

Cognitive and Evolutionary Approaches to Religion

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Introduction

David Hume's *The Natural History of Religion* (1776) is probably the best known intellectual ancestor of recent cognitive and evolutionary approaches to religion. These projects share an interest in the origins and forms of religiosity and a broadly naturalistic methodological orientation that inspires caution, if not outright abstemiousness, with regard to related metaphysical and epistemological issues. They also all look to features of the mind as the most important proximate explanatory consideration when accounting for the recurrence of religion among human populations.

Contemporary approaches, however, differ from Hume's work in two respects. They take advantage of significant scientific developments and the explanatory resources that have arisen since Hume's time, and, consequently, they are usually less concerned with the rational status of religious beliefs and actions. Their methods are scientific and their interests are solely explanatory. Therefore, they remain noncommittal with regard to the array of metaphysical assumptions in which religions and their believers routinely traffic, and they accord no privilege to religious knowledge claims or religious "ways of knowing."

Logically, those positions are born of these fields' methodological naturalism (not of some collective antipathy to religion). Certainly, some scholars (Dawkins 2006; Dennett 2006) employ these fields' explanatory proposals and research as part of a larger argument against religion, but more premises than either the cognitive or evolutionary approaches to religion can supply are required for compelling arguments against many religious claims. Nothing in principle or in practice bars people with religious convictions from either contributing to these fields or, of course, making use of these fields' findings as they will. Arguably, evidence from cognitive and evolutionary research about religions generally appears to support the contention that the methodological, epistemological, and metaphysical caution of naturalistic approaches to religion will prove incompatible with the claims of

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popular religion. Those claims, however, do not exhaust the set of all religious claims, and to presume that that incompatibility extends so far may underestimate the ingenuity of the religious imagination (McCauley 2011).

Setting the Stage

The two most influential scientific developments for these new approaches to religion are the evolutionary and cognitive revolutions. The former is more than 150 years old. In addition to rendering teleological attributions dispensable in the explanation of biological phenomena, Charles Darwin's theory provides a framework for making sense of long-term changes in large-scale (biological) systems, such as populations and species. E.O. Wilson's (1975) sociobiological speculations resuscitated proposals, which Darwin himself entertained (as did William James), that natural selection shapes human behavior no less than human bodies. Wilson's work occasioned in the subsequent decades an array of new evolutionary thinking about human behavior and culture that has variously informed the new scientific theorizing about religion.

The cognitive revolution's origins are more recent and more diffuse. Since the 1950s, works by such figures as Noam Chomsky, George Miller, Ulric Neisser, and Herbert Simon have introduced the possibility of studying the operations of the human mind systematically. That suggestion was revolutionary, because it came after a 30-year reign of behaviorism in experimental psychology. Behaviorism in its several forms maintains that what is available for empirical study is *behavior*, and that mind, if it amounts to anything more than behavior, is inaccessible to empirical scrutiny, let alone experimental investigation. Behaviorism's influence waned in the face of withering criticisms of its limitations (Chomsky 1959), empirical results it could not explain (Garcia et al. 1966), and new findings and explanatory hypotheses spawned by cognitively oriented research (Neisser 1967). The emerging cognitive sciences promised insights about the mental representations, and the mechanisms for their manipulation, that informed thought and action in any sphere.

Different unpromising circumstances across the apposite disciplines (psychology of religion, cultural anthropology, and religious studies) provoked some interested in the explanation of religious beliefs and practices to look to the new cognitive sciences for inspiration. Correlational studies in the psychology of religion pertaining to personality and features of religious experience are certainly worthwhile, but they highlight neither cognition nor action nor causal mechanisms. From Franz Boas to Clifford Geertz, cultural anthropology throughout the 20th century abjured attention to psychology or cognition in deference to the influence of *culture* on conduct and thought, and to its putative autonomy from the exigencies of the workings of individuals' minds. Culture is not the result of those varied workings, but rather the framework shaping them.

Both cultural anthropology and religious studies held that the key to understanding thought and action depended upon fathoming the *meanings* of the cultural and the religious. They concurred that culture and religion are *symbolic*, and, thus, the inquirer's principal task is to ascertain symbols' meanings. Resonant developments within the humanities generally, and in religious studies particularly, involved a decisive turn toward the *primacy of texts*. This position not only holds that texts are the most prominent, plentiful, and lasting evidence about religious thought, especially the religious thought of the past, but that the

methods for interpreting texts' meanings are the principal means for approaching anything that humans find meaningful, including nonlinguistic symbolism.¹

Dissenting voices submitted that solely searching for meanings of nonlinguistic symbols is inauspicious for explanatory purposes and that cognition deserves more attention than that view allows. Dan Sperber (1975) argued that this general approach, whether in the form of cryptological accounts or of perspectives that appeal to the unconscious, offers no exit from the symbolic.

The cryptological perspective insists that symbols have hidden meanings, in conformity with a code that few, if any, know. Command of such codes allegedly results from recognizing *motivations* informing symbols' connections to meanings. Noting that this standpoint entails that the "mass of humanity obsessively manipulates tools whose usage it does not know, and reiterates messages whose sense it is ignorant of" (1975, 22), Sperber holds that no uniformities underlie the motivations connecting symbols and their hidden meanings, and that putative motivations' apparent plausibility only arises after the fact; that is, *after* learning a pairing between some symbol and its purported meaning. Consequently, assertions about motivations are themselves *symbolic* claims.

