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The Elephant in the Room

Do Evolutionary Accounts of Religion Entail the Falsity of Religious Belief?

Recent evolutionary accounts seek to explain religious belief and behavior in terms of native cognitive dispositions and culturally transmitted innovations that have persisted because they have adaptive value. Despite the often vitriolic evolution-religion debate, new evolutionary theories typically avoid challenging the truth of religious beliefs. In this paper we do three things. (1) We describe five new developments in evolutionary theory that have potential relevance to whether religious beliefs are truth-tracking or not: adaptive misbeliefs, error management theory, self-deception, signaling, and imitation. (2) We assess both their posited application to religious cognition and their possible entailments for the truth or warrant of religious beliefs. (3) We explore whether and under what conditions scientific explanations of religious belief should (a) remain neutral to the truth status of those beliefs or (b) render judgment about a belief’s falsity – or truth – as important aspects of the phenomenon to be explained.

1. Introduction

An error does not become truth by reason of multiplied propagation, nor does truth become error because nobody sees it.

Mahatma Gandhi

The idea that human nature is disposed to seek truth, is innately endowed with some grasp of it, and is constituted so as to flourish in its recognition is an ancient and fundamental view – from Platonic epistemology to Johannine and Pauline anthropology. Although these questions have also animated modern philosophy, they have only recently become the focus of the natural sciences. The extent to which, and domains in which, human mentation is 'truth-tracking'¹ and the ways in which true versus false beliefs would

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¹ The very notion of 'truth-tracking' is itself a complicated issue, and here we have in mind the modest claim that a belief about or mental representation of P reliably covaries with the existence of and properties of P.
be expected to contribute to biological fitness and (various construals of) human flourishing are important issues for the cognitive and evolutionary sciences. Recent cognitive and evolutionary accounts of religious belief are especially illustrative of these issues. In this paper we examine five new developments in evolutionary theory that specifically speak to the adaptive nature of true, false, or factually opaque beliefs: (1) adaptive misbeliefs; (2) error management theory; (3) self-deception; (4) signaling; and (5) imitation.

We are interested in assessing the relationship that these theories may have to religious truth claims in two ways. First, evolutionary theories themselves may reflect implicit or explicit assumptions about the truth status of religious beliefs. Many evolutionary accounts of religious cognition simply assume the falsity of beliefs in supernatural agents, cosmic purpose, miracles, or moral truths that exist independent of human judgment. Others are committed to neutrality on the truth or falsity of beliefs, even beliefs across traditions that cannot be simultaneously true. The conditions under which a scientific account of a belief should (or should not) render judgment on the truth or falsity of that belief, and the role that this judgment appropriately plays in the explanation of belief, needs more discussion.

Second, evolutionary theories of religion may have implications for the epistemic status of the beliefs they purport to explain. We discuss two issues. One regards the truth of religious beliefs. There are both theoretical and empirical grounds for viewing certain kinds of belief-forming mechanisms as systematically biased toward false beliefs. To the extent that these mechanisms can be shown to influence religious beliefs, what are the entailments for the reliability of such beliefs? Another issue is warrant. Independent of any bias toward error in belief-forming mechanisms, if evolutionary accounts of religious cognition provide an explanation for the ultimate and proximate origin of beliefs on the basis of their adaptive utility, which would exist independently of the truth of these beliefs (i.e., a causal account that would produce beliefs that did not reliably track the existence or properties of the object of belief), then what are the implications not for the truth of such beliefs, but for their warrant?

We should say from the start that this paper is written by a theist, an atheist, and an agnostic with our main training in human behavioral and evolutionary sciences rather than theology. We agree on, indeed celebrate, the promising developments in basic science explored here. We agree quite

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2 The very definition of all these concepts is itself admittedly problematic.
3 In evolutionary biology, ‘ultimate’ means the advantage to biological fitness conferred by the trait, and ‘proximate’ means the physiological mechanism that gives rise to the trait. These concepts are explored in a later section.
specifically on the viability and the importance of seeking to understand 
the capacity for and content of religious cognition in light of the natural sci-
ences, including the phylogenetic and functional accounts pursued in evo-
lutionary theory. We agree that scholars across the disciplines need to take 
more seriously and open-mindedly the religiously-salient assumptions and 
implications of these accounts. And most importantly, we agree these topics 
should be explored not by polemical debate, but by respectful conversation 
and even exploratory collaboration between those who disagree. That said, 
we do disagree. We disagree on the extent to which the theories we describe 
adequately account for or (in some cases) even plausibly apply to religious 
belief. And we disagree on the entailments of these accounts for the reliabil-
ity of religious cognition. Nevertheless, we have sought to speak in a shared 
voice rather than point-counterpoint opposition. This has involved uneasy 
compromise on some points. So if the reader finds things to strongly disa-
gree with, it’s probably one of the other authors’ fault.

a) Beyond Scientific Atheism?

Many prominent evolutionary accounts of religion by public intellectual or 
high profile evolutionist and philosopher colleagues – the so-called Scien-
tific or New Atheists – have been dominated by the emphatic claims that 
evolution, and evolutionary accounts of religion, straight-forwardly either 
assume or entail the falsity of religious beliefs (Nielsen 2001; Harris 2004; 
Dawkins 2006). Kai Nielsen explicitly acknowledges the former: “So with the 
critical work (the critique of the truth-claims of theism) essentially done by 
Hume, we should set both metaphysical speculation and fideistic angst aside 
and turn to naturalistic explanations of religious belief” (2001, 35). Dawk-
ins conjoins the former and latter in his emphatically-titled book, The God 
Delusion (2006). Although unrepresentative of most scholars’ views, these 
reductionistic and at times rhetorically vitriolic dichotomizations have gen-
erated a new and in many respects a more understandable wave of creation-
ist suspicions about evolution.

Elsewhere, but less well known, the evolution-and-religion discussion 
has developed much more constructively with new scholarly work that seri-
ously considers: (1) the role of religion in human evolution (by archeolo-
gists, anthropologists, evolutionary biologists, and psychologists); (2) the 
role of evolution in religion and theology (by religious studies scholars, phi-
losophers, and theologians); and (3) the role of theological or metaphysical 
presuppositions in scientific theorizing about religion (Schloss and Murray 
2009).
On the science side, two areas especially have blossomed: first, ‘evolutionary religious studies,’ which is the development of evolutionary theories of religion, and empirical tests thereof (Bulbulia et al. 2008; Wilson 2008); and second, the ‘cognitive science of religion,’ which is the empirical identification of psychological dispositions that predispose human beings to religious beliefs and behaviors (Boyer 2001; Atran and Norenzayan 2004; Barrett 2004; McNamara 2006; Norenzayan et al. 2012).

On the religion side, many religious studies scholars are employing evolutionary explanations in their understanding of religious systems, and many theologians are incorporating evolutionary biology in their theological anthropology and even accounts of divine providence (Hefner 2000; Schoenborn 2007; Deane-Drummond 2009; Haught 2010).

b) Potential Dangers of Consilience

From these newer developments above, one might think that we are seeing the emergence of a peaceful and profitable middle ground, an interchange in which religious belief and evolutionary theory coexist happily, while also informing each other. However, we suggest that there are dangers of veering too far in this direction, and too readily affirming an easy convergence or peaceful coexistence between religion and all attempts to explain it scientifically. Such an approach overlooks a possible epistemic tension, the subtlety of which has been dishonored by the New Atheists but the potential legitimacy of which has been dismissed by uncritical advocates of consilience: the implications of causal or materially reductionistic explanations of belief for religious truth claims. We examine ways in which both science and theology may benefit from tackling this sensitive issue.

