

In the Beginning, Evolution Created Religion and the Arts

Books Under Review

Beyond God: Evolution and the Future of Religion
by Kenneth V. Kardong. Humanity Books (Prometheus), 2010.

The Biological Evolution of Religious Mind and Behavior
Edited by Eckart Voland and Wulf Schiefenhövel. Springer, 2009.

*The Biology of Religious Behavior:
The Evolutionary Origins of Faith and Religion*
Edited by Jay R. Feierman. ABC-CLIO (Praeger), 2009.

The Evolution of Religion: Studies, Theories, and Critiques
Edited by Joseph Bulbulia, Richard Sosis, Erica Harris, Russell Genet,
Cheryl Genet, and Karen Wyman. Collins Foundation Press, 2008.

The Faith Instinct: How Religion Evolved and Why It Endures
by Nicholas Wade. Penguin Press, 2009.

God's Brain
by Lionel Tiger and Michael McGuire. Prometheus Books, 2010.

ELLEN DISSANAYAKE

In their speculations about the origin of religion, early theorists looked to single features that might have kicked off this universal human invention: seeing dead people in dreams, a fear of death, an infantile wish for a caring parent, an opiate to relieve suffering, gaining power over underlings. Although these conjectures, somewhat differently phrased, still have their adherents, today's cognitive and evolutionary scholars of religion no longer look for a single origin or a single identifying trait. Instead, the subject of religion is approached as a complex and interconnected repertoire of patterns of thinking and behaving.¹ As with art (with which religion shares a history), there are many manifestations and a single foremost trait is elusive. It doesn't help that the word *religion*, like art, is not in the languages of the societies to which we look for insights about its beginnings.

This confusion of definition, of knowing what we are talking about, is probably in part responsible for the scarcity of evolutionary and cognitive studies of both subjects, until recently. For about two decades a growing number of scholars have been addressing the fascinating and puzzling phenomenon of humankind's long emotional intertwining with the beliefs and practices that we can recognize as "religious," even when they cannot be tied into a tidy definition. The cognitive/evolutionary interest in religion began fitfully in the 1990s,² gained momentum in the early-to-middle 2000s,³ and at the end of the decade with the six books under review has reached flood stage. Still other books are already here or in the works.⁴ Those who wish to stay afloat must paddle fast: the three edited books under review themselves contain nearly a hundred chapters. Anyone who wishes to contribute to the field can anticipate many months of background reading. As an interested outsider, I found the endeavor unexpectedly engaging and clarifying and was gratified to discern in a number of the studies clues not only to the evolutionary origin of religion but also—although few of their authors seemed to realize it—of the arts, or, better, the co-evolution of the two. I'll come back to this.

Religious behavior has evidently been a successful human trait. It has existed universally from ancestral times and is easier to instill than to eradicate. But for a Darwinist, it offers at least two fundamental problems. How could natural selection have favored individuals or groups who (a) hold obviously false, even self-contradictory beliefs about the world and (b) frequently espouse harmful, even fatal practices—think of celibacy, fasting, mortification of the flesh, suicide bombing, Jim Jones, David Koresh, cicatrizations or circumcisions performed with unsterilized implements, and so on?

Scholarly efforts to examine these two questions have gone through two main phases. Approximately half the pioneering studies from 1993 to 2007 were by cognitive scientists who proposed ingenious and plausible sources for religious belief in various "cognitive mechanisms" of the human mind. They considered religion to be at most a "by-product" of these other adaptive human traits but not itself adaptive.⁵ Some years later, in contrast, the authors of

and most of the contributors to the six books reviewed here accept the cognitive antecedents proposed by their predecessors but nevertheless believe religiosity (or religiousness) is or was adaptive.⁶ The earlier, cognitive scholars focus on the religious *mind*; they are most concerned with belief. The later, more ethological scholars also take into account religious *behavior*, which involves religious practice and emotional experience.⁷

FOUR MAJOR QUESTIONS ABOUT RELIGIOUS BEHAVIOR (RELIGIOSITY)

1. Description: What is religiosity? What are its distinguishing features? The most cited feature that characterizes religiosity is a belief in **supernatural agents** (independent entities such as gods, demons, or spirit animals that "act," using supernatural powers). Most scholars regard this feature as a fundamental if not sufficient feature of the religious mind.⁸ Other core features include **myth**, *stories that explain, legitimize, and evaluate the world and people's place in it*; **moral-ity**, *rules and prohibitions that guide the thought and actions of individuals*; **rites/rituals**, *with symbolic objects and special actions (such as prayer and sacrifice) through which people believe they can seek the help of supernatural agents for healing illness, averting harm, assuring success, and attaining the other good outcomes that humans desire*; and **community**, *the social attachment that is gained through sharing and reiterating a bequeathed system of religious beliefs*. Also included may be what Rüdiger Vaas calls **ultimate relatedness**, *the distinct experience or state of consciousness that results from religious belief and the performance of religious rituals—feelings of attachment, connectedness, dependence and obligation as well as a sense of ultimate purpose and meaning*⁹ and **mysticism**, *which refers to distinguishing a world or mental state that is felt to be sacred (numinous, holy) as opposed to the ordinary or profane*.¹⁰ This mental state can occur in unobservable forms but can also be dramatically manifested in outward behavior: glossolalia, convulsive weeping, contagious laughter or singing, fainting, trembling, shaking, and trance.

2. Origin: From which antecedent behaviors or mental traits did these features come? Most cognitive and evolutionary

scholars of religion accept in some form the features just listed that characterize religion. And whether or not they think religion or religiosity is adaptive, they trace its various characteristics to a naturalistic source—the biology of the mind. If everything we perceive, think, feel, plan, and do is based on brain activity, then the same will be the case for religious experiences, convictions, and behavior.¹¹ Although there are no brain regions dedicated especially for religion, religion is a product of brain function¹² and diverse beliefs may share similar underlying cognitive structures.¹³

Thus religiosity is traced to evolved intuitive universal ways of thinking (called “folk psychology,” “cognitive mechanisms,” or “cognitive architecture”) with descriptive labels such as belief perseverance, confirmation bias, expectancy effect, overgeneralization, overinterpretation, oversimplification,¹⁴ categorical domains, semantic episodic memory systems, action-grammar,¹⁵ or the perception of similarity or illusionary correlations.¹⁶ These are well-attested features of nonreligious thought and behavior that religion/religiosity has co-opted, rather as jungle roads are sometimes built upon already existing animal trails.

For example, belief in supernatural agents could easily emerge from the evolved human penchant for attributing “agency” to any environmental sound or movement: for our ancestors it would have been wiser to assume that a rustling in the bushes indicated a live, hungry predator rather than to ignore it as nothing important and become prey. Thus a *hyperactive agency detection device* (HADD) that automatically attributes unusual natural phenomena to the presence of an agent could be adopted to invent disembodied but animate supernatural entities that, like people, have intentions and goals.¹⁷

Similarly, humans intuitively *infer a designer or maker* and *attribute events to causes*, positing reasons or explanations for why things occur as they do. Even small children are easily inclined to understand that living things have desires and goals and are able to act.¹⁸ Extending these attributions, children (and even animals) automatically find animism and purpose in things that seem to move voluntarily.¹⁹ I recall my dog barking excitedly at a discarded food container being blown about in a large puddle or my daughter refusing to sleep in a strange room where the paisley bedspread

had “eyes that were watching” her. Without being taught, children invent imaginary friends and engage in pretend play with objects as if they were alive.²⁰ Another factor contributing to the invention of supernatural agents is what cognitive scientists call Theory of Mind, the evolved ability to detect others’ mental or emotional states.²¹

Humans are born with an intuitive *mind-body dualism*,²² as when an invisible immaterial self (not the material body that ages and changes throughout life) is assumed to be the actual person. At death, the body remains but not the “person,” who has vanished. If we later dream about those who have died, it seems as though they live on in another world or afterlife,²³ and it is thus easy to posit a divide between everyday existence and another mysterious, extraordinary, or ultimate reality or state of being.