Approaches to symbolism appealing to the unconscious, such as Sigmund Freud's, fare no better, says Sperber. Here, the motivation for the connections – in a word, *sexuality*, in Freud's case – is both uniform and clear. The problem is that this approach neither delimits the range of possible symbols (what cannot support some sexual interpretation?) nor articulates the principles that determine the interpretive import of the sexual motivation in specific cases.

Such interpretive approaches supply no tools for gaining explanatory purchase on symbolism, because "all keys to symbolism are part of symbolism itself" (1975, 50). Interpretations are simply *more* symbolism demanding yet more interpretations and so on. Sperber (1975, 112) observes that the symbolic is "not a property either of objects, or of acts, or of utterances, but of conceptual representations that describe or interpret them." Thus, any explanatory leverage with cultural and religious symbolism will come from the study of conceptual representations. Enter cognitive science.

On what they take to be cognitive grounds, E. Thomas Lawson and Robert N. McCauley (1990) grant interpretive materials a somewhat more significant role. Minimally, they regard interpretations as provisionally delineating domains of interest and as employing the categories with which the framing of values and explanatory inquiries must inevitably begin. Their dissent (1993) aims, instead, at assumptions about the primacy of texts and the concomitant primacy of textual tools. Everything looks like a nail to workers whose only tools are hammers. Everything looks like a text to scholars whose only tools are for textual interpretation. But neither rituals nor other religious actions nor temples nor iconography nor flags nor vestments nor crosses nor further nonlinguistic religious symbolism, nor even the conceptual representations that undergird such symbolism, are texts. The literary does not even encompass everything linguistic; indeed, it amounts to but a small fraction of humans' linguistic output. Humans have done a lot more talking than they have reading or writing. Moreover, the interpretation of texts seems misplaced when pondering the religious lives of illiterate people, who have been the vast majority of religious people across history. The emphasis on texts is particularly misplaced when examining religious beliefs and practices in *nonliterate* societies.

1 Their many well-founded moral concerns and their often flamboyant intellectual posturing notwithstanding, the postmodernist heirs to this symbolic-hermeneutic paradigm remain committed to the primacy of texts.

These considerations cut through the smokescreen of abstractions enveloping the doctrine of the primacy of texts in religious studies. The approach is not well suited to analyze religious actions. It is mute about what people must know to take part in coordinated symbolic practices. It is ill equipped to handle the nonliterate origins of religions and the origins and character of religious thought and activity both in preliterate settings and (until the last two centuries) in the minds of the vast majority of religious people.

Given the rhetoric of diversity, inclusiveness, and equality that regularly accompanies work championing textual primacy, especially among postmodernists, it is ironic that Lawson and McCauley (1993) also argue that the doctrine is prejudicial. They contrast the cognitive scientist's interest in the features of the mind that underlie and unite religious thought, expression, and behavior across places and times with the focus of so much work in mainstream religious studies on religious traditions as *rooted in texts*. They contend that this prominence within religious studies of a textually based notion of history and tradition perpetuates colonialist prejudices. Since peoples of nonliterate, small-scale societies have no texts, they cannot be granted traditions or histories in the relevant sense. Their beliefs, activities, and nonlinguistic symbolism remain forever subterranean. Such approaches unavoidably encourage distinctions between more valued (literate, textual) and less valued (nonliterate, nontextual) arrangements, tending, however unintentionally, to favor religions of the book.

The more restrictive conceptions of history and traditions according with textual primacy contrast with Pascal Boyer's (1990) admittedly thinner, cognitively inspired conception of "traditions" as cultural habits and customs. On Boyer's account, participants need not have knowledge about those practices' origins or evolution. Transmission of such behaviors or of representations of their cultural or epistemic prestige suffices for the sense of "tradition" at stake. This notion of tradition (and of history), of course, embraces all of the traditions and histories that the doctrine of textual primacy admits.

Cognitivists ask why nonliterate cultural arrangements should be excluded from scholarly treatments of religions. They disagree that texts and textually based traditions are either all or even the most basic religious phenomena. They maintain that such materials are susceptible to cognitive analyses and that the thinner, cognitive conception of tradition will cast a wider net that captures both textual materials and practices, rituals, spaces, buildings, artifacts, experiences, and so on accorded religious significance. Approaches to religions eschewing the cognitive sciences' theories, findings, and research tools needlessly deprive scholars of resources that:

- Have proven fruitful and effective in other domains.
- Bring greater precision, empirical accountability, and evidential diversity to the study of religions than heretofore.
- Facilitate explicit theorizing and empirical research about a wider range of factors shaping religious thought and conduct.
- Include consideration of pan-human cognitive factors that undergird religious phenomena in *all* cultural settings, regardless of their time, place, size, or technological or intellectual sophistication.

No less than with languages, economies, and social and political arrangements, the cognitive sciences can aid our understanding of religions and their histories. Consequently, archaeologists, theorists of cultural evolution, classicists, scholars of ancient religions (for

which sometimes few, if any, texts are known), and even historians of religion, whose primary materials are texts, are increasingly recognizing the value of the cognitive science of religion (CSR) (Whitehouse and Martin 2004; Pyysiäinen and Uro 2007; Martin and Sørensen 2011; Czachesz and Uro 2013; Richerson and Christiansen 2013).