The problem is that attempts at dialogue often consist of scientists who appropriately eschew metaphysical reductionism and scientism, politely acknowledging that science cannot explain everything (e.g., the questions of what, if anything, is beyond the universe or what the subjective experience of qualia is or means), and theologians who for their part appropriately eschew rejections of the scientific method, politely acknowledging the truth of evolution (e.g., humans – and theologians – being the products of natural selection). This amounts to what Mary Midgley has described as a “precarious truce” in which non-biologists “agree not to deny the reality of human evolution, so long as nobody attempts to make any intellectual use of it” (Midgley 1982, xi). Put another way, much of the rapidly expanding evolutionary research on religion, and theological invocations of it, skirt around an enormous elephant in the room: the truth claims of religion.
2. Why We Must Tackle Truth Claims

Initially, it may seem possible, or even necessary, to suggest that there is no conceivable tension here. On the one hand, one might argue that evolution is no challenge to belief in, say, a Christian God’s existence because: (a) If there is a God, he had to make humans somehow, and there is no *a priori* theological reason to question evolution as a means; and (b) science entails a naturalistic methodology but no metaphysical commitments that adjudicate the truth or falsity of religious beliefs. On the other hand, one might argue that belief in God is no challenge to science, because the efficacy of scientific explanation is achieved by a focus on modest questions that are not vulnerable to the ‘ultimate’ issues addressed by religion. Thus, if science and religion honor their respective epistemic domains, there is no necessary, and perhaps no possible conflict in their respective understandings. This would be a view close to Gould’s (1997) notion of ‘non-overlapping magisteria.’ Perhaps for these reasons, most explanatory accounts of religion given by cognitive scientists and evolutionary biologists take a neutral stand on the truth or falsity of the propositions to which religious believers give ascent and for which these accounts purport to explain (with some exceptions, such as Boyer 2001; Bering 2010).

However, besides the fact that both of the above reasons are open to some debate⁴, such a stance runs into a significant intellectual problem. This is because the truth or falsity of religious beliefs, or whether (and how) beliefs can be known to be true or false, does in fact have direct implications for evolutionary theories of those beliefs (as it does for any other kind of non-religious beliefs, where this problem tends to be addressed more readily⁵). The properties of an *explanandum* ought not to be ignored, but rather should be accounted for, by the *explanans*. For an explanation of dispositions to form particular kinds of belief, the very accuracy or knowability of those beliefs is a crucial property to be explained.

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⁴ The idea of completely non-overlapping domains of religious and scientific claims about the world does not comport with many scientific and religious propositions. And the idea of creating through the evolutionary process has been pointed out by both theists and non-theists to raise manifold (though not necessarily insoluble) problems for notions of divine providence and goodness.

⁵ For example, a large number of social psychological biases are about beliefs that depart from what would be expected of a rational analysis (Kahnemann et al. 1982; Fiske and Taylor 2007). These ‘false’ beliefs are commonly and readily examined from an evolutionary perspective and it is precisely their falsity that is the puzzle under investigation (see, e.g., Haselton et al. 2009).
Moreover, from an evolutionary perspective, we need to understand whether fitness is enhanced (or damaged, or uninfluenced) by organisms conceiving the world in purely material terms, or in non-material, teleological terms as well (which may depend on domain or context). And we need to at least consider the way fitness might or might not be influenced by the truth or falsity of beliefs of each kind.

a) The Limits of Evolutionary Theories of Religion: Everything but the Truth

In recent years, there has been an explosion in the number and depth of evolutionary accounts of religion (Bulbulia et al. 2008; Schloss and Murray 2009; Nowak and Coakley 2013). However, few of them purport to present any challenge to the truth claims of religion at all. They implicitly or explicitly suggest that if a given evolutionary account is correct, religious beliefs may or may not also be correct. This applies to variants of both major strands of evolutionary theories of religion: adaptationist theories (which see religion as having positive effects on individuals or groups), and by-product theories (which see religion as having neutral or negative effects). The most prominent mimetic accounts of religion are possible exceptions, in that they are based on the explicit claim (which underwrites but does not result from the theory) that religious beliefs are false (Dawkins 1976, 2006; Dennett 2006). However, even this may derive from Richard Dawkins’ initial presentation of the idea rather than its logic. Memes can be ‘sticky’ and spread whether they are true or not.

The puzzle, therefore, is that while all evolutionary theories of religion offer a causal account of the origins of beliefs in God (that do not invoke God in the causal genealogy), evolutionary theories also remain perfectly compatible with the proposition that God exists (and, say, made humans through an evolutionary process that even generated the ability if not disposition to believe in God). None of them overtly challenge truth claims and few of them even refer to the truth or falsity of belief. One reason they do not challenge them is because the truth or falsity of the belief is not relevant to the functional or proximal causal account of the belief itself – the theory ‘works’ in either case. Many theologians are well aware of this neutrality in the evolutionary science of religion. For example, Nicola Hoggard Creegan notes that “the split between the natural capacity for religion and the content of that

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6 A thoughtful exception to this is Bulbulia (2013), with rejoinder by Murray and Schloss (2013).
7 Or beliefs in other types of supernatual agents or agency. Here and elsewhere we say ‘God’ for clarity of writing, but the argument stands for other contexts too.

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belief is not at all threatening for religious belief” (Hoggard Creegan 2014, 234 in this volume). For this reason, theologians may not be concerned by or exploring the implications of evolutionary theory as much as they might.

b) Why Have Evolutionary Theories Ignored Truth Claims?

In trying to account for why evolutionary theorizing about religion does not address the truth or falsity of religious beliefs, we suggest that it reflects a disciplined focus on four ‘levels of explanation’ that biologists gravitate to in their explanations of behavior. The four levels were famously laid out by ethologist and Nobel laureate Niko Tinbergen (1963), in cautioning biologists to maintain a broad view of alternative kinds of explanations for a given behavioral (or physiological) trait, namely: its ultimate function (what is it for?), proximate function (how is it done?), development (how does it develop from birth to maturity?), and phylogeny (how is it represented among similar species?). So a bird sings because singing attracts a mate, is triggered by hormones in the mating season, is learned from its parents, and is a common trait of songbirds. All of these explanations are correct, but focusing only on one particular explanation fails to fully account for the behavior.

Now, Tinbergen was hugely successful in widening biologists’ minds, and to this day students and scholars alike regularly refer to the four causes to ensure they are covering all their bases. For a wide range of evolutionary theories it has helped to conceptualize and enable accounts of biological traits at all four levels. But Tinbergen’s approach was developed for, and most readily applies to, behaviors (and other observable traits). When it comes to cognition and the ‘beliefs’ that may underlie behaviors, Tinbergen’s four causes of behavior may give us a false sense of security that we are looking broadly, when in fact they guide our vision away from asking the critical question of whether the belief-forming mechanism is truth-tracking or not. Because the focus is on behavior, rather than cognition, the truth or falsity of beliefs giving rise to that behavior is encompassed in the black box of proximate mechanisms. Thus, we could have an adequate causal account of dispositions to form some belief at each of Tinbergen’s levels – ultimate, proximate, developmental, and phylogenetic – without any reference to the truth or falsity of that belief.8 Table 1 below lists the major evolutionary theories of

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8 This is actually a complicated point. For certain kinds of beliefs, for example beliefs about entities or properties of the physical and social world, the truth (or falsity) of belief actually functions as part of the causal account in several of Tinbergen’s levels, i.e., the object of belief exerts causal influence in the process of belief formation. For example, beliefs about physical objects or other minds are both mediated physiologi-
religion, and marks which of Tinbergen's levels of explanation they primarily focus on. What becomes clear is that while evolutionary theories vary in the levels and spread of levels on which they focus, few of them consider developmental or phylogenetic processes and none of them include the question of whether beliefs are true or not.

