New Cognitive and Cultural Evolutionary Perspectives on Atheism

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1. Introduction

Atheism is a topic that has only recently attracted the attention of evolutionarily minded scholars. In this chapter, we will present the current issues with the study of atheism from an evolutionary perspective.

Attempts to place atheism into an evolutionary framework have followed a methodological direction that, we argue, may have stymied inquiry thus far: the idea that the best starting place to develop an explanation of atheism is by building on explanations of theism (e.g., Barrett, 2004, 2010; Bering, 2002, 2010; Johnson, 2012; Kalkman, 2013; Norenzayan & Gervais, 2013; Mercier, Krammer, & Shariff, 2018). Under this view, atheism is situated at the low end of a psychological continuum of religiosity and/or is a result of malfunctioning cognitive capacities that, if working normally, would produce religious belief (cf. Caldwell-Harris, 2012; Weekes-Shackleford & Shackleford, 2012). Thus, this stance assumes *a priori* that humans evolved to become *homo religiosus* (the idea that humans are inherently god believing creatures) and implies that atheists are either psychological deviants or closet believers (Coleman & Messick, 2019; Shook, 2017). Moreover, this view entails the idea that atheism is an empty signifier and individual atheists are therefore defined by the beliefs or psychological processes that they lack, rather than the ones they have. The problem for this perspective is: How can the absence of something(s) be linked to our evolved psychological endowment? Under this view, the possibility that atheism might be produced, in-part, by its own set of mechanisms (and not just a reversal of “theistic cognition”), or be evolutionary adaptive, would remain unexplored.

In this chapter, we explore atheism—in its broadest sense—as a product of our evolved species-typical psychology. We build on past scholarship and research,

whilst also taking this in several new directions. First, we argue that atheism can be defined in “positive” terms, and then we link this definition to evolved psychological mechanisms. This allows us to explore the phylogeny of atheism, including the possibility that our ancestors exhibited atheistic beliefs. Second, informed by evolutionary psychology, we review the ontogeny of atheism, as well as discussing the development of theistic cognition. Third, we review several adaptive and nonadaptive evolutionary hypotheses for atheism developed by Johnson (2012) and use new evidence to argue in favor of atheism as an adaptive worldview. Fourth, we reflect on the limited ability of existing biophysiological studies to inform current understandings of atheism. In closing, we further extrapolate advantages of this approach, as well as some potential limitations, and discuss future directions for research. Our overall aim is to spark renewed discussion for possible evolutionary perspectives on atheism.

2. Identifying atheism in the present and the past

Before examining any phenomena, such as atheism, we must provide a way of identifying and delimiting our scope of inquiry. This is a familiar task for social scientists who study religion, but a much more recent endeavor for the science of atheism (Coleman & Jong, 2020; Jong, 2015). These discussions have grown tiresome, because defining any socioculturally mediated phenomena is a matter of convention. In other words, there are no theory-neutral definitions, no essential definitions, and no definitions that will capture every aspect of interest to the researcher. For these same reasons, however, discussions about defining one’s object(s) of inquiry are no less important (Coleman & Hood, 2015; Lanman, 2012b).

Definitions of atheism are usually positioned in contrast to definitions of theism. For example, Bullivant (2013) provides a substantive definition for atheism as the lack of belief in gods. This is a fairly intuitive usage, and reflects the common folk understanding of the term, despite there being no agreement on how these nonbelievers should identify themselves (Silver, Coleman, Hood, & Holcombe, 2014). However, a key question immediately arises: If atheism is defined in terms of absence, is there anything to study? Our answer is: It depends.

From a social scientific perspective, atheism is a real and measurable phenomenon. The expressed rejection or absence of theistic belief is as old as recorded history and can be identified in the writings of early Greek philosophers (Sedley, 2013) and various Asian schools of thought (Gardner, 2014; Joshi, 1966). Despite the growth of religiosity in other parts of the world (Keysar, 2018; Stonawski et al., 2015), the number of atheists has been increasing in the West (Bruce, 2011; McCafree, 2017), and “nonreligious” identification has grown substantially in several predominantly Muslim countries (Arab Barometer, 2019). All of this makes atheism and religious decline a highly interesting and timely topic of research (Bullivant & Ruse, 2013; Coleman, Hood, & Shook, 2015; Coleman, Hood, & Streib, 2018; Messick & Farias, 2019; Messick, Szocik, & Langston, 2019; Shults, 2018; Wildman, Sosis, & McNamara, 2012).