Religious experiences such as heightened emotional states of elation and a sense of peace or timelessness can be traced to autonomic neural causes and correlates²⁴ that are shared with nonreligious experiences such as listening to music, the aftermath of orgasm, breastfeeding, or even intense exercise. It is not only shamans and other mystics who see visions, hear voices, or become possessed. These and other dramatic symptoms interpreted as religious transport may occur in persons under treatment for mental disorders.

The invention of myth can be attributed to the development of the prefrontal cortex of the enlarging human brain, which made possible language, complex thought, and imaginative abilities to create virtual worlds in the arts and in story. As self-reflection developed, the susceptibility to religious explanations and creations increased.²⁵ Scott Atran, among others, has suggested that religion may soothe anxieties that arise from having a large brain, such as existential loneliness and awareness of unavoidable loss.²⁶ I think that a tragic sense of life is more likely to be found in the psychology of recent humans than in that of ancestral hunter-gatherers.

Scholars claim that various evolved factors contribute to the development of moral intuition in humans: for example, innate notions of harm and of fairness, some shared even with other primates; in-group-out-group dynamics and the importance of loyalty; intuitions about bodily and spiritual purity and the importance of living in a sanctified

rather than casual way; and intuitions about authority and the importance of respect and obedience.²⁷

Some cognitive scientists have traced religious rituals to ritualistic sorts of behaviors such as obsession, compulsion, and anxiety that may themselves be linked to adaptive contamination-avoidance systems motivated by disgust or fear of contagion from corpses and other toxic or putrefied material.²⁸

Numerous cognitive and neural substrates predispose humans to sociality and feelings of trust or sympathy. Infant attachment to a protective parental figure can easily generalize to an assumption that god/gods will care for us and protect us from harm.²⁹ Evolved traits of docility and conformism that lead to obedience to social authority are useful in instilling cooperation.³⁰ Oviedo [*Mind and Behavior*] suggests that religiosity is a by-product of mirror neurons and the empathy system.

3. Adaptiveness: What does religious behavior accomplish: what evolutionary problems does it solve? Is religion or religiosity an adaptation and why (and if not, why not)? Perhaps it was adaptive in the past but not now; it may be a neutral leftover or a by-product/exaptation from another behavior.

Although the authors of and contributors to the books reviewed here tend to agree about the defining features of religiosity and their evolutionary antecedents, they sometimes emphasize different adaptive problems that religions solve and differ about the factors that account for this adaptiveness. These can be collected under some seven categories of adaptive functions, all of which promote the leaving of descendants—that is, reproductive success.

(a) Religious behavior serves as a “library” of necessary knowledge, enabling practitioners to store important information and pass it on.³¹ Humans, like any animal, must adapt to the environment into which they are born and in which they live.³² Although as a species we are generalists and can adapt to various environments, we must understand things and events in our particular circumstances, a complicated task because environments are often uncertain. Religious behavior contributes to that imperative in several ways. Several scholars suggest that the earliest known form of religion was ancestor worship, the belief that dead ancestors

(one’s kin) are alive and can influence the living.³³ Regard for ancestors encourages respect for living kin, obedience to traditions, and transmission of traditions.³⁴ Means of transmission include stories and rituals that through repetition and emotional arousal create vividness and aid memory.³⁵

(b) Religious behavior establishes and reinforces rules of conduct.³⁶ It instills and shapes desirable behavior and prohibits antisocial behaviors.³⁷ In forty-three ethnographies coded to cover eighteen foraging societies, Christopher Boehm [*Evolution of Religion*] found that hunter-gatherers universally have supernatural sanctions against socially disruptive behaviors such as murder, incest, cheating, stealing, lying, adultery, and lazy noncooperation. Other actions are prohibited with taboos about food, animals, sex, transgressions against ritual rules, traditions surrounding birth and death, and deities (taking the Lord’s name in vain): these are prohibited more often than morally relevant problems.

(c) Religious behavior coordinates behavior within groups, leading to social cohesion,³⁸ attachment,³⁹ emotional bonding,⁴⁰ and cooperation.⁴¹ Ancestor worship encourages cooperation even among distant living kin⁴² as does the wearing of badges, insignia, or other signs of group membership.⁴³ Religious rituals are “amplification technologies” that dramatically enhance the message being transmitted (e.g., “we achieve more together than alone”).^{44, 45} Securely bonded and cooperative individuals could more successfully hunt and kill large and dangerous animals, which were necessary to hominin subsistence for hundreds of thousands of years.⁴⁶ Social cohesion and cooperation were adaptive not only for killing animals to eat or for defense against animal predators but for competing with other human groups—that is, for warfare.⁴⁷ Religious practice has been a motivator and justification for aggression throughout human prehistory and history: a dramatic increase in the scale of warfare accompanied the rise of world religions and monotheism in settled agricultural societies.⁴⁸ Even without the prompting of war, urbanization itself is socially and psychologically disruptive, fostering a need for security and comfort that religion could provide.

(d) Religious behavior provides opportunities for the public display of religious commitment by means of “hard-to-fake” signals like fasting, penitence, body mutilation, and

so forth, which demonstrate that one is a true member, not a freeloader or parasite on the group. Such demonstrations build trust and solidarity among members of a group.⁴⁹

(e) Religious behavior turns children into socialized adults, bonded to their communities. Neurological and other evidence suggests that there is a "critical period" at puberty in which the brains of restless and energetic youngsters are susceptible to indoctrination and group bonding. Three-fourths of societies, whether hunter-gatherer, pastoral, agricultural, or industrial, observe adolescent rites of passage with common elements: music-based communal rituals, evocation of emotions, and association of those emotions with sacred symbols and beliefs that prescribe or proscribe social behaviors.⁵⁰

(f) Religious behavior enhances health and well-being.⁵¹ Healing practices involving shamanistic rituals and altered states of consciousness are widely found in traditional societies.⁵² In modern societies, a converging number of studies demonstrate that religiousness acts as a protective influence on mental and physical health for some if not all illnesses, as well as promoting prosocial and cooperative behaviors.⁵³ For example, religious nations have lower suicide rates than secular ones—even taking into account depressed economic and social conditions.⁵⁴

(g) Religious behavior helps humans to cope with unpredictability and the feeling of lack of control.⁵⁵ In thirty-five years of fieldwork with the Eipo in Highland New Guinea, Wulf Schiefelhövel found that helplessness, stress, and anxiety were reduced through belief and ritual, and he proposes that ritualized forms of behavior are adaptive in helping humans deal with the bewildering magnitude of phenomena that plague the exceptionally large human cortex.⁵⁶ Whether or not a particular ritual practice succeeds, individuals feel a sense of control and their anxiety is relieved.⁵⁷ Studies suggest that increased religiosity is a common response to exposure to terror.⁵⁸

4. Is religion an adaptation? A by-product? Until recently, most cognitive and evolutionary scientists concluded that religion is not an evolutionary adaptation. They point out that to begin with, religiosity is not a coherent functional property. It looks cobbled together: a complex mixture of

by-products of a diverse collection of the various psychological mechanisms, described earlier, and cultural evolution.⁵⁹ Depending on the religion, these various properties change in importance and in some cases may even be absent.⁶⁰ Different scholars focus on different aspects of religion—cognitive, affective, experiential, behavioral, institutional. It is not surprising that their explanations are directed toward different and nonexclusive levels of causation (cognitive function, genetic selection, cultural transmission); viewing these as "alternatives" is inappropriate.⁶¹ Some aspects of religion may be adaptive and some not—or may be adaptive in one context and not another; a spandrel or viral meme may end up having reproductive benefits and driving selection for genetic enhancement of the benefit.⁶²

Although she builds an excellent case for adolescence being an evolved critical period for religious indoctrination, Candace Alcorta⁶³ concludes that religion is not necessary for normal adolescent development if people live in groups that do not require the cooperation of non-kin (25 percent of the societies that she surveyed). When other institutions meet the need, religion and adolescent rites should be absent or sparse. That is, it may be adaptive under some circumstances but not all.