Table 1. Major evolutionary theories of religion and which of Tinbergen's four causes of behavior they primarily focus on. A fifth element not included in Tinbergen's scheme is whether belief-forming mechanisms giving rise to behaviors are truth-tracking or not.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Primary focus among Tinbergen's four levels of explanation</th>
<th>Truth tracking?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costly Signaling</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Supernatural Punishment</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Group Cooperation</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Cognitive Science of Religion</td>
<td>✓    ✓</td>
<td>?</td>
</tr>
<tr>
<td>Meme Theory</td>
<td>✓</td>
<td>?</td>
</tr>
</tbody>
</table>

cally and emerge developmentally through interaction between neurological capacities and experience with entities about which beliefs are formed. The target of belief plays a functional role in physiological and developmental processes giving rise to the belief (Murray and Schloss 2013). Moreover, it is also claimed that the targets of belief exerted evolutionary influence on the general disposition to form beliefs, giving rise to the innateness of folk physics, folk psychology, etc. But when it comes to religious, moral, or other metaphysical beliefs (including beliefs in such things as mathematical realism), there is no readily apparent way to assess the causal role of the targets of beliefs in the process of belief formation. The picture may become even further complicated and context dependent, however, because we do have examples in which people obtain feedback on the status of real-world, observable, material entities, but nevertheless maintain a bias to under- or over-estimate their magnitude or frequency (such as vertical heights, the speed of approaching objects, or the probability of rare events; see Haselton and Nettle 2006; Taylor et al. 1989; Johnson et al. 2013). In short, differentiating kinds of belief does not necessarily rescue us from the possibility that false beliefs may have been favored by natural selection.

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c) Adaptation and the Truth or Falsity of Beliefs

So current evolutionary accounts of religion do not overtly pose any challenge to religious beliefs. However, to do so would be a very tall order and therefore perhaps should be no great surprise. Science should not be expected to directly contradict non-scientific modes of understanding. But, if evolutionary theories of religion apparently have so little to say about the validity of beliefs, does that mean their relevance for religious truth claims does not need to be taken seriously?

There are, in fact, four ways that evolutionary theory, and evolutionary theories of religion, potentially bear upon truth claims: (1) Beliefs may be more likely to be adaptive if they are true; (2) beliefs may be more likely to be adaptive if they are false; (3) beliefs may be adaptive whether they are true or not; and (4) beliefs may be adaptive because one cannot tell if they are true or not. Let us unpack these possibilities.

First, evolutionary theories have implications for the question of whether human cognitive dispositions are truth-tracking, both in general terms, and more specifically with respect to the kinds of religious beliefs that are especially widespread and may reflect native human cognitive dispositions. This involves the probability distribution of true and false beliefs within different belief classes, including religious beliefs. Certain kinds of beliefs (e.g., beliefs about whether a certain food source is poisonous) are more likely to be adaptive if they are true, or at least if they positively correlate with what is true.

Second, other kinds of beliefs – for a range of reasons discussed in the next section – are actually more likely to be adaptive if they are false, and precisely by virtue of their falsity or negative correlation with truth. Such belief-forming mechanisms do not merely fail to generate beliefs that track or correlate with truth, they are actual built to favor a bias toward false beliefs. And as we go on to explain, there are theoretical reasons for proposing that some kinds of religious beliefs fall into this class.

Third, yet other kinds of beliefs (e.g., beliefs about when and why one must conduct collective rituals) may be adaptive whether they are true or not – because the adaptive value is in the doing (bonding people, values, and goals), not the explanation or causal logic. This represents a different way that evolutionary and cognitive accounts of certain kinds of beliefs – particularly religious (and moral) beliefs – have implications for truth-tracking. Here, it is not so much to do with the likelihood of a belief’s truth or falsity, but the claim that certain belief forming mechanisms operate without any causal trigger from the object of belief. Hence, they have no demonstrable
relation to truth or falsity at all – they may be independent or orthogonal. If, for example, a particular class of beliefs can be shown to contribute to fitness whether or not they are true (as with the ritual example above), then we can expect underlying belief-forming mechanisms to generate beliefs randomly with respect to their truth or falsity⁹. That is not to say that a belief formed by a mechanism that is insensitive to the truth or falsity of the object of belief is necessarily or even likely false. But it lacks warrant. One might even cite the extraordinary diversity of religious rituals here as empirical evidence. All societies have rituals of one form or another. Yet, as with many other cultural traits, the exact content is not constrained by selection and is free to take many forms.

Fourth, a final important question in evolutionary accounts of cognition is whether the adaptive value of certain kinds of beliefs (including or especially religious beliefs) does not just happen to be insensitive to its truth or falsity, but actually derives adaptive benefit from this very fact. In other words, does unhinging beliefs from veracity in itself provide functional utility? In the next section, we explore some recent developments in evolutionary theory suggesting why we might expect falsity or obscurity in religious beliefs to have been favored by natural selection.

3. Five Reasons Natural Selection May Favour False Beliefs

One might worry that evolutionary science does not have the tools to grapple with these thorny problems of truth claims. But in fact, several recent strands of evolutionary theory have explicitly focused on the question of

⁹ Strictly speaking this is not quite the case. If a belief forming mechanism evolved by virtue of its ability to motivate adaptive behaviors, and these behaviors would be adaptive whether the belief itself were true or false (or if beliefs were completely dissociated from fitness-relevant behaviors), then the evolutionary account provides no reason for construing the underlying cognitive mechanisms as truth-tracking. But this does not mean either that they are random with respect to the truth, or that there are not other (non-evolutionary) reasons. For example, there could be biophysical or developmental constraints on the range of possible beliefs that are not randomly correlated to the object of beliefs. Or there could be a mathematical or moral structure to nature that constrains what emerges evolutionarily, including cognitive dispositions, in a way that reflects awareness of mathematical or moral reality. The same could be said of religious or divine reality. Importantly, these proposals do not play a role in Tinbergen’s causal cascade, and they do not constitute explanations in a scientific sense. And given considerations of parsimony, they may not be acceptable causal ‘explanations’ at all. But if true, they would underwrite confidence in truth-tracking of mathematical, moral, religious, or other beliefs in the unseen.
whether false beliefs – in their very falsity – provide an adaptive advantage that outperforms accurate beliefs. Other accounts contend that the fact that some beliefs cannot be known to be true or false, or that some beliefs cannot even be understood in terms of truth or falsity, is itself adaptive. For these types of reason, natural selection may favor false beliefs, and mechanisms for forming false beliefs; or it may favor beliefs that have no actual (or knowable) connection to the truth or falsity of the object of belief. Five key theoretical perspectives that some contend are relevant to belief in God or other religious beliefs are outlined below: (1) adaptive misbeliefs; (2) error management theory; (3) self-deception; (4) signaling; and (5) imitation.

a) Adaptive Misbeliefs

Ryan McKay and Daniel Dennett’s target article *The Evolution of Misbelief* in *Behavioral and Brain Sciences* (2009) set out a framework for examining the plausibility of a range of possibly adaptive (fitness enhancing) ‘misbeliefs,’ including religious beliefs. They explored the hypothesis that false beliefs can generate advantages over accurate beliefs, and may thus have been under positive selection pressure in our evolutionary history.