The Byproduct Theory

The earliest works in CSR (Guthrie 1980; 1993; Lawson and McCauley 1990; Whitehouse 1992; 1995; Boyer 1994) agree that minds do not come automatically equipped with cognitive machinery devoted to religion. Whatever else each position affirms, all declare that religions involve cultural arrangements which effectively engage ordinary cognitive systems that are in place on the basis of considerations having nothing to do with religion or with one another. They also assert that religions are not the only cultural arrangements that do so. Folklore contains comparably amazing personages; militaries can utilize more rituals than religions. Though their ambitions vary and they attend to different cognitive capacities, these early proposals all maintain that these cognitive capacities' exercises in religious contexts are *byproducts* of their normal functioning. Whether they concern anthropomorphism (Guthrie), action representation (Lawson and McCauley), episodic and autobiographical memory (Whitehouse), or all of these and more (Boyer), these cognitive capacities exist in human minds because they enable people to deal with the species' perennial problems.

Stewart Guthrie (1980; 1993) argues that humans' penchant for anthropomorphic representations and explanations of the non-human world is what *all* religions have in common and what sets them apart from other explanatory endeavors. This penchant for anthropomorphism is an all-purpose cognitive tool and is typically humans' *first* resort for managing ambiguous phenomena; that is, things they do not understand. Religions, on his view, primarily deliver intellectual resources for explaining things in terms of the impact on the world of the thoughts and actions of more or less human-like beings. The orderliness, simplicity, and plausibility (as a function of the familiarity) of religions' anthropomorphic accounts fund their allure, which they retain even in the face of overwhelming contrary evidence. Humans find faces in the clouds and not merely meanings but messages in events.

For more than a decade, Justin Barrett (e.g., 2012) has argued that the hypersensitivity of a more general agent detection device (HADD), rather than a penchant for anthropomorphism specifically, is required to explain much that Guthrie's theory aims to encompass. It is not obvious, for example, how a devastating drought *resembles* the ancestors who are presumed to have caused it in order to warn about a community's moral failures. Barrett and Guthrie concur that whatever the precise character of the mechanisms, evolution insured that their settings are acute, given the potentially disastrous consequences of false negatives; better to err on the side of caution.

Lawson and McCauley (1990) advance a more modest speculation, since they only take up participants' knowledge, particularly their *implicit* knowledge, of their religious ritual systems. Developmental psychologists (Rochat, Morgan, and Carpenter 1997) have disclosed that infants as young as 3 months are sensitive to goal-oriented activity and can discriminate between agents and other things, and between actions and other events. Lawson and McCauley assert that people deploy the pertinent cognitive machinery to represent religious ritual actions. Outlining an action representation system that utilizes

no more than elementary assumptions about basic action roles, prerequisite rituals (when they exist), and the assignment of superhuman agents to fulfill one or another of these roles, Lawson and McCauley formulate principles about ritual form that generate systematic predictions about a host of rituals' properties, including their repeatability (with the same participants in the same roles), their reversibility, and their comparative levels of sensory pageantry.

Subsequent research on multiple religious systems (Malley and Barrett 2003) and on the representation of ritual action (Legare and Souza 2012) corroborates the pivotal role that Lawson and McCauley attribute to the positions of the gods as a decisive variable in determining religious rituals' forms. Further research on action representation (Sørensen, Lienard, and Feeny 2006; Nielbo and Sørensen 2011), and on ritualized behaviors generally (Boyer and Lienard 2006), underscores additional cognitive considerations that distinguish rituals and that tie them to humans' intuitions about hazard precautions. Religious rituals are not filled with all of that cleansing, spatial ordering, and meticulous attention to procedures by chance.

Harvey Whitehouse (1992; 1995) explores how contrasting ritual arrangements differ in their mnemonic impact on participants and in their associations with a host of religious, social, and political patterns. The ambition of his overall proposals thus extends far beyond that of the byproduct theory. His two modes of religiosity, the imagistic and doctrinal, are ideal types that delineate two contrasting assemblages of interacting and mutually supportive factors. Different religious arrangements more or less approximate one or the other.

The imagistic mode relies on infrequently performed rituals with comparatively high levels of sensory pageantry and emotional arousal, which both instill salient autobiographical memories and fuse strong psychological ties between the members of small, close-knit groups. The imagistic mode relies primarily on largely unexplicated, loosely linked, nonlinguistic symbolism. Whitehouse has subsequently emphasized the key roles of *dysphoric* ritual and fictive kinship in the imagistic mode (Whitehouse and Lanman 2014).

Whitehouse's doctrinal mode, by contrast, relies on frequently performed, highly routinized rituals with unexceptional levels of sensory pageantry, and on standardized, logically integrated, verbalized formulae. The doctrinal mode emerges with the advent of large-scale societies and the invention of writing (Mullins, Whitehouse, and Atkinson 2013). Here, conviction depends more on intellectual persuasion. The resulting generalized schemas that participants acquire become elements of semantic memory. Doctrinal arrangements befit large-scale societies that must forge a sense of group identification among people who would, otherwise, be strangers.

