address research questions about the adaptiveness of individuals' religious behavior in a particular environment. While the behavioral ecology of religion is still in its infancy (Sosis & Bulbulia, 2011), research to date has been both diverse and fruitful. Here we focus on just a few of these research programs.

At first glance, religious behavior appears maladaptive; it is often materially, energetically, and temporally expensive and thus superficially appears to be detrimental to individuals' immediate somatic and reproductive self-interest. However, behavioral ecologists interpret these costs as investments that return material benefits that positively impact fitness. To explain the adaptive benefits of ritual behavior, behavioral ecologists borrow two key insights from social theorists. First, Durkheim (2001) speculated that the effervescent nature of collective rituals binds group members together and increases within-group cohesion. Second, Rappaport's (1999) definition of ritual as "the performance of more or less invariant sequences of formal acts and utterances not entirely encoded by the performer" (Rappaport, p. 24). has been widely employed by behavioral ecologists. He argued that rituals are able to increase social solidarity because they communicate adherence to a moral code and commitment to a social order, which in turn promotes trust, and hence cooperation.

Like all collectivities, religious groups are susceptible to exploitation by free-riders, who reap the benefits of group cooperation without cooperating themselves. Irons (2001) argued that the costliness of religious obligations functions as commitment devices and serves to minimize the free-rider problem, because only those who are truly committed to the group would be willing to incur the costs of these obligations. In other words, individuals who observe religious taboos and perform religious rituals (p. 356) communicate (or

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“signal”) their commitment to the group and, in turn, benefit from increased cooperation; these material benefits are ultimately translated into reproductive success.

This theoretical framework, known as the *costly signaling theory of religion*, suggests that religious groups that require costly behaviors of their members will exhibit high levels of cooperation. For example, Sosis and Bressler (2003) found that nineteenth-century religious communes in United States that demanded more costly behaviors of group members out-survived those with fewer costly obligations. Moreover, the ritual costs associated with group membership vary across environments and increase as a function of the risks of exploiting these resources via free-riding. Perhaps the greatest risks of free-riding occur among groups engaged in warfare, where shirking on one’s commitment to the group might mean death to other group members. Indeed, Sosis et al. (2007) found that cultures engaged in endemic warfare have the most taxing religious rites. Research has also shown that religious communities are able to stabilize at larger group sizes (Dunbar & Sosis, 2018), presumably affording them greater defense and resource exploitation capacities. In general, a significant body of empirical research now provides support for the premise that costs paid in ritual performance return high levels of cooperation (e.g., Power, 2017a, 2017b; Ruffle & Sosis, 2007; Soler, 2012; Sosis & Ruffle, 2003).

Behavioral ecologists have also explored the socioecological conditions that have favored specific religious behavioral patterns. For example, Strassmann’s (1992, 1996) work with the Dogon of Mali examined the manner in which religious taboos and rituals surrounding sexual activity, such as attending menstrual huts, reduce the risks of cuckoldry. And Strassmann et al. (2012) specifically showed how the various religions practiced by the Dogon differentially impact cuckoldry rates.

In other studies, behavioral ecologists have begun to address the “paradox of religious fertility” (Shaver, 2017). Many religious families globally have large families, and because resources are finite, there is typically a negative relationship between family size and child success on education and health measures. But large family size does not seem to negatively impact religious children. Shaver and his colleagues have suggested that religious families receive help raising their children from coreligionists, known as *allocare*, which offsets the costs of their large families. Shaver et al. (2019), for example, found that religious New Zealanders were more likely to engage in *allocare* than their secular counterparts. Moreover, Shaver et al. (2020) showed that religious women in the United Kingdom receive more social support than secular women and that this support is positively associated with fertility and children’s cognitive development.

Dual Inheritance Theories of Religion

The aforementioned evolutionary approaches to the study of religion focus on the individual-level evolutionary forces that led to the emergence of religious belief and behavior. But there is a third group of scholars who emphasize that selection operating at (p. 357) the group level might explain the origins and proliferation of religions. Dual inheritance theory (DIT) posits that genes and culture provide separate but interacting forms of in-

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heritance. DIT theorists suggest that cultures, like genes, exhibit the three necessary conditions for evolution by natural selection: variation, inheritance, and fitness consequences. Because people acquire a significant amount of information from other group members and cultures differ, the information some groups accumulate allows them to overcome adaptive problems better, and thus they spread at the expense of less successful groups (Boyd & Richerson, 1985).