In view of the received wisdom that religion or religiosity is not adaptive, how can so many newer books, like those under review, now claim that it is? It is time to examine them individually, beginning with the authored books.

BEYOND GOD: EVOLUTION AND THE FUTURE OF RELIGION, BY KENNETH KARDONG

As a professor emeritus of biology and the author of a successful textbook on biological evolution,⁶⁴ Kardong is the only actual professional biologist among the hundred or so authors, contributors, and editors discussed in this review. He believes that religion is adaptive, but like many who believe otherwise, he thinks that analyses of religion by psychologists and sociologists give only "proximate" explanations (19). He aims to produce a "truly evolutionary" explanation that can clarify the presence of religion "in the human character in the first place" (9).⁶⁵ He takes Darwin seriously:

Natural selection is not an invention of compassionate humans or of a caring God, but an intrinsic consequence of nature's harsh culling process. In menacing environments or risky competition or bloody predation, those with adaptations that see them through survive and enjoy the greatest of all biological rewards—successful reproduction, and hence perpetuation of the lineage. It is that stark and that simple. (20)

Kardong concludes that because all human societies have religion, and because religious practices consume such great amounts of effort, time, and energy, such a vast and pervasive phenomenon would not escape natural selection if it returned no adaptive benefits.

Kardong examines the usual explanations for religion (roughly, the seven theories described earlier) and says that all but the first two, which are the ones he espouses, do not answer why religion is present in the first place: on examination, they collapse into proximate explanations—the secondary and derived features that now encrust it (122). In order to show examples of adaptive religion in action, he describes actual religious behavior in hunter-gatherer and small-scale societies such as the Fore and Maring of New Guinea, the Kalahari Desert San, the Northwest Coast Indians of North America, and several Australian Aboriginal groups. In each, he illustrates his view that in biological terms, religion supplies an individual with two adaptive advantages—a “library” and a value system. Religious lore and myth contain “a systematic body of knowledge” about topographical, economic, and social features of the local ecosystem. Those same myths, working in tandem with ceremonies and sacred beliefs, serve as a medium for a system of values. In religious practice, the tested experience of previous generations is promoted, preserved, and passed on to the current generation (126–27, 140).⁶⁶ Religious practices enforce conformity to adaptive cults and customs that bring survival in unique environments. Religion, then, is “the linchpin between culture and habitat” (94).

Kardong argues that religion became established through its immediate ecological advantages, those of the library and value system. Once in place, it could accumulate

other functions such as social cohesion and cooperative effort. These in turn led to better defense and resource exploitation, then to a sense of group identity, then to economic or political control. Kardong does not overlook the “tools of the trade” (256ff.) that produce religious belief and resolve (rites and rituals) or the basic, embedded, and fundamental mental characteristics of religion (acceptance of dogma, the idea of the supernatural, and blind faith). But he sees these as consequent, not prior, to the two primary functions that made religious belief and practice adaptive in the first place.

Kardong's book gave me a mind-clearing breath of fresh oxygen. Reductionist, reasonable, and written in plain language, it develops the author's views with ethnographic examples and fully assimilated knowledge of how Darwinian evolution works. The arguments seem to have taken form over a lifetime of careful thought. Although sometimes repetitious, the style is assured, occasionally epigrammatic, reader-friendly, and passionate. I recommend this book as the first, and essential, reading for anyone interested in understanding the biology and evolution of religious behavior.

After describing some of the horrors that have been justified by religious belief, Kardong concludes, “Ironically, for our survival, we must leave behind the once-useful command by religion and its gods, and move to the next moment in our long evolutionary history” (287). We must, or “we will reap the whirlwind” (288). This last sentence, urging humankind to give up religion, is proclaimed with as much conviction and fervor as any apocalyptic preacher demanding religious conversion. Kardong does not deny that “religion is a lust implanted in our bodies” (287) and that humans have a “God-sized hole to fill” (287), yet he personally feels that informed discussion of religion's evolutionary emergence is the first and necessary step toward taming this urge, as we have learned to tame other once adaptive but now pernicious predilections.

**THE FAITH INSTINCT: HOW RELIGION
EVOLVED AND WHY IT ENDURES, BY
NICHOLAS WADE**

Nicholas Wade is a science writer for the *New York Times* and specializes in human evolution. (His *Before the Dawn*:

Recovering the Lost History of Our Ancestors, from 2007, is also reviewed in this volume). Like Kardong, Wade claims that religion is natural to human nature: the human mind is prepared by evolution to believe in gods. And like Kardong, Wade looks for insights about the past in contemporary hunter-gatherer societies, for example, Aboriginal Australians, Andaman Islanders, and the San. Because these long-isolated groups, like other hunter-gatherers, are conservative, their rites may still reflect ancient forms directly transmitted from ancestral populations.⁶⁷ Wade observes that these three hunter-gatherer peoples have no priests or ecclesiastical hierarchy. Their stance toward the world is practical, not concerned with theory or theology; that is, though moral or practical lessons are conveyed by sacred narratives, these beliefs or ideologies are integrated with rituals/ceremonies and are not the focus of religious practice, which is composed of rhythmic, physical communal activity with song-dance marathons, everybody moving together in time.⁶⁸

Like Tiger and McGuire and some contributors to the edited volumes under review, Wade addresses world religions (127) and gives a fascinating historical description of "the tree of religion," which, he speculates, has fourteen super families (145). He notes that although both modern (generally monotheistic) religions and religions of hunter-gatherers provide social cohesion for their adherents,⁶⁹ the religions of hunter-gatherers require the physical as well as mental involvement of all members of the community; the religions of settled people are more cerebral. Whereas ancestral religions sought to secure survival in the real world, modern religions are more focused on salvation in the next (127). In modern societies the state now performs many social functions that used to be the province of the church—education, caring for the sick, looking after the poor. Because science is a better explanatory framework than religion for understanding physical and biological phenomena like weather or disease (190–91), religion today is no longer, as in premodern societies, a comprehensive guide to daily life (228ff.).

Wade's book is commendable for many reasons. It is comprehensive with regard to almost every aspect of religion and clearly and engagingly written. He is well informed about the most recent research but is also familiar with the work of prominent early ethnographers and other theorists of religion such as Durkheim, Evans-Pritchard,

Frazer, Freud, William James, Malinowski, Radcliffe-Brown, Spencer and Gillen, and Tylor. Rather than ignoring them, or dismissing them as hopelessly mired in the prejudices of their day, he situates their ideas historically and, where possible, uses them illustratively.

In contrast to many cognitive and evolutionary scholars, Wade does not neglect emotional life or the effects of unconscious processes on individual thought and behavior. He recognizes that religion is both personal and social, emotional and cognitive. Unlike the vast proportion of cognitive and evolutionary scholars of religion,⁷⁰ Wade emphasizes the importance of music, dance, and trance (90–97, 197)—devoting an entire chapter to this trinity. Indeed, apart from Alcorta and Sosis,⁷¹ he is to my knowledge the only scholar who proposes that religious behavior emerged from rhythmic activities like dancing or marching (74).