McKay and Dennett were most convinced by the case of ‘positive illusions.’ Although this particular example may appear to have little to do with religious beliefs (although see Schloss and Murray 2011), we outline it here because it demonstrates an example of how a false belief – in general – can provide adaptive advantages. The general phenomenon can then be examined for its potential role in accounting for religious beliefs as well.

Positive illusions are a set of empirically common psychological dispositions among mentally healthy adults to exhibit positive biases in three broad categories: We tend to exaggerate our perceived capabilities, overestimate our control over events, and are over-optimistic about the future (Taylor and Brown 1988, 1994). For example, a 1976 College Board survey of one million U.S. high school students found that 70 percent rated themselves as above average in leadership ability, and only 2 percent rated themselves as below average. Every single student rated themselves as at least average in their ability to get along with others, and 25 percent of students placed themselves in the top 1 percent. Numerous other studies have replicated the same phenomenon in different domains, with a variety of types of laboratory and real-world subjects, and using different benchmarks of what constitutes accurate assessments (Taylor et al. 1989; Peterson 2006; Sharot 2011).

But why are people biased in this way? The key point for our purposes is to recognize that these beliefs, although inaccurate, appear to be advan-
tageous. They are advantageous because they increase ambition, perseverance, morale and the willingness to exploit opportunities when they arise (Taylor 1989; Peterson 2006). For example, various superstitious or magical beliefs about people’s ability to influence the future, or faith in (demonstrably inert) alternative medical therapies or the well-known ‘placebo effect’ are all explainable in terms of marshaling the commitment of resources in a context where a more realistic assessment of likely failure would not effectively motivate attempts to succeed. Recent models show that, in competition with unbiased strategies, optimistic strategies have a competitive edge and are evolutionarily stable (Nettle 2004; Johnson and Fowler 2011; Johnson et al. 2011).

How might misbeliefs specifically apply to religion? One course-grained and unsubtle claim is that religion is, along with magical and superstitious thinking, an overly optimistic assessment of our ability to succeed in the world through appealing to or appeasing supernatural agents. Another somewhat more cautious and discriminating claim is that many core religious beliefs – which involve attributions of deep purpose in the world – accrue from a cognitive bias toward teleological attributions. Such beliefs are an adaptive if primitive means of recognizing order in and predicting events in the natural world, by attributing them to agency or purpose. Or they are byproducts of our accurate attribution of purpose in products of human agency. There is a significant amount of empirical work in purpose attribution. Deb Kelemen refers to human children as innately being ‘promiscuous teleologists’ and ‘intuitive theists’ (1999, 2004). And recent work indicates that this inclination – even in atheists – is preserved well into adulthood (Gilbert et al. 2000; Bering 2004; Kelemen et al. 2013).

One final possibility is that belief in supernatural agents, and associated punishments and rewards, may bring adaptive advantages to individuals or groups. McKay and Dennett did examine this and were not convinced that

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10 There is one major problem with construing ‘over-optimism’ as a misbelief. And that is the fact that having a belief that, for example, your chances of surviving cancer are higher than the epidemiological likelihood of all people may actually elevate your chances of surviving. In such a case, belief can still be truth-tracking even if positively biased. William James famously observed that some kinds of beliefs actually help make real what is believed, and indeed Shelley Taylor suggests positive illusions can be a ‘self-fulfilling prophecy’ (Taylor 1989). However, this does not make over-optimism a contradiction in terms. Controlled experiments have been important in demonstrating that, although positive illusions may raise people’s game – to some extent – their beliefs remain disproportionately optimistic when evaluated by third parties or by exogenous benchmarks (e.g., exam results). Inflated expectations can help improve performance but does not guarantee a match of prediction and result. People aim high and by doing so get half-way there.
such beliefs were adaptive (McKay and Dennett 2009). However, as noted in a commentary, McKay and Dennett’s rejection of supernatural beliefs as adaptive “hinges on a perceived lack of empirical evidence” (Johnson 2009b, 523). Since their paper was written, this exact topic has become the focus of considerable new empirical and experimental work. Across a wide variety of contexts, subjects, societies, and laboratory and field settings, priming with supernatural agent concepts consistently increases cooperation and payoffs in economic games and social interactions (Atkinson and Bourrat 2011; Schloss and Murray 2011; Shariff and Norenzayan 2011; Hadnes and Schumacher 2012; Purzycki et al. 2012; Shariff and Rhemtulla 2012; Norenzayan 2013).

To the extent that religious beliefs accrue from dispositions toward adaptive misbeliefs, this may seem to raise questions about their reliability. But there are also two problems here. One is that, unlike beliefs that are demonstrably untrue (e.g., only 2% placing themselves below average), we don’t know that religious beliefs about agents or purpose or afterlife are untrue. And second, even in cases where differing religious beliefs about afterlife or god/s or purpose are contradictory and therefore must include untruths, we don’t know whether these contradictions reflect a disposition toward misbeliefs, or one that tracks truth, but at a coarse- rather than fine-grained level. In such a case, beliefs would be truth-tracking, with much noise.

b) Error Management Theory

Error Management Theory (EMT) offers another perspective on how false beliefs can be adaptive. EMT suggests that if the costs of different possible errors are asymmetric over time, then an inaccurate representation of the world can outperform accurate beliefs (Haselton and Buss 2000; Haselton and Nettle 2006; Johnson et al. 2013). Let us unpack the logic below.

A decision can be wrong in two ways (Table 2). It can assume X when not-X is true (a ‘false positive,’ such as the belief that a predator or food source exists when it does not), and not-X when X is true (a ‘false negative,’ such as the belief that a predator or food source does not exist when it does). EMT suggests that, under uncertainty (that is, where the true probability of outcomes cannot be precisely predicted), and if the costs of false positive and false negative errors are different, then the optimal decision-making strategy can be a bias towards making the least costly error over time. If it is not pos-

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11 For example, afterlife beliefs could be right that death is not the end, although they differ on whether this occurs via reincarnation, resurrection, ancestral ghosts, etc.
sible to be right all the time, we can at least generate a bias to steer us away from the worst of the possible errors.

The conditions for EMT may seem limiting but are in fact common to a wide range of decision problems: The true probability of outcomes is rarely known precisely, and different outcomes are unlikely to have identical costs. Consider smoke alarms (Nesse 2005). Smoke alarms are deliberately set to go off too often (sometimes they go off when you burn your toast), in order to avoid making errors in the other direction (failing to go off when there is a real fire). Since there is uncertainty in the signal (aerial particulates may look similar to the smoke alarm in both cases), the only way to make sure all genuine fires are detected is to set alarms to be slightly ‘too’ sensitive – we give them a bias.

Table 2. The four possible combinations of beliefs about the world and actual states of the world (giving rise to two different types of errors).