Quentin Atkinson and Whitehouse (2011) have surveyed ethnographic evidence showing that these two packages of religious, social, and political arrangements correlate, respectively, with different patterns of resource acquisition. The imagistic pattern, for example, arises far less frequently in connection with intensive agriculture than it does with other types of resource procurement.

Boyer (1994; 2001) has provided the most elaborate discussion of the byproduct theory in the course of offering an overall account of human mental architecture (see also Atran 2002; Barrett 2004; Pyysiäinen 2009). Taking inspiration from the evolutionary psychologists (e.g., Tooby and Cosmides 2005), Boyer outlines the provenance and characteristics of the mental systems religions customarily engage. He argues that they are evolved, domain-specific systems for handling problems fundamental to human survival in a natural world in which predation is a given and in a social world that involves competition for resources and mates.

Theory of mind is the mental system that religions most prominently engage, by means of representations of ancestors, gods, angels, saints, demons, and more. Theory of mind is a multifaceted capacity concerned with detecting animate beings and agents, ascertaining their goals and intentions, representing their actions, and reading their minds. Handling the problems of predation requires keen sensitivity to the presence of agents in the environment, to those agents' goals, and to how their goals inform their actions. Managing social competition among humans relies on such abilities as using language, recognizing kin, creating coalitions, protecting reputation, and detecting and coping with things like intrigue, deception, cheating, and gossip. Possessing theory of mind is a decisive advantage in both realms. The ability to ascertain others' goals and intentions enables humans to ponder alternative actions and to anticipate the states of mind and the probable responses of their predators, their prey, and their conspecifics. The same is true when it comes to the gods.

Theory of mind is not the only mental system whose operations religions have evolved to incite. Boyer thinks that particular religions engage this and various other members of an array of evolved, task-specific systems, concerning such matters as language, contamination avoidance, kinship recognition, biological essentialism, and more. Religions develop materials and circumstances that cue such achievements as detecting inspired speech (glossolalia), designating sacred spaces and objects, creating fictive kin, and recognizing inherited authority (e.g., priestly lines).

These systems operate in the mind's basement; that is, they operate mostly below the level of consciousness. Boyer contends that humans are innately prepared to process some kinds of information readily and unreflectively. Those kinds of information correspond to the diverse domains that our species' natural history reveals to be vital to survival and the propagation of our genes. Typically, a few pertinent cues activate these automatic systems. For example, experimental evidence suggests that unconscious recognition of nothing more than eyes in the environment will elicit unconscious inferences about being watched and, thus, produce greater levels of honesty (e.g., Bateson, Nettle, and Roberts 2006). That ready and unreflective information processing includes automatically and effortlessly pursuing any of a vast complement of default inferences appropriate to the disparate materials of the many domains in question – whether inferences about persons' identities on the basis of seeing their faces, or about the underlying syntactic forms of utterances in a natural language (to which someone's linguistic system has been tuned), or about judicious conduct in dealing with a contaminant, or about the character of an animal's potential offspring, and so on.

Such unconscious inferences about “intuitive ontology” (2001) figure centrally in Boyer's explanation of religious representations. Intuitive ontologies constitute foundational theories about the kinds of thing in the world. They are not the products of repeated experience in the relevant domains, as humans spontaneously execute speculative inferences about a huge variety of matters, including causal connections, with regard to which they have little or no direct experience. For example, people instantly draw inferences about animals' innards or their food acquisition patterns on the basis of learning their diets.

However bizarre the assumptions of (other peoples') religions may seem, Boyer asserts that religious ontologies – at least the successful ones – follow a standard pattern. The catalogue of the supernatural is not unconstrained. Boyer proposes that religious concepts violate expectations, usually only one in each instance, associated with some member or other of a small set of intuitive ontological categories, *while preserving* all of that category's further default inferences. The set of intuitive ontological categories consists of ANIMAL, PERSON, TOOL, NATURAL OBJECT, and PLANT. Violations of presumptive

physical, biological, or psychological properties of these categories yield concepts with *counterintuitive* properties, exemplified by walking on water, immortality, and *knowing* other peoples' thoughts, respectively. The violations come in either of two kinds. *Breaches* occur when something transgresses a principle of folk physics, folk biology, or folk psychology that ordinarily applies to it. A person who walks through walls violates a principle of intuitive physics which holds that two objects cannot occupy the same space at the same time. A person born of a wolf breaches our folk biological expectations about the transmission of a species' essential character in reproduction. *Transfers* occur when properties are reassigned to items that do not possess them. Claims about a mountain that is alive transfer a collection of biological properties to a natural object. Claims about a snake that talks transfer a collection of sophisticated psychological capacities to an organism that does not possess them.

Boyer hypothesizes that *minimally counterintuitive* (MCI) concepts enjoy a decisive advantage from the standpoint of selection in the competition among ideas for our attentions. Representations of items (from the list of intuitive ontological categories) that incorporate but a single breach or transfer are MCI.² MCI representations are ideas that humans like to think. Boyer submits that they appeal to the human mind because they approximate a cognitive optimum.

First, *all* counterintuitive concepts are *attention-grabbing*. Counterintuitiveness is not the only way to seize attention, but it will suffice. For example, having a conversation with someone is nothing out of the ordinary, but having a conversation with someone who knows exactly what you are thinking (regardless of what you say) is quite another matter.