Rhythmic social activity began, he thinks, during the transition from the male dominance of ape-like societies to the egalitarianism of hunter-gatherer societies. Individuals had to depart from self-interest and commit emotionally to the group: those who learned to bond through ritual and dance developed the most cohesive communities. The ability to entrain to a rhythmic beat, he conjectures, may have been the first element of religious behavior to have been favored by natural selection—for its role in emotional bonding.⁷²

By emphasizing music and dance, Wade (like Alcorta and Sosis, whose pathbreaking and indispensable work he cites) is able to recognize that these behaviors are important vehicles of emotional information. I will say more about the relationship between religious behavior, emotion, and the arts at the end of the next section.

GOD'S BRAIN, BY LIONEL TIGER AND MICHAEL MCGUIRE

For Kenneth Kardong in *Beyond God*, natural selection is responsible for religion. The authors of *God's Brain*, Lionel Tiger and Michael McGuire, professors of anthropology and psychiatry respectively, consider all religions as the "product of the human brain." Somewhat confusingly, they then claim that religions "endure because of the strong influence of the product—religion—on brain function" (11). Does this say very much? The authors perhaps confuse Religion (the

institution or system), which is a cultural product of the human brain, with Religious Practice and Precepts, which as behavior and moral ideas strongly influence brain function in a sort of feedback loop.

Kardong as a biologist is aware that all thought and behavior are ultimately the product of brain function, and Tiger and McGuire are well-known and well-regarded proponents of Darwinism.⁷³ All three would certainly accept natural selection as primary. Nonetheless, this difference in point of view—bottom up (Kardong) and top down (Tiger and Fox)—results in very different books.

Certainly it was natural selection that put “God” in the brain—the brain itself did not do it. The conceit in the title takes advantage of currently fashionable interest in neuroscience and is thus a clever wrinkle on the subject of religion. But I think it offers a platform on which to pirouette more than a substantial floor for a developed argument, grounded in evolutionary theory. Granted, *God’s Brain* is advertised as contributing to the “fractious debate on the existence of God and the nature of religion.”⁷⁴ So one should perhaps not expect a reference to natural selection (absent in the index) or more than passing mention of Darwin.

God’s Brain was motivated by puzzlement about the “remarkable difference between what the brain created about religion and the vast and long-lasting social systems that were the result” (7). As well as shortchanging “evolutionary biology,” this motivation excludes ethnographic reports of traditional societies’ religious belief and practice in favor of interesting information about institutionalized or “formal” religions—that is, religion as most people think of it today. The authors nevertheless include a substantial chapter on chimpanzee social behavior and cognition, noting that humans and chimps are more similar than not. The two species have a “shared scaffolding” that includes features such as socialization, grief, altruism to the disabled, reconciliations, rituals, rules of behavior, hierarchies, and deference to a higher authority or idea (110). Agreed, but it should be remembered that between chimpanzees and the Holocene there was an enormous period of hunter-gatherer existence in the Pleistocene in which God-in-the-brain was creating or imagining religious concepts and practices that predated the doctrines of organized, monotheistic world religions. This vast expanse of time is of utmost importance to both Kardong and Wade in

their books. Tiger and McGuire’s efforts are tailored to evolutionarily uninformed general readers concerned primarily with modern ideas about religion. For example, an interesting chapter addresses religions’ serious concern and active attempts to guide, manage, judge, and adjudicate the sexual lives of their members. Wade, too, remarks that religions have a lot to say about marriage and sexual activity, although he adds that earlier religions had a lot to say, in addition, about agriculture and ecological management.

God’s Brain is chock full of vivid metaphors (e.g., the brain under stress is compared to a “bustling kitchen during the lunch-hour rush” [138]) and epigrams (“Belief, not doubt, is the brain’s default” [201]; “As oxygen is to air, guilt is to religion” [80]; “The brain secretes belief” [201]). Yet there is a fine line between these pithy summaries and snappy one-liners (“Small wonder religions take the cake” [99]; “Religion pleases the brain’s sweet tooth” [129]). The authors also use long lists, for instance: “The offer of sweet immortality is clearly a highly attractive product of the religious system—possibly its premier one, its loss-leader, its fabulous bargain” (75). “People who could otherwise go to a beach or buy shoes or sleep or do Sudoku or spray chemicals on roses, decide it is vital and desirable that they punish their fellow inhabitants and, if necessary, attack and kill them” (197). Such lists, even longer, often go on to no effect (to this reviewer) other than cleverness-for-its-own-sake. The book contains fascinating information and good ideas but they are delivered in a manner that is so obviously intended to be lively and readable that it too often has a result similar to eating a rich pudding filled with too many sweetmeats. Let’s get to the point!! With a less-flashy style (plainer ingredients, as with Kardong), this reader would have felt better nourished and more satisfied.

God’s Brain and *Beyond God* are products of the same publisher—Prometheus Books—although Kardong’s title is from a less well-known imprint, Humanity Books. The last time I looked, the Prometheus book had a nearly thirty times better sales ranking (on Amazon) than the Humanity Books title. Although these rankings may not be the last word on a book’s success, I found Kardong’s book more informative, equally well grounded, and more clearly written as well as more fundamentally provocative. Too bad that its publishers did not choose to give it the same promotion and marketing.

Style and tone aside, the book has an original and important emphasis with which I strongly agree and that I'll use as a launching pad for discussing the importance to religion of the arts. Like me,⁷⁵ the authors view the brain as a "making sense" organ. We agree that the brain perceives drastic and uncertain factors in the world that must be explained and dealt with. (Others who hold this view are Schiefenhövel [*Mind and Behavior*] and Alcorta and Sosis ["Ritual, Emotion"]). Tiger and McGuire's answer to this adaptive problem is that the brain seeks to soothe itself through rituals that have the effect of changing the brain's chemical profile and function, thereby reducing the aversive effects of stress (170). I was pleased to discover that they find religious ritual to be among the features of religion that excel in "brainsoothing." (*Brainsoothing*, as a term, appears always in italics. The other factors that brainsoothe, besides ritual, are socialization and belief).

RELIGION AND THE ARTS

Although ritual practice is given its due in most evolutionary writings about religion, the reasons given for its effects have been (apart from a few writers)⁷⁶ heavily "cognitive" or theory-driven. For example, rituals instill beliefs that reduce ambiguity and uncertainty whether real or imagined.⁷⁷ Or rituals provide an arena for displaying costly signals that show commitment to a group⁷⁸ or, in male-dominated ceremonies with much sensory pageantry, elaborate courtship behaviors relevant to female preferences for mates.⁷⁹ Although Sosis [*Evolution of Religion*] and Purzycki and Sosis [*Mind and Behavior*] note many important effects of ritual, they don't seem to realize that the arts in ritual, not just "ritual" in the abstract, create these effects. Purzycki and Sosis say that costly demands help to bind individuals in their shared experiences, but do not use the term "arts." McGuire and Tiger [*Religious Behavior*] note the importance of repetition, repeated patterns of behavior and thought in religion, but do not say that repetition is a major ingredient of the arts, both visual and processual (dance, song, performance).⁸⁰

Despite growing recognition of the therapeutic importance of ritual practices, little is said about how these work to reduce uncertainty and stress or, for that matter, to instill beliefs. A crucial point, overlooked or not emphasized enough

in these and other books about religion, is that rituals, especially ceremonial rituals, are notably *collections of arts*. If the arts are removed, there is no ceremony.⁸⁰ The reason for using ritual in religious behavior, I think, is that it captures attention, holds interest, and arouses and molds the emotions of participants. It accomplishes these ends through its extraordinariness—the use of art, aesthetic effect—and not just through its doctrine or message, which, in any case, may be only implied or obscure. Recall Wade's contention (101–02) that among hunter-gatherers religious practice in rituals, not theory or beliefs, was paramount. Whitehouse (*Modes*) proposes that action systems related to religious practice came first and were then filled in with religious concepts.