<table>
<thead>
<tr>
<th>Belief</th>
<th>Actual</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>Correct</td>
</tr>
<tr>
<td>Not X</td>
<td>False Negative Error</td>
</tr>
</tbody>
</table>

EMT attracted particular attention (and the term was coined) when it was applied to explain decision-making biases in humans. If decision-making errors had asymmetric costs over human evolutionary history, then natural selection may have favored biases that minimized whichever mistakes incurred the greatest costs (Nesse 2001, 2005; Haselton and Nettle 2006). This intriguing logic led to a number of studies that proposed a role for EMT in explaining a range of puzzling biases from sex differences in dating behavior (Haselton and Buss 2000; Haselton and Galperin 2014), to optimism (Nettle 2004), and cooperation towards strangers (Yamagishi et al. 2007).

But what does EMT have to do with religious beliefs? Recently, EMT was applied to account for why people may maintain an unconfirmable belief in supernatural agents, as a way to help avoid even more costly errors incurred by selfish behavior (Johnson 2009a)\textsuperscript{12}. In effect, a belief in supernatural

\textsuperscript{12} Note that this proposal does not assume the falsity of all beliefs in supernatural agents, or even any particular belief. But with so many different, and in some cases mutually
agency represented a bias to increase self-restraint, which may have become especially important as human societies became increasingly transparent with the advent of theory of mind and language, and the costs of social transgressions increased as a result.

There are three steps to the logic here. First, there is abundant empirical evidence that humans have natural dispositions to form beliefs about the presence and nature of agents, and these beliefs develop quite early, without formal instruction (Bloom 2004; Barrett 2012). Indeed, whether and in what way infants have ‘beliefs’ is a difficult question, but newborns distinguish living from non-living entities – and human faces – within hours of birth. It appears that human cognition is structured with an innate ‘agency detection device’ (ADD).

Second, EMT suggests that errors in agency detection may be non-random. Of course, the adaptive value of accurately detecting an agent is high: Fleeing a snake or capturing food or recognizing the presence of another human agent (friend or foe) is important. But no detection mechanism is perfect, and given the fact that any such mechanism will make errors, the costs of a false negative (failing to recognize an agent when one is present) is generally higher than the costs of a false positive (thinking an agent is present when none is). Thus, we expect the ADD to be biased toward false positives, or overly sensitive (hence the so-called ‘hypersensitive agency detection device,’ or HADD). And it turns out there is empirical evidence that this is just the case (Barrett 2004).

Third and finally, it appears that various kinds of religious beliefs – not least beliefs in supernatural agents, or agents with magnified agent qualities like omniscience, omniperceptual ability, or immortality – accrue from HADD. Importantly, there is considerable empirical evidence that beliefs in eternal souls or all-knowing beings are not merely cultural impositions, but entail native dispositions to form such beliefs, which arise naturally, untaught, and quite early in human development (Bloom 2004; Barrett 2012). In short, while EMT may underlie one or more rather simple elements of religious thinking, this may provide the framework over which other aspects of religious systems accumulate and build.

We should note that even if EMT does apply to religious belief, the entailment for the truth of religious beliefs is not straightforward. On the one hand, HADD may promiscuously generate false-positive agents in such exclusive beliefs – one God, many Gods, ancestors, ghosts, other spirits, one afterlife, many rebirths – some must be false. Or at least false in detail; all could be true in the general belief in supernatural moral policing, even though they differ in exactly how or by whom it is administered.
a way that religiously salient agents accruing from its action are likely to be false. But even here, as mentioned before, the distinction between false positives and course-grained but true positives is important. On the other hand, the actual adaptive significance proposed for belief in supernatural punishing agents is not a bias toward over-attributing agency, but a bias toward over-estimating the chances of getting caught for social transgressions (although the latter is argued to cause the former). EMT argues that where the costs of transgressions are high, it is strategically preferable to err on the side of caution, forgoing some chances of cheating that one might get away with. This says nothing about the existence or non-existence of the conceived agents who motivate such caution. Nevertheless, it at least suggests that beliefs may be adaptive even if they are false.

c) The Evolution of Self-deception

Robert Trivers’ theory of the evolution of self-deception suggests that there may be adaptive value not only to false beliefs, but to sequestering recognition of belief falsity (2000, 2011; von Hippel and Trivers 2011). The core of his theory moves away from individual false beliefs, as in the misbeliefs and error management outlined above. Instead it focuses on the adaptive advantages of deceiving others.

The basic argument builds on the idea that deceiving others can bring many benefits (or avoid many costs), but is hard to do. Acting convincingly as if something is true takes considerable effort and practice. Meanwhile, on the other side of the coin, humans appear to be particularly good at detecting cheats (Cosmides and Tooby 1992; Mealey et al. 1996; Yamagishi et al. 2003; Chiappe and Brown 2004). This asymmetry is intuitive: Few of us can act well, but everyone can tell a bad actor from a good one. Natural selection, therefore, may have favored self-deception in common forms of bluffing or cheating, the better to hide them from others. Our attempts to bluff others are limited because of the risk of ‘behavioral leakage’ that, try as we might, can give the game away, and reveal our actions or words as a bluff. This would be outperformed by a strategy of self-deception that makes us truly believe in the bluff ourselves, because that way there can be no behavioral leakage to undermine it (see also Frank 1988).

The underlying logic has ramifications for a host of behaviors and domains. It turns out to be especially important to signaling religious beliefs. One theoretical proposal for religious belief is that beliefs in supernatural punishing agents or forces stabilize cooperation by preventing social transgressions (Johnson and Bering 2009). There are various plausible versions
of these proposals, involving adaptive function at individual or group lev-
els (Schloss and Murray 2011), and, as already noted, there is wide empiri-
cal support for the efficacy of supernatural agents. The problem is that a
community or individual who entirely trusts supernatural agents to police
defectors will be vulnerable to exploitation by those who do not believe in
such agents. Thus it is likely that mechanisms arose for detecting signals of
belief, in order to discriminate between those who do and do not believe
in the shared ascription of moral gods or forces. The best way to convince
others about the sincerity of one’s belief, as Trivers argues, is to be deceived
yourself. Thus, self-deception about religious belief may be an effective way
of signaling commitment – sincere but inauthentic – to other members of a
religious group (Schloss 2007).

One manifestation of this may be ‘auto-signaling’ in which one performs
rituals that are undertaken entirely in private, but nevertheless have utility
for signaling to others because: (1) they may be a necessary element of gen-
erating or maintaining self-deception; (2) they may help to reduce cognitive
dissonance between what one practices and preaches (‘I’m doing this so I
must believe it’); and (3) allows the opportunity to read and practice speech
and behaviors which are then more compelling when conducted in social
settings. Indeed, in light of the threat that self-deceived exploitation con-
stitutes, it is perhaps no coincidence that the prophetic tradition exercises
more concern for authenticity of commitment than it does for orthodoxy of
beliefs. Thus self-deception theory illuminates a kind of false religious belief
that religious traditions themselves recognize. However, it entails a differ-
ent kind of ‘falsity’: not untrue propositions about the existence of gods or
miraculous events, but untrue beliefs about oneself and the authenticity of
one’s commitments. Of course, such existential inauthenticity is not limited
to religion, but it is especially significant because: (1) The social costs are
high where religious signals function to stabilize cooperation; and (2) rei-
fied religious beliefs and practices may be especially effective in facilitating
self-deception. In the Hebrew prophet (Isa 29:30): “This people draws near
to me with their lips, but their hearts are far from me.”

d) Signaling Through Falsity

Above, we considered the role of self-deception in individuals signaling
to others. A separate strand of theory involves collective deception. Some
accounts of costly signaling suggest that embracing beliefs that are demon-
strably false (or that are seen as demonstrably false by the surrounding
culture of non-believers) itself may function as the critical signal of com-
mitment that facilitates within-group trust and cooperation. The idea was captured by Roy Rappaport, who wrote that

the very features of Ultimate Sacred Postulates that lead positivists to declare them to be without sense or even nonsensical – that they are unverifiable, unfalsifiable, materially empty, lacking social specificity and sometimes incomprehensible – are those that render them adaptive, that suit them for association with a certain class of ‘players of the existential game,’ social systems at their most inclusive (Rappaport 1999, 428).