Proponents of DIT are, typically, evolutionary biologists, anthropologists, and economists, who rely upon computer simulations and field and laboratory experiments to test mathematical models of cultural evolutionary processes. Many DIT scholars have suggested that religious groups are subject to these cultural evolutionary processes.

Notably, D. S. Wilson (2002) argues that because religious groups limit self-interested behavior but provide secular utility to their members, they function as adaptive units. When communities function as units, they are subject to the forces of cultural group selection, and better adapted religions spread at the expense of those less equipped to overcome socioenvironmental challenges. Wilson shows how religions, such as Calvinist Christianity and Jainism, provide material benefits for their members, while limiting self-interested behaviors and encouraging altruism toward other group members.

Other dual inheritance theorists share with evolutionary psychologists the assumption that supernatural beliefs are byproducts of cognitive systems and processing tendencies, such as an agency detection device, theory of mind mechanisms, and teleological reasoning. But the dual inheritance theorists also argue that variants of supernatural belief and religious groups are subject to cultural selection (e.g., Atran & Henrich, 2010; Norenzayan, 2013). These theorists note that groups committed to omniscient high gods who they believed intervene in human affairs and punish noncooperators were more successful than groups whose belief systems did not promote cooperation as effectively. In this way, cultural evolutionary processes led to the current global pattern of limited religious diversity—more than half the world's population practices Christianity or Islam, which affirm belief in an omniscient high god that can punish uncooperative behavior. To support these assertions, DIT theorists cite the results of experimental studies showing that people are more cooperative under perceived social monitoring (e.g., Bering et al., 2005); that religious primes decrease cheating behavior and increase generosity, fairness, cooperation, and the punishment of noncooperators (Norenzayan & Shariff, 2008), and that religious individuals are trusted more than nonreligious individuals (Purzycki & Arakchaa, 2013).

Norenzayan (2013), who has developed this argument extensively, recognizes that the widespread cooperation among non-kin in large-scale human societies is a significant evolutionary puzzle. He speculates that powerful, morally interested “Big Gods,” with their ability to promote prosocial behavior, enabled large-scale societies to emerge. Specifically, he posits that through coevolutionary processes, the groups that embraced watchful and omniscient gods were able to cooperate and outcompete groups that were unable to extend cooperation beyond kin and reciprocal relations.

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(p. 358) Dual inheritance theorists also assume that humans are endowed with psychological adaptations for general-purpose learning, which allow for the rapid gathering of fitness-relevant information from other group members. These evolved abilities bias attention and learning toward successful group members, which contributes to the cultural accumulation of solutions to significant fitness concerns, such as techniques for tool construction or methods of agricultural production (Boyd & Richerson, 1985; Richerson & Boyd, 2005). One of these biases is the *frequency bias*, which increases the probability of learning information that is copious in a social environment. In terms of religious beliefs, the more people believe something and express that belief, the more likely an individual is to learn that belief and act on it as well (Henrich, 2016). Another such bias is the *prestige bias*, which concerns specific sources of informational transfers. Like parents and successful hunters, priests, rabbis, shamans, lamas, mullahs, and other religious leaders are likely to transfer information with high fidelity, because it is assumed that selection has favored learning mechanisms that encourage us to copy the behavior of successful individuals.

Differences between the Evolutionary and Cognitive Sciences of Religion

Scholars have identified various key events, conferences, or milestone publications—spanning decades—that allegedly mark the founding of cognitive science of religion (CSR) (Sosis, 2017). Here is not the place to debate these alternative narratives. What is relevant here is that regardless of when the field was actually founded, by the 2000s, when cognitive scientists of religion began to regularly engage with scholars trained in evolution, CSR was already a well-established field of study. Again, this is not to say that some of the founding CSR researchers did not consider evolutionary perspectives or attempt to explain the evolution of religious cognition. They did. However, adaptationist approaches were absent from early discourse in cognitive science of religion. Consequently, two key areas of disagreement emerged once evolutionary and cognitive scientists began to seriously engage each other's work: whether religious expressions should be understood as adaptations or byproducts, and whether religion should be characterized by maturational or practiced naturalness.