Second, MCI concepts retain substantial *inferential potential*. An MCI concept's single violation of the assumptions accompanying an intuitive ontological category leaves its abundant inferential power basically intact. Moses may have parted the Red Sea, but we can still infer that he would have made a splash had he jumped in, that his heart was beating throughout the entire episode, and that he expected that the subsequent inundation of the Egyptians would keep his people safe from those pursuers, for the near term at least. These are but three unexceptional inferences which follow from this story that contains the concept PERSON WHO PARTED THE RED SEA, from an innumerable list of inferences that we might draw about physical, biological, and psychological matters, respectively.

Boyer accentuates the instantaneousness and alacrity with which human minds carry out such inferences and the wealth of inferences available. Both contribute to the *relevance* of the representations (Sperber and Wilson 1986), which here is, in effect, a measure of their cognitive appeal. The mind leaps at such representations of agents, particularly when they are embedded in narratives, the same way that a hungry frog leaps at flies. Such ideas are nearly irresistible. Consequently, Boyer maintains:

many religious phenomena are around because of a conspiracy of relevance...once a particular theme or object triggers rich inferences in a variety of different mental systems, it is more likely to be the object of great cultural attention and elaboration. (2001, 226)

Religious materials produce "snares for thought" (2001, 263).

Gaining someone's attention is necessary for the persistence of an inferentially rich concept, but it is not enough. The *memorability* of MCI concepts is a third consideration

2 For an extended, systematic treatment of this matter, see Barrett (2008).

contributing to their selective advantage. MCI concepts not only fascinate, but tend to stick. People are far more likely to transmit ideas that they remember than ones easily forgotten.

Researchers have explored the empirical merits of claims about MCI concepts' mnemonic advantages. Early studies obtained the predicted effects (Boyer and Ramble 2001; Barrett and Nyhof 2001). In assorted cultural and religious settings on four continents, MCI concepts were remembered significantly better than:

- Normal, intuitive concepts (a person who delivers thoughtful sermons and sleeps at night).
- Substantially counterintuitive concepts that involve more than one violation of intuitive assumptions (a statue that hears and answers prayers, weeps and bleeds, and walks about at night).³
- Highly unusual but not counterintuitive concepts (a chocolate table).

Researchers have explored the influence of other variables, such as narrative context (Upal et al. 2007), imagery (Slone et al. 2007), and causal integration (Harmon-Vukić and Slone 2009), but the mnemonic advantage accruing to MCI concepts generally stands, especially with retention intervals measured in months. Recent experiments indicate that the memorability of MCI concepts holds in children as young as seven (Banerjee, Haque, and Spelke 2013).

One response (e.g., Peterson 2013) to these claims about MCI concepts, about religions' engagement of diverse basement-level mental systems, and about the byproduct theory overall, is that they neglect a substantial amount of religious thought and utterance. The byproduct theory may provide insights about the cognitive foundations of aspects of *popular* religious expression and practice, but it has less to say about religious *reflection*, especially as it occurs in literate, large-scale societies, and about its articulation and organization in propositions, sermons, creeds, theologies, doctrines, and so on.

Talking about its basement presumes that the mind has an upstairs too. There, we think consciously, slowly, deliberately, verbally, and often at some remove from immediate circumstances (thus, this cognition is *off-line*). Abstruse theological formulations consistently feature counterintuitive representations, but their counterintuitiveness is copious rather than minimal. Just for starters, the theologically correct Christian God is all-good, all-seeing, all-knowing, all-powerful, and all-present. The theologically informed religiosity of educated participants in large-scale, literate societies regularly employs representations that are *radically* counterintuitive (McCauley 2011).

That this objection arises is no surprise. This is, after all, the kind of religious cognition that is conspicuous in Whitehouse's doctrinal religions, which have by far the largest numbers of adherents, and, of a piece with the doctrine of the primacy of texts, it is the kind of religious cognition on which so much of traditional religious studies has focused. The objection occasions two replies.

First, though, admittedly, not what the byproduct theorists have headlined, the cognitive sciences have also undertaken extensive research on *explicit* cognition. This concern about reflective religious thought discloses a *limitation* of the byproduct view, certainly, but, more

3 An unhelpful convention is referring to these as "maximally counterintuitive" representations (e.g., Norenzayan et al. 2006). Obviously, their number of violations exceeds one, but this hardly makes them *maximally* counterintuitive.

accurately, it identifies further religious phenomena that other resources from the cognitive sciences can address.

Second, empirical findings about the relations between this explicit religious reflection and unconscious cognition, which the byproduct theorists spotlight, suggest that everyday opinion and standard scholarship overestimate the former's importance. Scholars may overplay assumptions about the cognitive preeminence of carefully formulated, theologically correct texts, which commonly issue from years of contestation and debate, for shaping participants' religious understandings.

Barrett and Frank Keil (1996; see also Barrett 1998) furnish evidence that, in on-line tasks, such as processing and recalling narratives, religious people overwhelmingly utilize conceptions driven by the implicit cognition associated with the various unconscious, task-specific systems that appear to underlie so much of popular religion. These authors designed short narratives about interactions between people and God to be consistent with the theologically correct doctrines to which their experimental participants subscribe. Instead of deploying the theologically complex, ecclesiastically approved and policed concepts, which they affirm when questioned about their beliefs, the experimental participants frequently revert to spontaneous, theologically incorrect conceptions in their recollections of these narratives. This is true even when the task is merely to paraphrase, rather than recall, the narratives, when participants have *full access* to the texts. Barrett and Keil obtained such findings with Christians and Jews in America and with Hindus in India.