Some modern theologians accept that religious ideas can be contradictory and, like us (at least in this regard), see this contradictory property as part of its punch. As Gene Rogers put it, “religion locates its power in the anomaly that crosses conceptual lines: the pangolin neither reptile nor mammal, Christ both human and divine” (Rogers 2014).

As the costly signaling theory of religion has developed13, the idea that beliefs as signals may in fact be more effective if they are implicitly known to be (or believed to be) false by the culture at large has gained some traction (Cronk 2005). Belief in a young Earth may function as a signal of community commitment precisely by virtue of its demonstrable falsity by epistemic standards that are universally accepted outside that community. How better to demonstrate your commitment to a group, than to sign up to a belief that no one in the wider cultural milieu could reasonably hold or even respect?

e) Imitation

Beliefs are powerfully reinforced by social norms. In the context of large groups, beliefs are sometimes perpetuated more powerfully among many individuals than they are within individuals. Numerous tenets of social psychology, as well as empirical evidence, support the fundamental proposition. Humans are social animals, and many of our most powerful psychological tendencies are those that lead us accept, often uncritically, what relevant others believe or tell us to believe (Richerson and Boyd 2004). It is thought that our willingness to imitate and copy others was a highly adaptive trait, given the power and advantages of cultural learning. Of course, there is a cynical aspect to this argument in that people often tend, or are compelled, to accept what a particular individual, or group of elites, tell them to believe, but we seem to have evolved traits that lead us to copy individuals of high status or prestige, not necessarily high power or dominance (Henrich and


Moreover, there are other factors that influence the likelihood that a given idea will be successively socially retained and transmitted. False beliefs may have a special spreading power – as in the famous saying attributed to Churchill, “A lie gets halfway around the world before the truth has a chance to get its pants on.” And once again, this may be adaptive. This is an area where the cognitive science of religion contributes some new knowledge. Although ‘normal’ concepts tend to be remembered best of all, among non-normal, paranormal beliefs, it turns out that for such concepts to be maximally memorable, and therefore sustainably transmissible, they need to be ‘minimally counterintuitive’ (Boyer and Ramble 2001). Minimally counter-intuitive means a concept that is in nearly all elements perfectly intuitive, such as a person, but which has a single or minimal element that is counter-intuitive, such as that the person can walk through walls. Previous empirical studies have found that maximally counter-intuitive or nonsensical propositions, or utterly unremarkable statements, are not readily retained (Boyer 2001; Boyer and Ramble 2001; Atran and Norenzayan 2004; Harmon-Vukić et al. 2012). Minimally counter-intuitive concepts are better remembered, and degrade more slowly, than other concepts. The qualities ascribed to deities and other supernatural agents of many kinds typically conform to the minimal counter-intuitiveness requisite for successful belief transmission.

Now, being counter-intuitive does not make a belief false. But there are two possible entailments for the epistemic status of religious beliefs. One is that unlike other beliefs – like the value of $\pi$ or that touching fire hurts – these beliefs are transmitted not because they are rationally or empirically demonstrable, but only because they are memorable. This is the criticism of memetic accounts of religion for the warrant of beliefs. Of course, the problem with this is that while it is clear that memorability contributes to transmission, it is not clear this is the only factor. The other implication is the following: If one takes fundamental intuitions to be truth-tracking, then a systematic bias in the sustainability of religious ideas, away from the intuitive, may represent a systematic bias away from our most reliable cognitive dispositions. The problem with this is that: (1) We have just argued above that many intuitions are not truth-tracking; and (2) many conclusions (heliocentrism, evolution, relativity) if not the very methodology of the natural sciences are highly non-intuitive (McCauley 2011). The contribution of the scientific perspective here is that minimally counter-intuitive concepts are not only violations of intuition. Often, they are violations of what are understood to be physical laws, such as walking through walls or trees with voices.
Thus at face value, there is some rationale for recognizing them as false, or at least for being skeptical of their truth. This ostensible falsity, it seems, may be an important ingredient of their success.

\textbf{f) Interactions among Evolutionary Theories of Falsity}

Each of the above theoretical approaches has a somewhat different focus of attention, subject, and mechanism (summarized in Table 3). These differences increase the probability that a given domain may be subject to the evolution of false beliefs: manifold causal options for pushing cognition off the rails of truth-tracking.

\textit{Table 3.} Evolutionary theories of false beliefs: commonalities and differences.

<table>
<thead>
<tr>
<th>Problem with truth</th>
<th>Advantage of falsity</th>
<th>Subject</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Misbeliefs</td>
<td>Ineffective</td>
<td>Self-fulfilling prophecy</td>
<td>Individuals</td>
</tr>
<tr>
<td>Error Management Theory</td>
<td>Incurs costs</td>
<td>Avoids worst errors</td>
<td>Individuals</td>
</tr>
<tr>
<td>Self-deception</td>
<td>Undermines effective deception</td>
<td>Reduces behavioral leakage</td>
<td>Individuals</td>
</tr>
<tr>
<td>Signaling</td>
<td>Weak commitment signal</td>
<td>Amplified commitment signal</td>
<td>Groups</td>
</tr>
<tr>
<td>Imitation</td>
<td>Mundane; forgettable</td>
<td>Sensational; memorable</td>
<td>Groups</td>
</tr>
</tbody>
</table>

These five theories for the evolution of false beliefs might be seen as alternative hypotheses, or even mutually exclusive. However, it is possible that they operate simultaneously and interact. This is significant because one consequence of their interactions may be to reinforce each other, making the

\footnote{This is a complicated point entailing several issues on which we and many commentators do not agree. First is the question of whether there are ‘laws of nature,’ i.e., whether what science formulates as laws are prescriptive or descriptiv. Second, to the extent laws entail the obligate workings of, whether apparent anomalies represent ‘violations’ as opposed either to incomplete understanding or non-anomalous events within \textit{ceteris paribus} laws. Third, whether nature is a closed system and genuine ‘violations’ are impossible, hence belief in them is necessarily false.}

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overall effect stronger than any individual mechanism alone. For example, if self-deception interacts with error management, then natural selection may have developed an even stronger bias which is able to manage errors more rapidly and reliably than it otherwise would. As another example, if the advantages of misbeliefs interact with fake signals, then a group may believe itself to be more unified than it really is, setting its goals higher and attaining more than they otherwise would, in a kind of self-fulfilling prophecy. Teasing apart such interactions may be difficult, but what is clear is that they can amplify the potential importance and power of false beliefs.

g) Beyond Falsity: Adaptive Value of Unverifiability?

We have been describing theories for the adaptive value of beliefs that are false. However, many beliefs, while not demonstrably false, are not demonstrably true either. For example, the Christian God is widely regarded as being beyond the realm of scientific ‘explanation,’ and attributes of that God – e.g., Trinitarian, existence outside of time, etc. – are not fully resolvable empirically or by forms of rational argument. Some construals of God or other religious entities take them not only to be non-explainable or verifiable, but non-propositional and fundamentally incomprehensible.