Adaptationist versus Byproduct Debate

The pioneering work of early CSR researchers, including E. Thomas Lawson, Robert McCauley, Justin Barrett, Harvey Whitehouse, and Pascal Boyer, uniformly maintained that the psychological mechanisms involved in the production of religious beliefs and behaviors were not designed to produce these beliefs and behaviors. This position has become axiomatic among cognitive scientists of religion. (p. 359)

In the early 2000s, when evolutionary scholars finally began to engage with the burgeoning CSR literature, they were puzzled by what they encountered. Biologists argue for high standards before a trait can be accepted as an adaptation, but they caution that nonadap-

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tive explanations should be offered as a last resort because they stifle further scientific enquiry (Krebs & Davies, 1993, p. 31). Yet the cognitivists embraced religion as a byproduct even though adaptationist hypotheses had never been evaluated. As noted, not until the publication of D. S. Wilson's (2002) *Darwin's Cathedral* was there a significant challenge to the byproduct position; and Wilson did not tackle the byproduct position of the cognitivists but the byproduct views of the prominent sociologists Rodney Stark, William Bainbridge, and Roger Finke. Wilson offered an adaptationist account of religion based on cultural group selection models that focused on the secular utility of religion at the group level. Although Wilson demonstrated that religion can confer great benefits on its constituents, he did not address the underlying psychology of religious beliefs that were of interest to the cognitive scientists, and thus did little to sway them from their anti-adaptationist stance (e.g., Boyer, 2004).

The burden of evidence required to demonstrate an adaptation is considerable and unfortunately there is no agreed-upon protocol for accepting or rejecting what counts as an adaptation. Andrews et al. (2002) reviewed six evidentiary standards that have been employed by biologists to identify adaptations, including phylogenetic comparisons, fitness maximization, and beneficial effects in ancestral environments, but their thorough review also highlights the limitations of each of the approaches they discuss. Williams (1966), the recognized father of the adaptationist program, cautioned that alternative explanations for the emergence of trait characteristics had to be eliminated, but he also recognized that there is no universal list of evidentiary standards that can be applied to all traits. He argued that adaptations should exhibit evidence of "special design"; they should efficiently solve the adaptive problem they are purported to solve and demonstrate reliability, economy, and precision.

Despite the adaptationists' inability to conclusively eliminate all alternative explanations of a trait's emergence in a particular round of hypothesis testing, the cumulative output of sustained, rigorous hypothesis testing can reasonably support the existence of an adaptation. What is often unappreciated is that meeting the standards of evidence necessary to support the position that a trait is a byproduct is no less burdensome than establishing that a trait is an adaptation. Indeed, adaptationist hypotheses must be tested as alternative explanations (Andrews et al., 2002). In other words, hypotheses about functionless byproducts must meet rigorous scientific standards. These standards include a functional analysis of the original adaptations responsible for producing the functionless byproducts, and an analysis of the existing human cognitive and motivational mechanisms responsible for the co-opting. Needless to say, such standards of evidence are rarely met, especially by those claiming that religion is a byproduct (see Buss et al., 1998).

(p. 360) One reason for the communication impasse between evolutionists and cognitivists over the adaptive nature of religion is that they appear to be engaging different levels of analysis. Evolutionary analyses often begin with Niko Tinbergen's four questions, or four levels of analysis (Tinbergen, 1963). Importantly, these four types of explanations are not mutually exclusive but complementary. Ontogenetic analyses ask questions about the development of a trait over the life course of an organism. Mechanistic analyses ask ques-

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tions about how underlying physiological and psychological mechanisms produce the observed behaviors. Ontogenetic and mechanistic explanations are more broadly understood as proximate explanations. They address how behaviors become manifest; in other words, how they are produced and develop. Proximate explanations contrast with ultimate explanations, which aim to understand why certain traits evolved. One ultimate explanation concerns phylogeny—that is, analyses that focus on the evolutionary history of a trait. The other ultimate explanation concerns the functional value of a trait. Specifically, functional analyses are concerned with how a trait helps an organism survive and reproduce.

Most evolutionary studies of religion focus on ultimate-level explanations, aiming to determine whether there are selective advantages that could explain the patterns of religious expression in our species. Initial evolutionary forays sought to explain the costs of religious behavior. Such work turned toward behavioral ecological models of signaling, discussed above (Bulbulia, 2004; Bulbulia & Sosis, 2011; Irons, 2001; Sosis, 2003; Sosis & Alcorta, 2003). These models broadly showed that religious behaviors could serve as commitment devices that limit freeriding in communal endeavors; the collective gains from successful cooperation could outweigh the costs of religious performance. Other evolutionary researchers, also recognizing the cooperative nature of many religious groups, argued that adherence to supernatural agents helped resolve the inherent free-riding problems that plague collective endeavors (Schloss & Murray, 2011). This class of models includes supernatural punishment theory (Johnson, 2016, 2017), *supernatural monitoring theory* (Shariff & Norenzayan, 2007), and *Big Gods theory* (Norenzayan, 2013, 2015). These theories have generated an impressive body of empirical studies that have sought to assess and distinguish between these competing theories (e.g., Hartberg et al., 2016; McNamara et al., 2016).