Jason Slone (2004) outlines evidence of similar patterns in additional religions, and Emma Cohen and Barrett (2008a,b) marshal ethnographic and experimental evidence indicating that theological incorrectness occurs even in unpretentious settings in which scholarly sophistication and ecclesiastical authority are modest. They show that theologically incorrect ideas readily intrude in the thought of followers of a small Brazilian spirit-possession cult. McCauley (2011) argues that theological incorrectness is inevitable. This is an instance of a general pattern in which recurring intuitive assumptions connected with basement-level cognitive systems intrude in thought and can trump painstakingly acquired reflective knowledge, whether theological or scientific.

Religious Cognition as Individually Adaptive

Boyer explicitly ties his view of the mind informing the byproduct theory to the evolutionary psychologists' proposals about the mind's evolution.⁴ They state that the mind's numerous unconscious, domain-specific systems that religions engage are adaptations. The byproduct theory is agnostic at best, however, about whether religions' engagements with those systems are ever adaptive. If they are, then as byproducts of those systems' operations, such religious employments would qualify as *exaptations*. Religions coopt mental systems that are adaptations in their own right for different adaptive ends that are wholly independent of the factors that led to those systems' selection originally. Of a piece with functionalists' contentions in the social sciences for the past century that religion appears to further social integration, the leading candidate for an adaptive end that religious cognition might engender is *social cooperation*.

⁴ McCauley (2011) argues that the byproduct theory requires neither nativism nor muscular versions of modularity.

Among cognitive scientists of religion, Jesse Bering was the earliest advocate for viewing much religious cognition⁵ as an adaptation resulting from natural selection. Bering (2006) argues that the scale and complexity of the human *social* environment have constituted selection pressures on the mind's evolution, and he points to a collection of psychological dispositions that children exhibit and that persist in many (probably most) adults that have the collective effect of augmenting those individuals' fitness. These include mental systems that have already been noted, such as the penchants to presume intentional agents in settings in which the evidence is less than compelling, to attribute events to those agents' actions, to construe natural events especially as messages from those agents, to assume that those messages concern moral matters, and to increase honesty and cooperative behavior when being watched.

Bering also discusses beliefs about the mind's persistence after death. He and David Bjorklund provided experimental evidence that both children and adults typically hold views about the mind's continuing desires, emotions, and epistemic states after death and that these beliefs arise independently of acquiring religious beliefs (Bering and Bjorklund 2004). Another psychological trait that Bering highlights is the presence of pervasive teleological assumptions about intentional agents' designs behind nature and individuals' lives (Bering 2011). Deborah Kelemen (1999) has supplied numerous experimental studies supporting the position that children are promiscuously teleological, finding function, purpose, and design throughout the natural world. She has subsequently offered evidence of a similar tendency in adults (Kelemen and Rosset 2009), and even in scientists (Kelemen, Rottman, and Seston 2013). Bering basically concurs with Kelemen that children are "intuitive theists" (Kelemen 2004).

Bering contends that, on average, possessing this collection of (what he takes to be innate) psychological dispositions improves an individual's reproductive success. People who believe that the gods are watching them, that they will have an afterlife, and that the gods will reward or punish them *then* on the basis of their conduct's moral worthiness *now* are people who are more likely to cooperate (Shariff and Norenzayan 2011). Bering speculates that their cooperativeness will tend to boost their reputations and protect them from pernicious gossip. This will improve the probabilities that others will target them for cooperation, thereby allowing them to gain more access to resources and mating opportunities. Bering observes that at least "the illusion of a punitive God assisted their genetic well-being whenever they underestimated the risk of *actual* social detection by other people" (2011, 191). The reproductive success of individuals so equipped cognitively will result in greater frequency of the genes responsible for those dispositions. In large social groups, where the cooperation of strangers is critical to their success, strong social selection forces will favor dependable individuals. The suite of psychological traits that Bering's hypothesis showcases is likely to produce such trustworthy souls.

Though evidence exists for religious participation aiding health and well-being (Koenig, King, and Carson 2012), and, more pertinently, individuals' rates of reproduction (Blume 2009), advocates of religiosity as an adaptation see these patterns primarily as *effects* of the social cooperation religion fosters (e.g., Bulbulia 2006). Joseph Bulbulia and Richard Sosis enlist the tools of signaling theory and niche construction to explain the evolution of

5 Suggesting that much religious cognition may be adaptive need not defeat the byproduct view. Some aspects of religious cognition may be byproducts. Some of those byproducts may be adaptive exaptations. Other features of religious cognition, however, may be outright adaptations arising from natural selection.

humans' penchant for cooperation-enhancing religious displays. Cooperating individuals generally outperform freelancers, but sustaining such cooperation is ordinarily costly. Since undetected cheaters bear no costs, it pays to cheat when detection is quite unlikely, unless cooperation can be supported in a fashion that changes the probabilities of the payoffs. The evolution of cooperation, then, depends upon measures promoting its *stability*.