What makes ritual work are the *emotions* that it arouses, sustains, and molds. In an outstanding chapter, Gibson [*Mind and Behavior*] reminds us that emotions influence thinking and that the capacity for affective cognition is phylogenetically and developmentally prior to the capacity for explicit propositional thought and intellectual belief. Sjöblom [*Evolution of Religion*] points out that the ultimate function of affect programs is to enhance survival in a potentially hostile world. He suggests that in order to explain the origins and survival of religion, we should look to innate emotional triggers—especially to feelings that evoke fear, disgust, and anger, which have special potential to guide our attention and behavior. These are among the affects evoked by rituals.

The British anthropologist Radcliffe-Brown thought the function of religion, expressed in what he called "rites," was to maintain an orderly social life, which itself depends on the individuals having certain sentiments that influence and even control their behavior with others. It is by means of rites that these sentiments (emotions) are regulated, maintained, and transmitted from one generation to another.⁸² Writings about the evolution of religion generally acknowledge the importance of emotion, but few writers go further to address how the neurochemistry of ritual behavior creates emotions that reduce stress or produce cohesion or have any other effect. (Signal exceptions, again, include Alcorta and Sosis, Kardong, Tiger and McGuire, and Wade.)

Rituals serve not only as costly signals that indicate commitment. The arts (which by their consumption of costly amounts of time, energy, and material resources comprise the rituals) convince participants that the ceremony,

along with its messages (the beliefs that it conveys), is so important, so costly, and so outside the ordinary routine, that one could never question or doubt its truth. It is not only music and dance (that entrain bodily rhythms and coordinate individuals) but all of the arts, as extraordinary behaviors and artifacts that developed along with ritual, that are the *vehicles* of belief.⁸³ Sharing strong emotions binds humans as much as if not more than sharing strong beliefs, and it is the arts that provide the emotional, even transformational, lubricant to make the medicine go down. They are not casual and trivial excrescences tacked on here and there; on the contrary, they work together to reinforce the emotional magnitude of the beliefs. They do this by means of aesthetic mechanisms—formalization, repetition, exaggeration, elaboration, and manipulation of expectation, in visual, vocal, and movement mediums—that by their nature have emotional effects.⁸⁴ Repetition, in particular, and a measured beat in general, contribute (as in music, which in traditional societies invariably includes movement and dance as well as vocalizing)⁸⁵ to emotional and psychologi-

cal as well as physical entrainment. Individuals listening to music share the same autonomic functions (responses in heart rate, respiration, skin conductance, and pulse rate) and these shared functions highly correlate with the ability to empathize, an important element of cooperation.⁸⁶

In the first wave of books on religion, one looked in vain in their indexes for the words “art,” “arts,” or even “music.” It is encouraging that some of today’s authors emphasize the importance of music (sometimes “singing”), dance, drumming, or chant in religious ritual⁸⁷ to uniting individuals in a common rhythm or inducing trance. Yet precious little is said by any of the authors cited in this review about the visual arts that are ubiquitous in rituals—the body painting, tattooing, and other adornment; the elaborate masks and costumes and decorated dance staves; the often specially demarcated and decorated physical space in which the ritual is held. Although Wade does mention elaborate body painting with ochre, costumes, and the ceremonial mounds of the Arunta and Warlamunga in Australia, he does not emphasize that they might be considered as essential as other arts, like song and dance.⁸⁸



Figure 1. Petroglyph panel, Arizona, c. 4,000 to 3,000 BP. Several anthropomorphs, each decorated differently, surround a pronghorn antelope. The fact that the figures are lavishly decorated and positioned in a circle/oval around a central image strongly suggests that they are engaged in some sort of ritual/religious behavior. Some hold long meandering strings tipped with projectile points that possibly represent bull-roarers or magical spear points. Photograph from *Tapamveni: The Rock Art Galleries of Petrified Forest and Beyond*, by Patricia McCreery and Ekkehart Malotki.

Music, dance, body ornamentation and costumes—all of these give sensory as well as cognitive form to the extraordinary "Other World" of the supernatural and create the deep emotions of awe, exaltation, and transcendence that give people "hope in adversity [that] they can exert some measure of control over unpredictable disasters like disease or bad weather."⁸⁹ Our innate dualism⁹⁰ not only predisposes us to detect supernatural agents but enables us to imagine an other, special, world. Vaas [*Mind and Behavior*] argues that distinguishing between an ordinary and a sacred realm is as common as a belief in supernatural agents. I think the two are related, since the supernatural agents exist in a sacred ("supra" or "other") world alongside this one. Belief in an afterlife is itself a belief in an other, nonordinary world.

Extraordinary techniques for getting in touch with this "other world" are evident from as long as forty thousand years ago, as suggested by evidence of shamans in the Upper Paleolithic. Some writers think that the shamans are portrayed in trance.⁹¹ In a survey of five hundred small-scale societies of recent times, 90 percent are reported to practice some form of trance.⁹²

Wade (197) emphasizes that religions provide an idea of the sacred, marked by holding their rites in a special set-apart place (cave, grotto, temple, cathedral) that is decorated with symbols. I wish that he had included this penchant for demarcating hallowed ground by means of visual arts as integral to religious behavior—along with dance, chants, and sacred words (1). Wade does mention in passing that religion throughout its history has inspired great works of art (2), and of course much of what one sees in major museums, of fine art of historic times as well as of ethnographic artifacts, is religious art.

Kardong would say, I think, that the arts and myth were co-opted by natural selection because they contributed to survival and reproductive success but that they are not specific to religious belief: these are not *why* we have religion but *how* we have it. Neither Kardong nor Wade sees any selective advantage to personal religious belief (overcoming fear of death or finding courage, they imply, are proximate benefits). Yet the ubiquity of the arts in religious behavior suggests that by physiologically reducing the deleterious effects of the stress response, the arts and the

emotional effects they provide contribute to ultimate fitness, not just immediate or proximate relief from anxiety.

THREE COLLECTIONS

Although the three edited books are products of academic conferences, I am delighted to report that, for the most part, the ninety-four individual contributions are accessibly and engagingly written as well as full of interesting ideas and information. Though an often weary veteran of conferences and their proceedings, I was never bored with these collections.

The Biology of Religious Behavior: The Evolutionary Origins of Faith and Religion, edited by Jay R. Feierman

This book's fifteen chapters originated in an international symposium on the biology of religious behavior (i.e., not "religion" as a human universal or "religiousness" as a posited trait or cognitive faculty). This emphasis on observable behavior is unusual and laudable; it is borne out in its organization according to the "Four Questions" described by ethologist Niko Tinbergen: the evolutionary history of religious behavior, its development in individuals, its causes, and its adaptiveness.⁹³ The ideas offered are intended to be testable and the collection includes two empirical studies of religious behavior and cooperation.⁹⁴

In his own contribution to the volume, Feierman suggests that some religious behavior might originate in "LSV behavior" (make-oneself-lower-or-smaller-or-more-vulnerable behavior), "an ancient, coordinated motor pattern whose various forms can be traced back through the earliest vertebrates."⁹⁵ This is an interesting, testable idea, supported by Feierman's emphasis on the characteristics of petitionary prayer, which is widely found in "all major and at least some tribal religions of the world" (77). Other contributors to the book address a range of interesting but specialized topics such as the psychobiology of ocular (gazing) behavior in religious contexts,⁹⁶ religious suffering and obedience deriving from corporal punishment of children,⁹⁷ the brain chemistry of religious behavior in Christianity and

Islam,⁹⁸ the adaptiveness of changing one's religious belief system through revelation or conversion,⁹⁹ and fasting and feasting rituals.¹⁰⁰

Most religious behaviors are considered here as "appetitive" or "proximity-seeking" ways to get the attention of God through religious rituals and ceremonies that include praying, reciting, and reading or writing sacred narratives. As this last characteristic suggests, many (but not all) of the contributions are concerned with characteristics of monotheistic world religions of post-Holocene civilizations in addition to (and often to the exclusion of) the polytheistic religious behaviors in forager or other small-scale societies. Polytheistic and monotheistic religions differ in a number of respects. For example, from a sample of 186 preindustrial societies, most polytheistic religions are located in societies without writing. The vast majority of monotheistic religions occur in societies with true writing.¹⁰¹ Also, in simple subsistence societies, there are no punitive gods,¹⁰² although of course spirits can be angry and other people can work sorcery. The "LSV" behaviors described in Feierman's chapter or the possibility of changing one's religious belief system are, to my knowledge, not to be found in studies of hunter-gatherers' religious practices. Readers who are especially interested in origins or universals might want to turn to studies that are more concerned with religious behaviors that also occur in hunter-gatherers.