Some of the most exciting recent advances in the evolutionary study of religion have been the use of phylogenetic analyses. Watts et al. (2015), for example, were able to evaluate between two leading theories that aim to explain the role of religion in the rise of complex societies. Using phylogenetic methods, Watts and colleagues showed that commitments to supernatural punishing agents preceded political complexity, whereas contrary to predictions from Big Gods theory, beliefs in moralizing high gods did not. In subsequent phylogenetic work, Watts et al. (2016) demonstrated that human sacrifice emerged before strict class systems, and these rituals were used to develop and sustain systems of inequality. Phylogenetic tools offer a powerful way to evaluate hypotheses about the evolutionary origins, function, and trajectory of religious practices and beliefs.

At a fundamental level, cognitivists and evolutionists differ in their approach to religious beliefs. Evolutionists, in general, treat religious beliefs as proximate mechanisms. (p. 361) Beliefs, it is argued, are simply one of the underlying mechanisms capable of motivating behavior. Consequently, the psychological underpinnings of supernatural beliefs are typically not the focus of adaptationist analyses. Evolutionists have been more concerned with how such beliefs inspire religious behaviors that can impact aspects of fitness, such as survivorship, resource accrual, and mating opportunities. Cognitive scientists of reli-

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gion, on the other hand, have been deeply interested in explaining the psychological mechanisms that enable and foster supernatural beliefs. Cognitivists and evolutionists, thus, are often operating at different levels of analysis. This does not fully explain their disagreement over the adaptive nature of religion (we will return to this debate below), but it does help to explain some instances where researchers from each field are talking past each other (see Sosis, 2009).

Maturational versus Practiced Naturalness Debate

Many cognitive scientists of religion argue that human cognitive systems inevitably yield religious beliefs and commitments. This view is known as the *naturalness of religion thesis*. Some scholars take a strong position on the naturalness thesis, denying the relevance of much environmental input in the development of the cognitive systems that produce religion, whereas others support a weaker form of the thesis that recognizes environmental contributions to the developmental timing and manifestation of these systems, seeking to incorporate the role of cultural factors in religious expression. The naturalness of religion thesis has generated significant academic interest and discussion (see McCauley, 2013); however, its implications extend well beyond purely academic concerns. Whether or not religion is “natural” is relevant for understanding issues concerning the legal protection of religious expression, basic human rights, and conflict resolution between religious and secular values (Barrett, 2018; Sosis & Kiper, 2018). It is also central to understanding what it means to be human.

McCauley (2011) advanced the most thorough articulation of the naturalness thesis in his seminal book *Why Religion Is Natural and Science Is Not*. McCauley describes *naturalness* as thought processes or behaviors characterized by ease, automaticity, and fluency. He distinguishes between two basic types of naturalness that should be considered as existing along a continuum. On one side of the continuum, maturational naturalness arises as a consequence of normal development and requires relatively less socioecological input. Behaviors such as learning to walk, learning to speak, and recognizing faces, for example, are “maturationally natural.” On the other side, practiced naturalness 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.

McCauley places religious cognition (but not theological reflection) on the maturational side of the continuum. His argument relies on a growing body of research demonstrating that core elements of religious expression—such as supernatural agent beliefs, teleological reasoning, and afterlife beliefs—are the natural outcome of normal cognitive development. Evolutionary scholars generally have not contested these (p. 362) studies, however, they have argued that religion falls more toward the practiced end of the religious continuum (e.g., Sosis & Kiper, 2018).