Signaling theory concerns how "communication, perception, and control systems co-evolve" to manage the associated problems (Bulbulia and Sosis 2011, 364). *Honest signals* enable cooperation by allowing participants to discriminate reliable partners well enough to discourage cheating. Honest signals are hard to fake; that is, they are not easy to produce without the requisite commitment. Expressions of emotions are hard to fake in just this way, and conspicuously advertise on faces information about states of mind. A signal's costliness, such as a large investment of wealth (an engagement ring) or of time (spending days nursing a sick friend), add to its credibility.

Religions traffic in behaviors that seem candidates for honest signals, since they are costly, lack any obvious instrumental aim, and seem to nourish cooperation. Sosis and his colleagues have uncovered evidence that religious displays function as honest signals of individuals' cooperativeness. In examining a large sample of 19th-century American utopian groups, Sosis (2000) finds that the religious communes outlasted secular ones by a significant margin and that the strictest religious groups were the most successful. Sosis and Eric Bressler (2003) show that costly rituals extended the religious communes' longevity but provided no advantage to the secular ones. Using results from a common-pool resource-dilemma economic game as a measure of in-group cooperativeness, Sosis and Bradley Ruffle (2003) supply evidence that the members of Israeli religious kibbutzim on average show significantly greater cooperativeness than members of secular kibbutzim. Contrary to widespread presumptions about the cooperativeness of females and the competitiveness of males, that finding turns exclusively on the religious *males'* performance in the game. Crucially, males in these Modern Orthodox religious kibbutzim participate in *collective* rituals three times each day. (Though the females do comparable numbers of rituals, they do not do so collectively.)

Bulbulia and Sosis (2011) employ *niche construction* to surmount the problems honest signaling faces with large populations of strangers, who need to cooperate, but for whom it is normally impossible to share honest signals directly. Niche construction involves organisms influencing their environments in ways that affect the impinging selection forces, either by altering those environments or by relocating to different ones (Odling-Smee, Laland, and Feldman 2003). Bulbulia and Sosis propose that religions tend to establish *charismatic ecologies*; that is, arrangements that "*compel* relatively powerful and automatic cooperative responses," either negatively through cultivating inattentiveness to the possibilities for breakdowns or positively through learned expectations about the beneficial outcomes. Establishing such perennial arrangements will, for example, create a tendency among proselytizing religions, especially, for standardization of spaces (architecture) and places (pilgrimage sites) and standardization and repetition of symbols and practices across cultural, ethnic, and linguistic boundaries.

Though experimental research (Bering, McLeod, and Shackelforth 2005; Shariff and Norenzayan 2007) indicates that unconscious priming about the gods elicits concerns for reputation and circumspect conduct, such effects seem unable to explain the fact that religious belief is neither necessary nor sufficient for exhibiting cooperation (nonbelievers cooperate in large-scale societies, and under similar circumstances religious people cheat,

on average, about as frequently as everyone else). Bulbulia and Sosis maintain that it is charismatic ecologies, not religious belief *per se*, which sustain cooperation in large groups, as arrangements nurturing cooperation are, in effect, offloaded into the religiously structured social environment. For example, some recent research on synchronous or coordinated activity suggests that it bolsters not only cooperation among participants, but cooperation with people *outside* the group too (Reddish, Bulbulia, and Fischer 2014). On the other hand, armies carry out many synchronous and coordinated activities but are not spontaneously cooperative with out-group members. More importantly, indiscriminate cooperativeness is not obviously adaptive.

Religion and Religious Cognition as Beneficial for Groups

Diverse evolutionary conjectures about religion variously countenance three *mechanisms of selection* – natural, sexual, and cultural – that might operate at any of three different *levels of selection* – genetic, individual, and group (Slone and Van Slyke 2015). Though both focus on natural selection at the individual level, Bulbulia and Sosis explicitly couch their account in terms of *dual inheritance* (2011, 373), which looks to a further criterion for differentiating evolutionary approaches, viz., *units of inheritance*.⁶ Dual inheritance countenances genetic and cultural inheritance, and the best known version emphasizes gene–culture coevolution (Richerson and Boyd 2005). Positions that affirm cultural inheritance characteristically appeal to selective forces operating at the group level. These views attend to the consequences of religiously motivated cooperation for religious *groups*, instead of for individuals.

Science, including evolutionary science, regularly fractionates phenomena to gain explanatory leverage on some property, part, or pattern of a larger ensemble (Whitehouse and Lanman 2014). Advocates for selective forces at the group level acknowledge the merits of *all* of the evolutionary hypotheses about religion scouted heretofore (Wilson 2002, 45; Atran and Henrich 2010). They simply aver that selective processes at the group level can contribute to understanding of religiously motivated cooperation especially. Cooperative religious groups, for example, might engulf or eliminate less cooperative groups, or the former might out-reproduce the latter, or the latter might imitate the former.

David Sloan Wilson and Elliott Sober (e.g., 2008) challenge the dominant position in evolutionary thinking, which holds that though theoretically possible, *natural* selection at the level of groups, if it occurs at all, is rare and negligible. Wilson (2002) argues that multilevel selection theory, which includes natural selection at the group level, allows the construal of religious groups as more or less integrated organisms that compete with other groups, with consequences for the fates of group members' genes. Wilson applies the principle that, all else being equal, cooperative groups, as integrated organisms, outcompete less cooperative groups to explain the successes of John Calvin's Geneva during the Reformation, the system of water temples in Bali, the persistence and resilience of Judaism in the face of a history of persecution, and more.