3. Reverse engineering atheism

A common strategy for explaining and understanding phenomena scientifically has been to decompose the topic into smaller units (Betchel & Richardson, 1993/2010). The process goes by varying names, such as “benign reductionism” (Wesley, Sosis, & McNamara, 2012), “fractioning” (McKay & Whitehouse, 2015) or

“reverse engineering” (Pinker, 1997/2009; Taves, 2015), but the key idea is simple: reified cultural concepts can be decomposed into theoretically tractable units for investigation based on their functional components.¹ However, because cultural concepts are complex and multifaceted, a comprehensive attempt at reverse-engineering atheism would inevitably lead to more units of analysis than our current discussion permits. Moreover, our initial definition of atheism is untenable from the perspective of evolutionary psychology and cognitive science more generally, because the absence of a belief cannot be linked to psychological mechanisms. Therefore, a unit of analysis should be selected that can, in part, contribute to a definition of atheism in “positive” terms and be linked to evolved psychological mechanisms.

We argue that disaggregating atheism into the functional components of “skepticism” (at least in regard to the existence of deities) and the “generation of naturalistic explanations” has three key benefits (also see, Caldwell-Harris, 2012). First, they map, albeit imperfectly, the relationship between atheism and theism as dissimilar intellectual stances (this is not to say that atheism and theism form a single continuum). Second, the components are associated with the historical development of atheism, modern expressions of atheism (Bullivant & Lee, 2013), and the presence of individual skepticism among hunter-gatherer communities (Johnson, 2012; Purzycki & Sosis, in press), although that is not to say that all atheists are skeptical of religion, since many modern atheists are raised into a family and within cultures where religion is not even considered. Rather, it is to communicate the important historical role of skepticism when atheism emerges within historically religious groups. And third, they can be linked to evolved, universal components of

¹ By functional components we mean processes or sub-processes internal to the system (concept) being reverse engineered, which need not imply teleofunction (Mahner & Bunge, 2001).

human thinking or behavior, such as our ability to think symbolically to produce and evaluate propositional beliefs (i.e., reason; Gopnik, 1998; Mercier & Sperber, 2011; Tooby & Cosmides, 2015; Weekes-Shackleford & Shackleford, 2012) and our ability to explain the world without appeal to supernatural agency (Shults, 2018) or to embed natural explanations within existing supernatural explanations (Legare, Evans, Rosengren, & Harris, 2012). The distinction between the natural and supernatural is not without criticism, however, because this kind of epistemological bifurcation is only a recent occurrence and even absent in some cultures (Dein, 2016). Nevertheless, with atheism defined in positive terms we can explore the possibility that it has evolutionary roots.

4. The phylogeny of atheism

Phylogeny is the evolutionary history of a trait or organism. Because evolved psychological mechanisms reflect adaptive problems faced by our ancestors, evolutionary psychologists often use present-day populations of hunter-gatherers as an imperfect window into the past (Tooby & Cosmides, 2015). In this way, we can also examine the likelihood that our ancestors exhibited atheistic beliefs. For example, in Evans-Pritchard's (1976) research among the *Azande* in North-Central Africa, he reported it was very common for them to express skepticism toward their witch doctors and associated rituals. In another example, Edgerton (1966) surveyed four rarely contacted East African tribes about natural and supernatural explanations for psychosis. In those tribes, over eighty percent of the sample attributed the cause of psychosis to a natural explanation or said they did not know. In two of the tribes, supernatural explanations were much more frequent, however over 30% still gave naturalistic explanations or claimed not to know the cause. In a study investigating