That said, the book is a serious and welcome contribution to the understanding of religion in our time. It aims to reveal that, at biological and behavioral levels, what unites the different religions of the world is greater than what divides them.

The Evolution of Religion: Studies, Theories, and Critiques, edited by Joseph Bulbulia, Richard Sosis, Erica Harris, Russell Genet, Cheryl Genet, and Karen Wyman

This book is composed of fifty short chapters from an international conference on the evolution of religion, sponsored and published by the Collins Foundation with the aim of better understanding religion in order to address problems of international conflict and environmental sustainability. Overall the book is a comprehensive, clearly written, and highly

stimulating overview of evolutionary approaches to religion. Its commendably short chapters are easy to read—short and sweet and, to this reader, of almost unfailing interest. Two interesting findings: in a 2003 poll of over two thousand Americans, 33.5 percent of a predominantly Christian sample said they would disapprove if their child wanted to marry a Muslim but 47.6 percent would disapprove of their child marrying an atheist.¹⁰³ Simply having an image with conspicuous eyes in an otherwise uninhabited room, or telling people there is a ghost there (even if people do not believe in ghosts) results in more prosocial behavior than in rooms that lack eyes or putative ghosts.¹⁰⁴

The book offers a wide range of studies—theoretical, methodological, empirical, and philosophical. In addition to scholars who study religion from cognitive or evolutionary perspectives, contributors include scholars of religious studies, some of whom claim that religion is *sui generis* and that religious experience and traditions can be understood only from within, on their own terms.¹⁰⁵ A free-wheeling array of interesting specialized subjects include "Sankirtan Fever" in Hare Krishna,¹⁰⁶ Candomblé in Brazil and spirit possession,¹⁰⁷ firewalking in a Greek community,¹⁰⁸ representations of paradise,¹⁰⁹ mortuary practices,¹¹⁰ Jean-Paul Sartre's inadvertent presaging of an evolutionary science of religion,¹¹¹ free will and determinism of the "soul,"¹¹² and the costs and benefits of philosophical essentialism.¹¹³

In the first of three contributions to the volume, Justin Barrett calls for more empirical study to support major theories, rigorous hypothesis-testing (especially using cross-cultural and child development data), and more cross-trained scholars in multiple disciplines. Cohen, Hill, Shariff, and Rozin agree: let us now study religion in a multi-method way with new research techniques. Others criticize earlier proposals of the adaptiveness of various traits that have been suggested as defining religion.

The Biological Evolution of Religious Mind and Behavior, edited by Eckart Voland and Wulf Schiefelhövel

This book is serious and stimulating, highly readable, and authoritative. It includes an introduction and seventeen chapters, most of exceptionally high quality. The

contributors (half German, half American, plus one Chinese scholar) come from religious studies, psychology, psychiatry, anthropology, economic and social psychology, philosophy, and neuroscience. The overviews by Voland, Vaas, Richert and Smith, and a final theoretical-analytic chapter by Fetchenhauer, are required reading for all who wish to know the state of the art in critical thinking about fundamental issues in the evolutionary study of religiosity.

The articles offer up-to-date information emerging from neuroscientific studies of religious behavior. Some interesting examples: Parkinson's disease patients report a reduction in religiousness when compared to healthy age-matched controls, most likely because dopaminergic activity, crucial for obtaining rewards from experiences, diminishes in these patients.¹¹⁴ Conversely, religious delusions of epileptics, schizophrenics, and obsessive-compulsive disorder and bi-polar patients are linked to abnormally high dopamine states. High self-transcendence scores are correlated with genetic markers of dopaminergic transporter molecule.¹¹⁵ Experienced meditators have increased activity in prefrontal cortex, a decrease in activity in the object-association area in the parietal lobes; their brain activity is also more synchronous.¹¹⁶ "Spirituality" (self-transcendence, flow, transpersonal identification, spiritual acceptance) is a basic personality trait, with candidate gene VMAT2 on Chromosome 10.¹¹⁷

Data from a study on the reproductive benefits of religious activity in eighty-two nations indicate that people who are members of religious communities "show statistically higher motivations towards marriage, children, and family values, more cooperative orientation and finally higher reproductive success than their secular contemporaries."¹¹⁸

It is a pity that the book is so expensive—two to four times more costly than the other books under review. For those who can afford to buy it or find a used copy, it is an excellent value. In addition to the overviews, I was especially engaged by the chapters by Bouchard on authoritarianism and religious belief, Frey on cognitive foundations of religiosity, Rossano on the "African Interregnum," and Schiefelhövel on the conceptual framework of Eipo religion in Melanesia. But other chapters are equally stimulating and well researched and would appeal to readers with other interests.

SUMMARY RECOMMENDATIONS

Read Kardong first for a clearly and interestingly written bottom-line, bottom-up, no-nonsense approach to understanding the evolution of religion. Read the three collections for (mostly) fascinating, provocative, original, and worthy ideas about the religious mind and religious behavior as well as references to probably every thing that has been written on the subject. Pick up Tiger and McGuire to read on an airplane and for a decent bibliography about current neuroscience. And read Wade for a comprehensive summary of what has been said about religion by almost every classical anthropologist, cognitive scientist, and evolutionary scientist as well as to ponder the author's own provocative and well-grounded ideas.

Altogether, these six volumes confirm that the cognitive and evolutionary study of religion is a ripening field that, to its benefit, increasingly emphasizes behavior and emotion. I would recommend only that more researchers come to appreciate that the practice of the arts—emotion-rich multimedia clusters of the extraordinary—have been as integral to the evolution of religiosity as their cognitive counterpart, belief in an extra- (super-)natural realm. Perhaps the arts will become the hot topic in religious studies of the next decade.

WHY EVOLUTIONISTS AND COGNITIVISTS ARE STUDYING RELIGION NOW

Why has the subject of religion become rather suddenly the subject of so much biological (evolutionary and cognitive) attention? Why should evolutionary and cognitive scientists now find the subject interesting? I can think of three main reasons.

1. Acceptance of cooperation as an evolutionary concept. The idea of cooperation is no longer unfashionable, and, indeed, the theoretical primacy of the importance of competition in our species might by now have been inverted. Group (or multilevel) selection is no longer taboo and it is widely agreed that humans must be characterized by more than simple self-interest. Indeed, Wade (*Faith Instinct*) gives two reasons why humans may have been more strongly

affected by group selection than other species: conformist pressures for egalitarianism in hunter-gatherers and warfare between groups. Wade suggests that altruism and aggression co-evolved and are intertwined. He considers cooperation and warfare to be two sides of a coin in both people and ants (52). Ants obtain group cohesion by means of shared chemical signals. Humans need religion.

2. The rise in religiosity. Pentecostal movements are spreading around the world, mega-churches proliferate in the United States, and religion permeates American politics. If evolutionary behavioral scientists wish to claim broad explanatory scope for their ideas, they can hardly ignore a social phenomenon of this magnitude.