From an evolutionary perspective, the underlying cognitive structures of religion represent only the seeds of the potential development of religious systems (Sosis & Kiper, 2014). After all, theory of mind, mind-body dualism, and other cognitive features are nec-

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essary but not sufficient to produce religious traditions. To be sustained throughout the life course and across generations, religious beliefs require reinforcement, and religious behaviors require practice. Therefore, without further qualification, most evolutionists doubt that religious behaviors are nearly inevitable, as the naturalness of religion thesis suggests. Religious expression requires cultural inputs and cultivation, not just cognitive potential. Whether one believes in Zeus, Vishnu, or Allah will depend on the cultural environment in which one is raised. But mere exposure to teachings about these figures is not enough to generate commitments. Rather, adherents throughout the world believe in their gods, and the gods of other people, regardless of exposure, because adherents perform rituals for their particular deities (Alcorta & Sosis, 2005). In other words, though humans possess the cognitive machinery to believe in gods, the commitment to a particular god must be cultivated. In this way, belief is not automatic but achieved through ritual behaviors, such as supplications to a particular god, ritual presentations of myth, ascetic practices, and healing ceremonies, all of which instill sacred experiences.

In terms of cultivating religious experience, religious ritual is universally used to identify the sacred, and in so doing, separate it from the profane. As Durkheim (2001) argued, the sacred emerges through ritual and reflects issues concerning the social order, which take on a seemingly cosmic significance in light of religious discourse. Additionally, Rappaport (1999) noted, ritual does not merely identify that which is sacred—it *creates* the sacred. This is because rituals collectively alter participants' cognitive schema, giving them a template for differentiating sacred objects and activities from profane ones. Most importantly, from a behavioral perspective, the emotional significance of sacred and profane activities is quite distinct; it is not only inappropriate to traffic in the profane, it is emotionally repugnant to do so. Thus, while religious adherents differentiate sacred and profane things, their cognitive discrimination would be empty without an emotional reaction to the sacred, for it is the emotional significance of the sacred that underlies "faith," and it is ritual participation that invests the sacred with emotional meaning. This emotional valancing of the sacred and profane is learned.

The debate over where religious cognition falls along the naturalness continuum may partially be a consequence of disciplinary and methodological differences. Cognitive scientists are interested in uncovering the universal cognitive architecture that produces religious concepts. They are therefore more likely to emphasize the maturational character of religion because they study the cognitive mechanisms that produce religious beliefs and behavior; it is indeed the case that human cognition naturally produces religious expression. But evolutionary scientists—particularly evolutionary anthropologists—are often struck by the extraordinary plasticity of human behavior in contrast to other organisms. They generally perceive religion as lying toward the (p. 363) practiced end of the naturalness continuum because their attention is on the diversity of religious expression and how religious behaviors are critical for forming and sustaining belief and commitment.

Toward Integration: Religions as Complex Systems

Cognitive scientists of religion focus on how cognitive systems produce, retain, and transmit religious thought. Conversely, adaptationist approaches to religion emphasize variation in the costs and benefits of religious behavior. Thus these two perspectives differentially emphasize some features of religions while neglecting others. However, religions are made up of both features—and a host of others—including emotionally evocative symbols, myths, and taboos. Some recent evolutionary approaches recognize that these core elements of religion constitute an adaptive system designed for promoting cooperation (Alcorta & Sosis, 2005; Purzycki & Sosis, 2009, 2010; Sosis, 2009, 2016). This approach incorporates the insights from all three evolutionary perspectives, as well as CSR research, and aims to explain the central elements of religion taking into consideration the local environment in which people operate.

Religious systems typically maintain eight core elements: authority, meaning, moral obligation, myth, ritual, the sacred, supernatural agents, and taboo (Sosis, 2016, 2019). They are the building blocks of religious systems (Sosis, 2019; cf. Taves, 2009). Each element is most usefully conceived of as a unique category, which may have an independent phylogenetic history but which within a religious system is inherently interconnected with the other elements in that system. The core structure of religious systems consists of interactions between the eight core elements we have identified. Ritual is at the center of religious systems, and though all the elements may not interact with each other directly, they do all interact with and through ritual.

Our understanding of these interactions is rudimentary, but various cognitive theories shed light on these interactions, and it is here where integration between the evolutionary and cognitive sciences of religion is most promising. For example, Whitehouse's (2004) modes theory of religion provides a useful framework for understanding the mechanisms that enable rituals to create meaning, and significantly, how variation in the frequency of ritual performance is related to variation in the formation of meaning. Modes theory also captures how ritual intensity is related to religious authority; religious leaders are more likely to emerge under the doctrinal mode (low intensity rituals) than the imagistic mode (high intensity rituals) of religion. Other cognitivist theories, such as minimally counterintuitive or MCI theory (Purzycki & Willard, 2016), hazard precaution system theory (Liénard & Boyer, 2006), and ritual form theory (McCauley & Lawson, 2002), offer further insights about how the core elements of religious systems interrelate. These theories, alongside evolutionary theories, including (p. 364) supernatural punishment and signaling theories, are laying the groundwork for a more holistic analysis of religions (Sosis, 2020; Wood & Sosis, 2019). The patterns by which the core elements of religion interact likely constitute a grammar (Bulbulia, 2012); it is the ongoing task of evolutionary and cognitive researchers studying religion to uncover these grammatical rules.