the development of afterlife beliefs in rural Madagascar by Astuti and Harris (2008), when questioned about what psychological and biological functions would continue after death in a narrative focused on the corpse, children typically claimed these processes ceased post-mortem. However, when the question about death was presented in a religious narrative context, there was a pronounced increase in claiming that certain mental processes continued post-mortem. These same context-dependent effects were found for both children and adults in a separate study by Harris (2011). This offers some evidence that children are born as naturalists when it comes to thinking about death, however it is only with increased acculturation into adulthood or when primed with a religious context that they are conditioned toward behaving otherwise. In a study by Peoples, Duda, and Marlowe (2016), the ancestral state of 33 present day hunter-gatherer communities was reconstructed² based on ethnographic data, and it was found that high gods (i.e., morally concerned deities) were present in just 39% of those communities, and of those, only 15% viewed these gods as active in human affairs. These studies suggest there is substantial variation in the appeal to naturalistic explanations, as well as the types and degree of god beliefs. However, it does not indicate how many individuals or even communities might be specifically atheist. In a study of sixty-eight *Hazda* hunter-gatherers, Apicella (2018) asked about two prominent deities (*Haine* and *Ishoko*) and found that 7.4% of her sample claimed the gods did not exist, and an additional 5.9% reported not knowing if they existed.

Although more evidence is needed, this research suggests atheistic belief, even when defined as being “without god beliefs,” is unlikely to be absent in prehistoric times. Atheism as an *explicit* identity, however, may be less likely to appear in these

² We thank Benjamin Purzycki for bringing some of the examples to our attention.

small-scale societies, due to the gods being relatively unimportant to people's existence and circumstances (Boyer & Baumard, 2016), especially when more emphasis is placed on group rituals and behavioral commitments (Purzycki & Sosis, in prep). In addition, given religion's wellspring of coercive social control, individual level skepticism or outright atheism may have gone unexpressed (Ambasciano, 2019)³. Therefore, while it is likely supernatural agents have been recurring features of human cognition since the transition to behavioral modernity (cf. Barrett, 2011; Rossano, 2006), it is possible this was accompanied by disinterest, apathy, and skepticism, similar to some instances today that are explored in the subsequent sections.

5. The ontogeny of (a)theism

Ontogeny is the development of an organism from birth to maturity. Before understanding the development of cognitive processes supporting atheism and theism, however, it is paramount to grasp a central tenet of evolutionary psychology and one of its consequences: This is the idea that the mind consists of many evolved psychological mechanisms (i.e., "modules"), which are functionally specified adaptations that come in varying degrees of flexibility for processing specific information (for a review, see H. C. Barrett & Kurzban, 2006; H. C. Barrett, 2015). As a consequence of the brains modular design, one cognitive system can "believe" information that contradicts information "believed" by a separate system. Moreover, more than one system can be activated with differing "beliefs" at the same time. In other words, our thinking processes can be "consistently inconsistent" (Kurzban,

³ Since the beginning of recorded history, expressed atheism—broadly defined—has been met with public ridicule, legal persecution, physical violence, and even death (Bremmer, 2007).

2012, p. 4). In the present context, this means that we should expect the hallmarks of theistic thinking in even the staunchest of atheists and atheistic thinking present in even the most devoted of theists. Below, we explore one set of evolved mechanisms that support theistic thinking and another set that supports atheistic thinking.

Over the past decade the cognitive science of religion (CSR) has made considerable progress studying the processes that facilitate the development and maintenance of atheistic thinking. Because atheism is, in part, being skeptical toward or rejecting theism, we begin with a brief review of one set of mechanisms that makes us susceptible to theistic thinking (i.e., so-called ‘social-cognitive mechanisms’) before discussing a second set of mechanisms (i.e., so-called ‘analytic thinking mechanisms’), of which atheism is one product (Weekes-Shackelford & Shackelford, 2012).

5.1. The development of theistic thinking

CSR is an interdisciplinary approach to explaining religious belief and behavior as products of ordinary human cognition. The field generally asserts that evolved social-cognitive mechanisms operating below the level of conscious accessibility—more often than not—make a suite of ideas and behaviors that are deemed religious easy to generate and transmit (Atran & Norenzayan, 2004; McCauley & Cohen, 2010; Xygalatas, 2014). A significant amount of this research has focused on ritual and behavioral aspects of religion (van Mulukom, 2017), but it is cognitive accounts for religious beliefs that have served as the starting point for evolutionary explanations of atheism thus far (e.g., Barrett, 2004, 2010; Bering, 2010, 2012; Boyer, 2008; Johnson, 2012; Kalkman, 2014; Norenzayan & Gervais, 2013). A comprehensive

review of this literature is beyond the scope of this chapter, and we refer the interested reader to the other contributions in this volume.