3. Political and cultural threats of Islamic extremism and Christian fundamentalism. The study of the psychology of religious belief has more than academic interest today. We are inescapably aware of the hatred of religious fanatics beyond our shores and the zealotry of religious fundamentalists within. Humans are passionate animals, to be sure, and religion, which is supposed to bind together (see note 69), at the same time can obviously rend violently apart.

These last two reasons pose a still deeper question: why the rise in religiosity itself? I think this trend might be attributable in part to the ever-changing, fast-paced character of contemporary life. Although life on earth has never been predictable and is often difficult or dangerous, today's accelerating change and the sense of personal helplessness and anxiety about perceived threats seem especially alarming to greater numbers of people. The constant "news" about enemies and other dire things everywhere creates a pervasive sense of foreboding, punctuated by frequent and compelling predictions of doomsday—the Bomb, and then, added to that, the population bomb, and to that, the environmental bomb: climate change, depleted and rising oceans, toxic water, toxic air, degraded natural resources. Religion offers health and happiness, meaning and consolation, numinous experience and a sense of belonging. Religion helps people cope; it invests life with order, reconciles people to fate, and thus gives them a bulwark against contingency.¹¹⁹

Would people do better to forego their imaginary consolations, as some authors urge, and become purely practical in addressing and dealing with the dire things? Quite possibly,

but then, they wouldn't be people. If religion is part of human nature, and if human nature is very largely responsible for the dire things that are frightening people into more desperate forms of religion, it behooves us to develop a thorough understanding of religion, including a better appreciation of the human needs that religions fulfill. The books under review here are important steps in that direction.

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NOTES

1. E.g., Vaas [Mind and Behavior], Whitehouse [Evolution of Religion]. For Schloss [Evolution of Religion], religion includes belief, practice, and affect.
2. E.g., Guthrie, *Faces*; Boyer, *Naturalness*; Hinde, *Why Gods Persist*.
3. Boyer, *Religion Explained*; Pyysiäinen, *How Religion Works*; Atran, *In Gods We Trust*; McCauley and Lawson, *Bringing Ritual*; Wilson, *Darwin's Cathedral*; Barrett, *Why Would Anybody*; Hamer, *God Gene*; Whitehouse, *Modes of Religiosity*; Kirkpatrick, *Attachment*; Dawkins, *God Delusion*; Dennett, *Breaking the Spell*; Harris, *End of Faith*; King, *Evolving God*.
4. Others have recently appeared or are in press—e.g., McNamara, *Neuroscience*; Wright, *Evolution of God*; Lewis-Williams, *Cognitive Origin*; Rossano, *Supernatural Selection*; Steadman and Palmer, *Supernatural and Natural*.
5. As did the authors of three popular and polemical books that appeared in 2006 (Dawkins, *God Delusion*; Dennett, *Breaking the Spell*; Harris, *End of Faith*) who in no uncertain terms denounced religion as anathema—i.e., not beneficial and even harmful.
6. In this respect, they follow the other half of the first wave of scholars—an ethologist (Hinde), an evolutionary psychologist (D. S. Wilson), a geneticist (Hamer), and several kinds of anthro-

pologists or psychologists (Whitehouse, King)—who, unlike the cognitive scientists, were more amenable to religion's adaptiveness in its own right.

7. "Religious mind" and "religious behavior" (as distinct from "religion") occur in two titles [*Mind and Behavior, Religious Behavior*]. The editors of *The Biological Evolution of Religious Mind and Behavior* define religiousness as the capacity of humans to emotionally connect to religious ideas and rituals, to think along the lines of transcendency and eschatology, and to form religious institutions (6).

8. E.g., Harris and McNamara [*Mind and Behavior*], Oviedo [*Religious Behavior*]. Steadman, Palmer, and Ellsworth [*Religious Behavior*] cite some thirty authorities for whom this characteristic is of fundamental importance to religious belief and behavior.

9. Vaas [*Mind and Behavior*]; see also Harris and McNamara [*Mind and Behavior*].

10. Vaas [*Mind and Behavior*].

11. E.g., Vaas [*Mind and Behavior*].

12. Wade, *Faith Instinct*, 43.

13. Purzycki and Sosis [*Mind and Behavior*].

14. Purzycki and Sosis [*Mind and Behavior*].

15. Schjodt [*Evolution of Religion*].

16. Frey [*Mind and Behavior*].

17. Guthrie [*Evolution of Religion*, 240], whose pioneering book (*Faces*) is cited by many, e.g., Shariff [*Evolution of Religion*].

18. Richert and Smith [*Mind and Behavior*].

19. For a review, see Rossano [*Mind and Behavior*].

20. Purzycki and Sosis [*Mind and Behavior*].

21. See, e.g., Purzycki et al. [*Mind and Behavior*]; Atran, *In Gods We Trust*; Boyer, *Naturalness, Religion Explained*. Wade suggests that humans may attribute Theory of Mind to their omniscient gods (*Faith Instinct*, 56).

22. Bloom, *Descartes' Baby*.

23. Lahti [*Mind and Behavior*], Vaas [*Mind and Behavior*], Wade, *Faith Instinct*.

24. Kydd [*Evolution of Religion*], Taves [*Evolution of Religion*], Vaas [*Mind and Behavior*].

25. Blume [*Mind and Behavior*], Vaas [*Mind and Behavior*].

26. Atran, *In Gods We Trust*.

27. From Haidt, "Emotional Dog," in Bouchard [*Mind and Behavior*]. Bouchard [*Mind and Behavior*] reports a strong correlation among attitudes about Religiousness (who controls the universe), Conservatism (how societies should be organized), and Authoritarianism (how families should be organized), all of which are affected by an adaptive propensity for obedience to authority.

28. E.g., McCorkle [*Evolution of Religion*], Sjöblom [*Evolution of Religion*]. See also Boyer, "A Reductionist Model."

29. E.g., Kirkpatrick [*Evolution of Religion*], Sanderson [*Evolution of Religion*].

30. Bouchard [*Mind and Behavior*], Lahti [*Mind and Behavior*].

31. Kardong, *Beyond God*.

32. Whitehouse [*Evolution of Religion*] points out that differing ecologies result in different religious beliefs and practices.

33. Palmer, Ellsworth, and Steadman [*Mind and Behavior*], Rossano [*Mind and Behavior*], Steadman and Palmer [*Evolution of Religion*].

34. Steadman and Palmer [*Evolution of Religion*]. See also Blume [*Mind and Behavior*]; Coe, *Ancestress*; Kardong, *Beyond God*.

35. McCauley and Lawson, *Bringing Ritual*; Tiger and McGuire, *God's Brain*, 173.

36. Kardong, *Beyond God*; Tiger and McGuire, *God's Brain*.

37. Boehm [*Evolution of Religion*].

38. Irons [*Evolution of Religion*].

39. Kirkpatrick [*Evolution of Religion*], Sanderson [*Evolution of Religion*].

40. Geertz [*Evolution of Religion*]; Wade, *Faith Instinct*.

41. Kardong, *Beyond God*; Rossano [*Mind and Behavior*]; Tiger and McGuire, *God's Brain*; Whitehouse [*Evolution of Religion*], and other authors, e.g., Blume [*Mind and Behavior*], Palmer, Ellsworth, and Steadman [*Mind and Behavior*].

42. Steadman and Palmer [*Evolution of Religion*].

43. Purzycki and Sosis [*Mind and Behavior*], Yamamoto et al. [*Religious Behavior*].

44. Johnson [*Evolution of Religion*].

45. Bulbulia [*Evolution of Religion*], 157.

46. Kardong, *Beyond God*. Wade (*Faith Instinct*, 28) suggests that sociality perhaps first arose in our species as a defense against predators.