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The systemic approach to religion can also help resolve the adaptationist-byproduct debate discussed above. Adaptationists have been accused of not specifying “what it is that evolved or is evolving” (Wiebe, 2008, p. 344). The systemic approach clarifies what selection has operated on—a coalescence of cognitive, emotional, and behavioral elements—and directs us to the appropriate questions for an adaptationist analysis. Even if the category of religion is simply a Western construct as some contend (Klass, 1995), it is a collection of cognitive processes and behaviors that form an appropriate unit of evolutionary analysis. To clarify, we are not arguing that we should abandon the study of individual core elements of the religious system, such as supernatural agent beliefs, ritual, or religious authority. Quite the contrary; studying these core elements is essential. The point here is that the religious system—the coalescence of these elements—must be the focus of adaptationist analyses. To claim that the cognitive systems that produce supernatural agent belief have not evolved to produce such beliefs and therefore “religion” is not adaptive is misleading. It is the religious system that produces functional effects, not the constituent parts. A proper byproduct account of religion, which has yet to be offered, must explain why the religious system’s constituent parts recurrently coalesce across cultures.

Conclusion

The title of our chapter questions the nature of the relationship between the evolutionary and cognitive sciences of religion. On the one hand, these fields have independent academic histories. One draws inspiration from Darwin and the modern evolutionary sciences; the other sees its roots in the cognitive revolution inspired by Chomsky and others. On the other hand, the contemporary cognitive sciences have widely incorporated evolutionary perspectives. Moreover, the intellectual promiscuity of CSR, welcoming nearly all non-sociological scientific research into the fold, has meant that evolutionists and cognitivists have been bedfellows for nearly two decades. Admittedly, sharing the same bed has not always been comfortable. The tensions between the evolutionary and cognitive sciences of religion in some ways mirror those between evolutionary psychology, on which much CSR thinking is based, and behavioral ecology and dual inheritance theory. Although competition between fields of study can advance understanding, the history of collaboration between these evolutionary subfields also suggests that complementarity can foster progress and provide a more complete picture of the human condition (Sosis, 2017). We think an integration of the cognitive and evolutionary sciences of religion holds similar promise.

(p. 365) Questions for Future Research

1. What data are needed to evaluate byproduct theories of religion?
2. Can behavioral ecological and cultural evolutionary models inform cognitive science approaches to religion?
3. How can the cognitive and evolutionary sciences of religion become better integrated?

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Soul Mates? Conflicts and Complementarities in the Evolutionary and Cognitive Sciences of Religion

Religion, Brain & Behavior, which publishes research on the bio-cultural study of religion.

John Shaver

John Shaver is an evolutionary anthropologist concerned mostly with understanding the relationships between social inequality, cooperation, and conflict. His recent research focuses on how religion impacts maternal fertility as well as maternal and child health. He has conducted demographic, ethnographic, and experimental research in the Czech Republic, Fiji, Mauritius, New Zealand, and the United States.

Benjamin Grant Purzycki

Benjamin Grant Purzycki is an Associate Professor in Aarhus University's Department of the Study of Religion. He studies how and why religious traditions evolve to overcome problems associated with cooperation and coordination. In addition to managing large international teams, he has conducted fieldwork in the Tyva Republic in southern Siberia.

Jordan Kiper

Jordan Kiper is Assistant Professor of Anthropology and Human Rights at the University of Alabama, Birmingham (UAB). Drawing from cognitive science, human rights, and philosophy, his research has examined the social conditions that induce commitments to peace or armed conflict, with particular interests in propaganda, nationalism, moral cognition, and the dynamics of religious systems. His work has also considered the influence of various types of propaganda and speech acts, including hate speech, on decision-making, intergroup perceptions, and support for violence. To explore these issues, he has conducted experimental studies and fieldwork in post-conflict regions of the Balkans, including Bosnia-Herzegovina, Croatia, and Serbia. Much of his current research is collaborative and cross-cultural.