Thoughts about supernatural agent ideation closely parallel our everyday intuitions for thinking in terms of purpose and agency (Atran & Norenzayan, 2004; Boyer & Baumard, 2016), and arise early in a child's development (McCauley & Cohen, 2010). The proper domain of these mechanisms is to enable and facilitate interpersonal communication, however their actual domain is much broader (H. C. Barrett & Kurzban, 2006; Sperber & Hirschfeld, 2004). For example, we have evolved psychological mechanisms designed to detect other conspecifics (i.e., human agents), but this also causes us to see faces in the clouds and hear voices in the wind, and one manifestation of this is that we also see and hear gods. In other words, the psychological origin of god beliefs may stem from a misattribution of agency (Galen, 2017). If this is the case, we would expect theist cognition to stray more frequently into the mechanism's actual domain, than its proper domain.

Research suggests our default position is to think teleologically when reasoning about objects and everyday life events (Bering, 2012). For example, children easily endorse claims that rocks are pointed for the purpose of preventing animals from sitting on them and even adults make similar misattributions under pressure to respond quickly or if they lack formal education (Casler & Keleman, 2008; Keleman & Rosset, 2009). Moreover, historical case studies and survey research indicate fortuitous events are often imbued with a deeper, intentional, meaning (Bering, 2012; Heywood & Bering, 2014). In other words, we routinely perceive purpose and intentionality where, in fact, there is none. Furthermore, our brains produce intuitions that the mind and body are separate (i.e., dualism; Bloom, 2007; Chudek, McNamara, Birch, Bloom, & Henrich, 2018), and we have a tendency to confuse

different domains of conceptual knowledge, such as psychological properties with physical ones (e.g., minds without bodies; Lindeman, Svedholm-Häkkinen, & Lipsanen, 2015). These intuitions, or confusions in the latter case, often nudge human minds in favor of theistic thinking (Boyer, 2008). Nevertheless, if theists and atheists share the same cognitive mechanisms—whence atheists?

5.2. The development of atheistic thinking

If god beliefs are ordinary by-products of human thinking, then we would expect more similarities in the cognitive tendencies of atheists and theists than differences. Indeed, research using samples of Northern European and Israeli atheists suggest wide variability in the cognitive profile of atheists and overlapping with that of theists (and vice versa; Lindeman et al., 2016; Lindeman et al., 2019; van Elk & Naaman, 2020). Moreover, studies exploring the theory of mind capabilities of atheists and theists have been unable to consistently identify differences (Coleman, 2016; Maij et al. 2017). The distinction between the proper and actual domains of cognitive mechanisms, introduced above, is helpful for understanding where, if theists and atheists share a similar underlying psychology, they might also differ.

Atheists typically display fewer of the social-cognitive biases that make theistic thinking intuitive. For example, compared to theists, atheists are less likely to misattribute intentionality to random patterns (Riekk, Lindeman, & Raij, 2014), less likely to overattribute intentionality when reasoning about ambiguous situations (Coleman, 2016), less likely to reason about life in teleological terms (Banerjee & Bloom, 2014; Heywood & Bering, 2014), and are less likely to support dualism (Nelson, Abeyta, & Routledge, 2019a). Moreover, in a sample of religious and nonreligious participants, individuals who were less likely to confuse psychological

properties with physical properties also had fewer supernatural beliefs (Lindemann, Svedholm-Häkkinen, & Lipsanen, 2015; Lindeman, Svedholm-Häkkinen, & Riekk, 2016). In another study, when asked to respond whether supernatural agents were “imaginary” or “real” in an implicit association task, participants who were more skeptical were less likely to demonstrate an implicit “real” response (Lindeman et al., 2016). In two other studies, nonreligious individuals were much less likely to view natural phenomena as intentionally created compared to religious individuals (Järnefelt, Canfield, & Kelemen, 2015; Zemla, Steiner, & Sloman, 2016), and only showed a marked increase in this bias when under cognitive load (Järnefelt et al., 2015). Together, these studies support the idea that both atheists and theists share the same evolved social-cognitive mechanisms, but that atheists demonstrate greater ability keeping these mechanisms functioning in their proper domain. If this is correct, it follows that we should expect a second set of mechanisms to aid in this process, and thus be positively correlated with atheism and negatively correlated with theism.