47. See also Bouchard [*Mind and Behavior*], Johnson [*Evolution of Religion*], Purzycki and Sosis [*Mind and Behavior*], Wade, *Faith Instinct*.

48. Sanderson [*Evolution of Religion*], Wade, *Faith Instinct*. More costly rituals, rites, and initiations are found in those pre-industrial societies that have a greater incidence of between-group warfare (Johnson [*Evolution of Religion*, 112], citing Sosis et al., "Scars").

49. Bulbulia [*Evolution of Religion*], Irons [*Evolution of Religion*], Schloss [*Evolution of Religion*], Sosis, "Hutterites"; Wade, *Faith Instinct*. "Commitment theory" was first described for religion by Irons ("Religion as Hard-to-Fake"). Also see Sanderson [*Evolution of Religion*, 72] who compares costly signaling in polytheistic and monotheistic religions.

50. Alcorta [*Religious Behavior*].
51. Harris and McNamara [*Evolution of Religion; Mind and Behavior*].
52. Rossano [*Mind and Behavior*, 137].
53. Harris and McNamara [*Evolution of Religion; Mind and Behavior*].
54. Zuckerman ("Atheism") in Alcorta [*Religious Behavior*, 119].
55. Sosis [*Evolution of Religion*, 104] notes that "most evolutionary accounts of religion have either ignored or dismissed the human tendency to turn to the supernatural world under conditions of uncertainty," although superstitions are found to reduce anxiety and enhance the ability to cope with uncertainty.
56. Schiefenhövel [*Mind and Behavior*].
57. Schiefenhövel [*Mind and Behavior*]; Sosis [*Evolution of Religion*]. Neither author says how this is accomplished physiologically.
58. Sosis [*Evolution of Religion*]. Dissanayake (*Art and Intimacy*, 232) gives examples of increased ritual/arts activity during historic and prehistoric periods of social and environmental stress.
59. Kirkpatrick [*Evolution of Religion*]. See also Atran, *In Gods We Trust*; Boyer, *Naturalness*; Dawkins, *God Delusion*; Frey [*Mind and Behavior*]; Kirkpatrick, *Attachment*; Richert and Smith [*Mind and Behavior*]; Schloss [*Evolution of Religion*, 197–207].
60. E.g., Vaas [*Mind and Behavior*].
61. Schloss [*Evolution of Religion*].
62. Schloss [*Evolution of Religion*].
63. Alcorta [*Religious Behavior*, 118].
64. Kardong, *An Introduction*.
65. In this, Kardong's scheme answers the criticism of philosopher Detlef Fetschenhauer [*Mind and Behavior*] that most theories of adaptiveness take the phenomenon of religion for granted, assuming that people are religious without asking why that should be so, and then propose and analyze possible adaptive functions.
66. See Steadman and Palmer [*Evolution of Religion*], who also begin with ancestor worship and passing on of traditions.
67. See also Coe, *Ancestress Hypothesis*; Kardong, *Beyond God*; Palmer, Ellsworth, and Steadman [*Mind and Behavior*]; Steadman and Palmer [*Evolution of Religion*].
68. Wade, *Faith Instinct*, 101–02, 118.
69. He emphasizes the importance of emotional bonding, reminding us that *religare* (L.) means "to bind."
70. Notable exceptions are Alcorta and Sosis, "Ritual," and Tiger and McGuire, *God's Brain* (see next section).
71. Alcorta and Sosis, "Ritual." McNeill (*Keeping Together*) mentions the probable early appearance and importance in our species of "muscular bonding"—of "keeping together in time"—but does not specifically tie it to the beginning of religion.
72. To my knowledge, the first person to propose this idea was Steven Brown ("An Introduction," 12).
73. See, e.g., Tiger and Fox, *Imperial Animal*; McGuire and Troisi, *Darwinian Psychiatry*.
74. N.B.: nature of, not evolution of, although the second sentence of promotional material mentions the book's "perspective rooted in evolutionary biology."
75. Dissanayake, *Art and Intimacy*.
76. Alcorta and Sosis, "Ritual, Emotion"; Alcorta [*Evolution of Religion, Religious Behavior*]; Dissanayake, *Art and Intimacy*; Gibson [*Evolution of Religion*]; Schiefenhövel [*Mind and Behavior*]; Wade, *Faith Instinct*.
77. Tiger and McGuire, *God's Brain*, 174. See also Kardong, *Beyond God*, 257.
78. E.g., Bulbulia [*Evolution of Religion*], Irons [*Evolution of Religion*], Purzycki and Sosis [*Mind and Behavior*].
79. Pyysiäinen [*Evolution of Religion*], Slone [*Evolution of Religion*].
80. See also Kardong (*Beyond God*, 258–61) on pattern and rhyme.
81. Dissanayake, *Art and Intimacy*, 138.
82. Radcliffe-Brown, *Andaman Islanders*. Although Wade (*Faith Instinct*, 107–09) discusses communal dancing in the Andaman Islanders, he does not mention Radcliffe-Brown's ideas about the function of ritual behavior.
83. Wade (*Faith Instinct*, 81) emphasizes the critical importance of music and dance, but not other arts, in conveying belief.
84. Dissanayake, "Artification Hypothesis." See also Schjødt's [*Evolution of Religion*] experiments showing the importance of structure and repetition in influencing body states toward relaxation and stress-reduction in highly structured prayer (The Lord's Prayer) compared to minimally structured (personal) prayer.
85. Wade, *Faith Instinct*, 82.
86. See Alcorta [*Evolution of Religion*, 265].
87. E.g., Alcorta [*Religious Behavior*], Alcorta and Sosis, "Ritual, Emotion"; Kardong, *Beyond God*; Tiger and McGuire, *God's Brain*; Wade, *Faith Instinct*.
88. He notes, however, that in their *n/um* dancing the !Kung wear no special clothing (*Faith Instinct*, 103).
89. Wade, *Faith Instinct*, 14.
90. Bloom, *Descartes' Baby*.
91. Cited in Rossano [*Mind and Behavior*, 132].
92. Cited in Wade, *Faith Instinct*, 91.

93. Tinbergen, "Aims and Methods."
94. Jaffe and Zaballa [*Religious Behavior*], Yamamoto et al. [*Religious Behavior*].
95. Feierman [*Religious Behavior*, 76].
96. Ellis [*Religious Behavior*].
97. Abeloro [*Religious Behavior*].
98. McGuire and Tiger [*Religious Behavior*].
99. Price [*Religious Behavior*].
100. Goldberg [*Religious Behavior*].
101. Sanderson [*Evolution of Religion*].
102. Voland [*Mind and Behavior*].
103. Cited in Shariff [*Evolution of Religion*].
104. Cited in Lanman [*Evolution of Religion*].
105. E.g., Wiebe [*Evolution of Religion*].
106. Ketola [*Evolution of Religion*].
107. Soler [*Evolution of Religion*], Cohen [*Evolution of Religion*].
108. Xygalatas [*Evolution of Religion*].
109. Närhi [*Evolution of Religion*].
110. McCorkle [*Evolution of Religion*].
111. Bering [*Evolution of Religion*].
112. Koch [*Evolution of Religion*].
113. Saler [*Evolution of Religion*].
114. Harris and McNamara [*Mind and Behavior*].
115. Harris and McNamara [*Mind and Behavior*]; see also Brüne [*Mind and Behavior*] and Rossano [*Mind and Behavior*] with regard to brain lesions and psychotropic drugs affecting altered states.
116. Reported in Vaas [*Mind and Behavior*].
117. Reported in Vaas [*Mind and Behavior*].
118. Cited in Blume [*Mind and Behavior*, 118] (from Enste, "Kinder").
119. See also Vaas [*Mind and Behavior*].