Now, this is interesting because evolutionary theories suggest that these qualities may themselves be adaptive, in terms of their social utility, their cultural sustainability, or both. A belief in a God that is beyond the realm of explanation may have outcompeted (by biological or cultural selection) a belief in a God that is within the realm of explanation (as argued, e.g., by Sosis and Bressler 2003). In other words, Rappaport’s (1999) insights about the adaptive advantages of unverifiable beliefs may extend to explaining why some features of the conception of supernatural agents are common across cultures, why some have spread and others have disappeared, and why some do well in certain locations and not elsewhere.

h) Implications of Adaptationist Theories of Beliefs

There is a considerable literature that applies evolutionary epistemology to the warrant of certain classes of non-empirical beliefs, e.g., moral or religious beliefs. In contrast to the New Atheist critics of religion as pathological or maladaptive, a number of evolutionary biologists and philosophers work-

15 Of course, this is not inconsonant with and has no clear entailments for the truth of such beliefs; and depending on one’s understanding of the epistemic status of non-evidential beliefs, it may have no implications for warrant either.
ing in this area argue on theoretical and empirical grounds that religious (and moral) beliefs are crucially adaptive\textsuperscript{16}. But if there is adaptive utility to certain kinds of supernatural or non-physical beliefs, unlike beliefs that a particular plant is poisonous, then beliefs in the existence of moral truths or a God who punishes moral transgressions – if they are adaptive – would be adaptive \textit{whether or not there was moral reality or whether or not God exists}\textsuperscript{17}. The claim is that such beliefs influence behaviors in ways that solve fitness related challenges, in virtue of \textit{their being believed}, not in virtue of the existence or activity of the object of belief. If certain behaviors – reciprocating a cooperative investment or pair bonding with a mate – have adaptive advantages, then belief in a supernatural entity that promotes these behaviors can have adaptive value, independent of its truth or falsity. This is a classic example of the situation referred to earlier: Natural selection favors a belief-forming mechanism that, while not biased toward false beliefs (as in some cases above), produces beliefs that have fitness benefits irrespective of whether they are true or false.

However, while this means that religious beliefs are not judged false in light of these accounts, at face value it means they may be unwarranted (Joyce 2001; Sommers and Rosenberg 2003). Alex Rosenberg sums it up in this way: If our best theory of why people believe $P$ does not require that $P$ is true, then there are no grounds to believe $P$ is true. The \textit{claim} that many of the beliefs to which humans are most naturally disposed, and may take to be most important if not most deeply true, can be explained by mechanisms that are not truth-tracking, has significant entailments for both religion and human meaning-making\textsuperscript{18}.

\textsuperscript{16}‘Adaptive’ does not mean benign, i.e., there are many beliefs and behaviors that may be adaptive in the sense of contributing to fitness, but that are subversive of what most would take to be human flourishing. However, a number of adaptationist accounts of religious and moral beliefs – including those that reject moral or religious realism – maintain that such beliefs are useful fictions, important to human well being (Wilson 2008; Joyce 2007).

\textsuperscript{17}Assuming there is a cosmos and believing creatures, see below.

\textsuperscript{18}Of course, there are several crucial limitations to this statement. First, we do not currently have an accepted or even a ‘best explanation’ that is deemed to adequately account for religious belief. We have alluded to many speculative proposals here. Second, if we did have an evolutionary account of belief-forming dispositions – say belief in God – that were favored by selection regardless of the truth of that belief, we would still not have explained the belief forming mechanism without an explanation of the origin of mind, life, and the cosmos, that also did not entail God. Note: This is not a ‘god of the gaps’ argument for God’s existence, much less employing divine action as an efficient cause. Rather, it is an observation that the legitimate challenge raised by a gapless naturalistic explanation for belief that is not in any way influenced by God’s existence, does indeed need to be gapless. Third, if we have an explanation of cognitive dispositions
4. Does Assessing Religious Truth Claims Corrupt Science?
Religious Claims about Human Nature and Historical Events

If scientific explanation seeks to be responsive to the falsity or indemonstrability of religious beliefs, should it also be open to the truth of beliefs? What are the implications for scientific methodology if inquiry does not begin with commitment to the falsity of religious beliefs as a starting point?

Here we wish to acknowledge that some work in this area does in fact begin with the assumption that all religious belief is false, and that the very task of cognitive or evolutionary accounts is to explain why such false beliefs exist. For example, philosopher Kai Nielsen claims:

By now it has been well established that there are no sound reasons for religious belief: there is no reasonable possibility of establishing religious beliefs to be true; there is no such thing as religious knowledge or sound religious belief. But, when there are no good reasons for religious belief … and yet religious belief, belief that is both widespread and tenacious, persists in our cultural life, then it is time to look for the causes of religious beliefs (2001, 35).

Ideally, we would want to emphatically reject this approach. While we have surveyed theoretical and empirical approaches that attempt to account for how some beliefs could have adaptive value while being biased toward falsity or being unconnected with truth, these accounts do not begin by assuming that all religious beliefs are false and do not result in the conclusion that any particular belief is false. The theories purport to explain the adaptive value of falsity or unknowability, but only in cases where such epistemic status can be demonstrated independent of the theory itself.

However, some beliefs, by our standards, must be false. This occurs in two ways. First, some specific religious claims, such as that the earth is only ten thousand years old, can be shown empirically to be factually false. Second, different religions sometimes have directly opposing claims that contradict each other – such as that there are multiple reincarnated lives, one judgment with eternal reward or punishment, or no life at all after death. Different cultures may also have different dispositions towards what kinds of things are more likely to be taken as true or false. For example, among indigenous North American societies, creator gods tend to be conceived as having made humans from earthly substances, and Åke Hultkrantz noted that some Native Americans “objected to the Christian doctrine, saying that it lacks

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common sense since its divinity created the world from nothing whereas the indigenous creators had materials from which to create” (1967, 20).

But, putting aside demonstrably false and culturally relative subsets of the debate, the question remains: Should scientific *explanans* be open to the possibility that some religious *explananda* are true? This would be a controversial question both for scientific colleagues who do not want science to be sullied by openness to such possibilities, and for theologians who wish to safeguard religion from the quest for scientific legitimation. But we – an unholy trinity of an atheist, a theist, and an agnostic – think scientific neutrality regarding religious beliefs should, at least with particular kinds of beliefs, involve not so much refusing to render judgment as willingness to render it either way. Science renders judgment that some beliefs with religious salience are clearly false: a 6,000 year old Earth, or the formation of human languages in a single day. And clearly some beliefs are not adjudicable by empirical means: trinitarianism, divine middle knowledge. However, some beliefs may be true in ways that science should be open to considering.

There are two classes of belief about which this might be the case. One class involves religious understandings of human nature. One need not have any view of the origin or reliability of religious understanding to recognize religion – like all systems of human thought – constitutes a repository of human insight about ourselves. Yet, for the last half century, under the supposed auspices of Darwinism there has been an abject dismissal of religious teaching about the human. George Simpson famously opined:

The question ‘What is man?’ is probably the most profound that can be asked by man. It has always been central to any system of philosophy or of theology. … The point I want to make now is that all attempts to answer that question before 1859 are worthless and that we will be better off if we ignore them completely (1966, 472).