The cognitive mechanisms that support atheism arise early in childhood development, also support atheism as being a part of our evolutionary-endowed biological makeup. A core component of analytical thinking mechanisms is executive functioning. Within the first year of life, executive functioning capabilities begin to develop, and this process continues into adolescence (Best & Miller, 2010). Executive functioning is an ability that covers several domains, such as reasoning ability and cognitive inhibition (Best & Miller, 2010; Diamond, 2013). As such, it facilitates critical thinking and skepticism.

Between three and four years of age, children begin to make distinctions between what is real and what is make-believe (Corriveau & Harris, 2015). During this age

window, research suggests that children are skeptical towards the factuality of religious and fictional storybook narratives. Across two studies with 5 to 6-year-old children from Columbia, Orozco-Giraldo and Harris (2019) found a systematic tendency to deny the possibility that miracles produced by God could in fact occur. This finding held irrespective of religious education and the children justified this with reference to ordinary causal constraints. There is evidence however, that as they continue to mature, a religious upbringing can influence children to treat religious narratives as though they were realistic (Cui, Clegg, Yan, Davoodi, Harris, & Corriveau, 2020; Corriveau, Chen, & Harris, 2014; Vaden & Woolley, 2011; Woolley & Cox, 2007). Notably, this pattern does not emerge for children with a secular upbringing, suggesting that, in the absence of religious socialization, children display a remarkable degree of skepticism (Cui et al., 2020; Chen, & Harris, 2014).

There are two key processes that may facilitate skepticism toward supernatural ideas: cognitive inhibition and analytic thinking style. Cognitive inhibition involves the suppression of non-pertinent or unwanted information from reaching conscious awareness (Nigg, 2000). Several studies have shown a connection between increased cognitive inhibition and lower levels of supernatural beliefs (e.g., Barlev, Mermelstein, & German, 2017; Lindeman, Riekk, & Hood, 2011; Keleman & Rosset, 2009; Svedholm-Häkkinen & Lindeman, 2013, van Mulukom, Baimel, Maraldi, Coleman & Farias (under review); but see Farias et al., 2017; and Langston & Coleman, submitted).

The engagement of analytic thinking style is another form of skepticism towards supernatural ideas. Analytic thinking (or analytic cognitive style as it is sometimes called) involves three related forms: the enjoyment of thinking deeply, open minded thinking (such as a willingness to change one's mind when presented with conflicting

evidence), and a reticence to rely on intuition without the consideration of adequate alternatives. Research indicates that nonreligious, nonbelieving individuals consistently score higher than their theistic peers on measures of analytic thinking style (e.g., Daws & Hampshire, 2017; Lindeman, Svedholm-Häkkinen, & Riekk, 2016; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2014; Pennycook, Ross, Koehler, & Fugelsang, 2016; Stagnaro, Ross, Pennycook, & Rand, 2019; Zmigrod, Rentfrow, Zmigrod, & Robbins, 2019; but see, Gervais et al., 2018). Moreover, a meta-analysis of 83 studies showed a positive correlation between nonreligiosity and intelligence, a relationship that was partially mediated by analytic cognitive style, which further suggests nonreligious individuals may be more likely to engage in this type of thinking (Zuckerman, Li, Lin, & Hall, 2020).

As we have outlined above, a suite of social-cognitive mechanisms has traditionally made religious ideas easy to believe, remember, and transmit, and another set, analytic thinking mechanisms, has served to promote skepticism and disbelief. Although the cognitive intuitions supporting theistic cognition have generally been interpreted in religious terms, these intuitions are always contextualized, and equally are amenable to interpretation in secular terms (Coleman & Hood, 2015). For example, while the common folk intuition that our life or specific life events are somehow purposeful has often been embedded in a theistic framework (Bering, 2012), an atheist can ground these intuitions in some other framework, such as philosophy (e.g., humanism, existentialism, or some “personal life philosophy”). This perspective avoids confusing the cognitive mechanisms that help to generate a phenomenon like theism and atheism, for the phenomenon itself.