Cultural group selection (CGS), by contrast, stresses *cultural* selection at the group level. Joseph Henrich (2009) maintains that CGS explains recurrent complexes of beliefs and associated credibility-enhancing displays (CREDs), which foster cooperation and

6 Dennett (2006) advocates memes as the units of inheritance, but the theory has generated little progressive experimental research.

commitment to (only some) superhuman agents. According to Henrich, the byproduct theory cannot explain either the commitment or its exclusivity.

Byproduct theorists champion *content* biases in cognition. In elucidating cultural learning, Henrich gives equal heed to *context* biases. Humans get information from other humans, but the information shared by some people, as opposed to others, is clearly more reliable, more likely to be helpful. Henrich thinks that humans possess an evolved bias favoring prestige (Henrich and Gil-White 2001). Children learn the markers of prestige and regard prestigious persons as more worthy of trust and emulation. To decrease possibilities for Machiavellian manipulation, however, cultural learners watch for exemplars who perform CREDs (Henrich 2009, 247). Costly signals are a subset of CREDs, so the empirical evidence for the former transfers. Exemplars eating the foods they recommend are CREDs but not costly signals. According to Henrich (2009, 256), costly signaling theory needs an account of cultural learning and cultural evolution to explain why signaling costliness does not routinely devolve into runaway extravagance.

Henrich constructs a formal model, which indicates that without CREDs, costly practices, including rituals, are not stable and are unlikely to survive, and that vigilance about CREDs can result in stable costly practices. CGS abets rituals that engage humans' contextual biases; those, for example, in which prestigious exemplars publically affirm beliefs (exploiting prestige bias) or undertake practices (scarification, snake handling, etc.) that only committed followers would affirm or undertake (exhibiting CREDs). CREDs are well-wrought to sustain religions' otherwise less plausible counterintuitive beliefs. They help, first, to solve the problem of *commitment* to such beliefs, which, in turn, helps to solidify the group's cooperative arrangements. They also help to explain why participants do not find competing gods tempting.

Ara Norenzayan (2013) has assembled the resources of these many positions and deployed CGS to endorse the pivotal role that the emergence of Big Gods played in solving problems of cooperation in big groups. Big Gods are not tied to a locale. They are so high up that they are, in effect, everywhere all of the time and, crucially, always watching people's morally relevant behaviors and (often) listening to their morally relevant thoughts. Failsafe moral monitors who dispense rewards and, crucially, punishments, Big Gods anchor large-scale cooperation and supply competitive advantages to the religious communities they supervise.

Big Gods expressly link religion and morality – comparatively recently in the species' natural history (de Waal 2013). Norenzayan (2013, 120–121) speculates that, instead of a side effect of agriculture, Big Gods are (partly) responsible for its emergence. On the other hand, he also argues that they can be dispensable. When citizens live in relatively safe, secure environments in societies with adequate material resources that develop governments with trustworthy institutions, legal systems, and police forces that monitor people's conduct in ways that are similar to the gods' oversight, interest in the gods decreases dramatically. Secularized societies indirectly but substantially check people's interests in religion (Talmont-Kaminski 2013).

Trends in Experimental Research

Subsequent research, since the founding of CSR, reflects two further influences in addition to evolutionary theorizing: an interest in experience and brain imaging. These trends together reflect how mainstream the field has become, since they are the three principal influences in cognitive science generally at this time.

The upsurge of interest in religious experience in CSR is ironic, since some practitioners (Boyer 2001) argue that scholars have overestimated its significance. Renewed interest in religious experience is, however, inevitable. That is because many religious people and scholars are convinced that it is special – whether it is or not. Researchers' interest in the character of experience and embodiment is also a general trend across the social, cognitive, and brain sciences. All have developed increasingly effective means for testing hypotheses about the characteristics, causes, and consequences of the varieties of experience, including ones deemed religious (Taves 2009). New methods have spawned noteworthy findings concerning pain thresholds, arousal, empathy, and memory in everyone from Oxford rowers to ritual firewalkers (Cohen et al. 2010; Xygalatas et al. 2011; 2013).

Research with noninvasive brain imaging, especially fMRI, has grown considerably, as the technology has become increasingly available. Brain imaging offers myriad details about the neural structures and activities involved in religious cognition and experience. Patrick McNamara (2009) reviews a diverse collection of neuropsychological and neuroscientific findings bearing on religious experience. He argues that the neural circuitry associated with religious experience tracks that connected with humans' sense of self, suggesting the potential of the former to alter the latter. Uffe Schjoedt and colleagues scanned the brains of Danish Christians while they were hearing prayers recited by people whom they believed possessed religious charisma. The scans showed significant deactivation in their frontal executive networks, which Schjoedt et al. (2011) construed as registering their deference to these purported religious experts. Brain imaging also provides a new body of evidence bearing on longstanding hypotheses about religious cognition. Schjoedt and his colleagues (2009) furnish evidence that their Danish Christian participants' improvisational praying activates brain areas associated with theory of mind and social cognition. For these individuals, such transactions with God are just like any other interpersonal interaction. That, of course, further corroborates the single most fundamental commitment in CSR, viz., that religious cognition is nothing out of the ordinary.

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