Indeed, many religious conceptions of the human have been rejected as not just worthless, but as patently false because they not only failed to make use of evolution, but also seemed to contradict it. For example, religious teaching in many traditions – such as Christianity and some forms of Buddhism – is that humans are constructed to flourish through compassionate service, and altruism is the highest purpose of existence. During some periods or in certain interpretive traditions, dominant views of evolution posited that “if natural selection is both sufficient and true, it is impossible for a genuinely

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19 One colleague was insistent that we should declare ourselves as comprising a *Christian* theist and a *Christian* atheist, which may of course explain some of our focus on beliefs rather than practices. In their defence, the atheist among us is just as impressed by the evolutionary puzzle of an organism ploughing precious time into religious activities as ploughing precious brainpower into religious beliefs.
disinterested or altruistic behavior pattern to evolve” (Ghiselin 1973, 967). On this view, religious beliefs about human nature would be false and hopelessly sentimentalized. However, in recent years, we have discovered forms of selection that may favour, and cases in which selection may admit, self-sacrifice and altruism (through, for example, kin-selection, pleiotropy, genetic lag, phenotypic plasticity and, perhaps, cultural group selection)\textsuperscript{20}. As Matt Ridley put it, “if we know that an ant is altruistic only because its genes are egotistical, we still cannot deny that the ant itself is altruistic” (1997, 20). It turns out that we had constructed a version of human nature based on a particular interpretation of evolutionary theory that was not strictly entailed by the theory itself, but was influenced by background beliefs of the theory’s exegetes. In this case, there was no good theoretical reason, and little empirical warrant at all, for dismissing the truth of religious claims in the area of human nature. Science is proving to be better served by constructing an account of human nature to fit insights from across the disciplines, than by trimming claims about human nature to fit an \textit{a priori} version of evolutionary theory (Schloss 2002)\textsuperscript{21}.

This does not mean we cannot seek to understand the cognitive and evolutionary genealogy of religious \textit{construals} of human nature itself. Virtually all cosmopolitan and many indigenous religions make claims about the nature of humanity. And many purport to be fulfillments of the deepest human longings, and to both diagnose and treat the most vexing problems confronting human social life and individual existence. Indeed, religious thought appears to be the first and perhaps still the most fundamental attempt by humans to address these issues. The very notion of ‘human nature’ itself, while analytically formalized in Greek thought, appears centuries if not a millennium earlier in Hebrew and Babylonian reflections on the unity of humankind and its role in the cosmos. One interesting question that evolutionary accounts of religious (and other) construals of human nature asks – given the extraordinary variability in how human problems are approached and how solutions are recommended – is how differing beliefs constitute solutions to contrasting adaptive challenges in various social and ecological settings. That is: Do some religious beliefs about human nature track \textit{ecological} reality, perhaps untethered to \textit{anthropological} reality? For example, one might be better off believing X in envi-

\textsuperscript{20} For some such mechanisms, however, ‘altruism’ may be the wrong term as the self-sacrifice of an individual may simply help other copies of the gene(s) that give rise to the trait. ‘Altruistic’ individuals are perfectly compatible with selfish genes.

\textsuperscript{21} Similar discussions have occurred regarding human native dispositions to mating systems and matrilineal versus patrilineal genealogical systems.
environment $Y$, even if $X$ is wrong and $Z$ is true. But elsewhere, a belief in $Z$ may be beneficial and $X$ lethal. Alternatively, religious beliefs about human nature may track but interpretively modify core anthropological truths in variable ecological contexts.

Another class of religious beliefs that can be, at least in principle, empirically assessed involves attributions of sacred significance to historical events that are taken to have occurred. While of course the legitimacy of their sacred quality cannot be assessed by science, the empirical and rational justification for the events' historicity can be. Science rejects a world-wide deluge and Babel account for the origin of human languages, because there is empirical evidence that neither happened. However, most scientists reject claims of a resurrection not because there is evidence that it did not happen, but because given the immensely fruitful uniformitarian (but non-demonstrable) assumptions of science, it is believed that such an event cannot happen. Thus the prevailing scientific account of resurrection beliefs would understandably entail the assumption of falsity, positing instead the mythic elevation and reification of a cultural hero or iconic religious figure.

We are not suggesting that supernatural causes (whether or not they exist) be employed in scientific explanations. Indeed, we are suggesting that our construal of what constitutes the natural is always tentative, ambiguous, and malleable. Real-world events are open to empirical scrutiny, and novel proposals that seem to involve the supernatural, if evidentially supported, do not mandate inclusion of the supernatural but may expand construal of the natural. Newton’s proposal for gravitational attraction was taken to entail ‘occult forces’ due to its positing action at a distance. Similar criticisms arose for proposals in quantum physics and biological time-keeping. If science is going to investigate religious beliefs, and in recognizing that the properties of the *explanandum* must be accounted for by the *explanans*, then it is going to have to move beyond the ‘politeness’ of refusing to render judgments about truth or falsity in some kinds of religious beliefs. However, the epistemic sword must cut all ways (Schloss 2009). Some beliefs are not adjudicatable by science, not because of a commitment to remain neutral but because science lacks the tools to make judgment. Others may be demonstrably false. But in the case of a belief that science can in principle illuminate as false, it may also be worthwhile to consider empirical or logical evidence for its truth. By some counts, any alternative stance would not constitute a scientific approach.
5. Conclusions: Evolution, Truth-Tracking, and the Naturalness of God

The point of this article is to describe a problem for the science-religion dialogue: The truth or falsity of religious beliefs – while not being fully adjudicable by scientific methodology – is neither irrelevant nor immune to scientific accounts of religion. Scientific accounts of religious belief should (where possible) consider their truth or falsity as properties to be explained, and these accounts may also have implications for the truth or warrant of the beliefs they purport to explain.

Hume famously observed that the two aspects of religion needing an explanation are “its root in nature” and “its grounding in reason.” Recent scientific investigations have understandably focused on the first question. But, just as cognitive and evolutionary accounts of, say, mathematical or empirical beliefs would consider the accuracy of those beliefs as well as their origin, religious beliefs should not be examined with a double standard. The answer to Hume’s first question depends to some extent on an answer to the second. The next wave of evolutionary theories of religion needs to focus on the adaptive or maladaptive nature of truth claims.

In his survey of evolutionary accounts of religion, Daniel Dennett observed that it is time “to put religion on the examination table, to see if it is fundamentally benign” or pathological (Dennett 2006, 39). This is an understandable proposal but is problematic on two counts. First, it is unlikely that religion (or science or any human enterprise) is fundamentally benign or hurtful, but will vary with internal content and external context. And with humans, this context varies dramatically across cultural time and place. Second, the diagnosis of beneficence or pathogenicity is not a scientific judgment, but entails values completely outside science. By what standards do we determine whether religious belief is ‘benign’ or ‘pathological,’ and how does the process represent an ‘examination table’ at all, if the background beliefs underlying those standards are implicitly skeptical, let alone explicitly anti-religious? So it is arguably not time to put religion on the examining table to assay its general pathogenicity. But it is certainly time for scientific accounts of religion to take more seriously the need to assess truth, falsity, and unknowability of religious beliefs, and for theologians and philosophers of religion to be an intimate part of this discussion. Ignoring the truth may have got us off to a false start.

Indeed many phenotypes across organisms – even sickle cell anemia – elude description as fundamentally benign or pathological.
References


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