6. The functionally adaptive explanation for atheism

In traditional evolutionary arguments, functional and adaptive traits are carried down to future generations through natural selection (or analogous processes operating at the cultural level; Laland & Brown, 2011). Adaptive traits help with the survival and success of a species. Citing numerous studies suggesting religiosity confers multiple beneficial outcomes, ranging from coping with stress, increasing social relatedness and facilitating social coordination, reducing death anxiety, and increasing psychological well-being and meaning in life, a group of researchers has consistently argued that religion should be considered an adaptive trait (Johnson, 2012, 2016; Laurin, 2017; Norenzayan et al., 2016; Sosis & Alcorta, 2003; Wilson, 2002; Wood & Shaver, 2018)⁴. Far less attention however has been given to the possibility that atheism might be similarly adaptive (although see Szocik & Messick, 2020; Messick, Szocik, & Langston, 2019; Shults, 2018), and it was not until recently that evidence has accumulated in support of this position however, through a broader set of mechanisms than what is found with religion.

Dominic Johnson (2012) has proposed ten evolutionary hypotheses for the emergence of atheism. There are three non-adaptive hypotheses (no variation, natural variation, unnatural variation), that posit that there either are no real atheists (because everyone has some level of implicit or explicit belief in supernatural agency), or that atheists are a result of a natural distribution of belief, or that a variety of life circumstances could result in the emergence of atheism. The latter two hypotheses essentially outline atheism as being a byproduct, and thus, not as

⁴ There are several reasons to be skeptical of religion as an adaptation, ranging from religion's incoherence as a trait that could be selected (Richerson & Newson, 2008) to an overestimation of "the degree to which ostensive benefits would be sufficient to permit natural selection to systematically favor religious variants over nonreligious ones" (Kirkpatrick, 2006, p. 167).

adaptive. The remaining seven explanations proposed by Johnson (2012), he suggests, are adaptive at either the individual or group level.

One of the adaptive hypotheses is the *exploitation hypothesis*. This hypothesis claims that atheism is adaptive for the individuals only when they are in a position of power. This hypothesis builds off Karl Marx's claim that religion functions as a tool for the elite to control "the masses," as the figureheads of a society can exploit religious belief among their denizens to increase their own power, wealth, and status. In its strongest form, this hypothesis assumes that the majority of atheists were or are socio-political elites and have made a "Machiavellian calculation" (p. 59) that their own level of belief only matters to the extent that they can exercise control over their lower status religious adherents. The *ecological contingency hypothesis* also posits that atheism, like theism, can be adaptive at the individual level, but only in certain settings, as some traits are environment-and context-dependent. For example, this hypothesis assumes that atheists are disposed to a type of rationalist thinking that is more likely to flourish in times of abundance and peace, and that the adaptive components of religious beliefs are costly and more likely to flourish in times of scarcity and warfare. The *atheism is a religion hypothesis* views atheism as being functionally equivalent to religion. This hypothesis assumes that atheism, as a shared belief and collection of values, can confer the functional benefits associated with religion. This hypothesis will be expanded upon further in the next section. The final individually adaptive hypothesis is the *frequency dependency hypothesis*. This hypothesis builds off evolutionary game theory, which in turn posits that coexisting traits, such as belief and nonbelief, can be beneficial for one another through competition. In other words, this hypothesis assumes that atheists can receive the benefits of religion without believing, as long as atheism is not overly common.

Finally, Johnson proposes three theories that he claims can explain how atheism can be adaptive at the group level: 1) as a catalyst for the facilitation of the adaptive advantages of belief, 2) through serving to bolster religious belief as a reaction to skepticism, and 3) through atheists being skeptical of religious doctrine which results in the religious 'toning down' their doctrine to make it seemingly more credible. As Johnson (see 2012, p. 65) himself notes, these explanations outline atheism as being beneficial for believers, but without clear benefits to the atheists themselves. In other words, the existence of individual atheists is a non-adaptive (but not maladaptive) by-product of religion having been selected at the group level. It is not clear why Johnson labels these as adaptive hypotheses for the group-level selection of atheists, as the position seems to confuse what he argues is selected at the group-level (i.e., religion) for what he argues is the adaptive benefits of atheism at the individual level (i.e., rationality).

Of the ten theories offered by Johnson (2012), we argue that explanations of atheism as a fluke, byproduct of, or bolster for religious adaptations do not sufficiently account for why atheism persists and how it functions. The next section will further outline two perspectives to support this idea: We will argue first that atheism can be adaptive in ways similar to religious belief, and secondly that atheism becomes more prominent when the adaptiveness of religious belief becomes obsolete or redundant through secular societal mechanisms. Both explanations give credence to the functional/adaptive explanation for why atheism exists while recognizing atheism as a phenomenon that is comparable to religion, rather than a side-effect of it.

6.1. Atheism as functionally adaptive, similar to religion

Religions generally have a well-defined and articulated structure, and consist of collections of different rituals, moral teachings, and normative beliefs typically codified into an authoritative text. It is these practical components of religions that putatively generate religions' adaptive and evolutionary advantageous traits, and fortify their persistence and ubiquity (Norenzayan et al., 2016). Since atheism would seem to lack the structure religion affords, it may seem strange to suggest that atheism can function similarly to religion. However, both theists and atheists create worldviews, which are normative ways of thinking and acting in one's environment that provide answers to fundamental questions, such as what exists, and what should one strive for (for an in-depth perspective of the worldviews framework, see Taves, Asprem, & Ihm, 2018; Taves, 2019). Moreover, at the individual level, any of the putative salutary effects of religion may be attributed to general psychological processes (Galen, 2017, 2018) or intra-group dynamics (Galen, 2015; Galen, Sharp, & McNulty, 2015). This implies that the adaptive benefits associated with religious worldviews should also be present in atheist worldviews.

There is good reason to be skeptical that the absence of belief alone could form a coherent worldview or social group due in-part to its inconspicuousness (Schiavone & Gervais, 2017). Atheists do, however, have many other positive beliefs from which to construct a worldview. Discerning the components of atheist worldviews and their psychological consequences is an empirical question, and one that has only recently received attention (Coleman et al., 2013; Farias, 2013; Taves et al., 2018; Uzarevic & Coleman, 2021; van Mulukom et al., 2020). We argue that the ways in which components of atheist worldviews might be adaptive are just as varied as the ways in which religious worldviews are.

6.1.1. *Group participation*

One path to positive health outcomes of worldviews, both religious and secular, comes from group participation (e.g., social embeddedness). Research shows benefits in psychological wellbeing from participation in organized secular groups (Charles, van Mulukom, Brown, Watts, Dunbar, & Farias, 2020; Price & Launay, 2018), and secular group affiliates report prosocial concerns, such as charity and social justice, as key goals of these groups (Langston, Hammer, & Cragun, 2015). Moreover, many atheists participate in groups that are unrelated to their nonbelieving epistemology (Langston et al., 2015), and participating in any social group, no matter the type, is associated with positive health outcomes (Galen, 2015, 2018; Shor and Roelfs, 2013).

6.1.2. *Humanistic concerns*

One commonality between secular group affiliates and non-affiliates is self-identification as a humanist (Langston et al., 2015). Humanism, defined as giving “special importance to human concerns, values, and dignity” (Law, 2013, p. 263), is another aspect of many atheist worldviews. Humanism, as a psychological construct, is associated with positive values, such as benevolence and universalism, prosocial attitudes and behavioral intentions (Coleman & Jong, 2020; Coleman, Holcombe, Silver, Swanson, van Mulukom, Hood, & Jong, 2019). Moreover, in a conceptual overlap with humanism, two components identified in interviews with nonbelievers were a belief in moral progress and in social progress (Coleman & Arrowood, 2015; Silver et al., 2014). Experimental research indicates that belief in moral and social progress can alleviate existential concerns by contributing to the perception of order and control (Rutjens, van Harreveld, & van der Pligt, 2010; Rutjens, van der Pligt, &

van Harreveld, 2009; Rutjens, van Harreveld, van der Pligt, van Elk, & Pyszczynski, 2016). Although humanistic concerns may be expressed by theists, humanism appears to be a distinct characteristic of atheist worldviews, in-part due to its consistent positive relationship with lack of religiosity and nonbelief in the supernatural (Coleman et al., 2019). Therefore, similar to a religious worldview, humanism, as a component of atheist worldviews, can serve in an adaptive capacity, contributing to human flourishing and personal psychological functioning.

6.1.3. Punishment and prosociality

Punishment by a supernatural authority is an often-cited cause of theistic prosocial intentions (Johnson, 2016). However, a meta-analysis examining the effects of theistic and secular authority primes on prosociality found that reminding nonbelievers of a secular authority had similar effects as reminding believers of a theistic authority (Shariff, Willard, Andersen, & Norenzayan, 2016). This suggests that it is the threat of punitive action that is one of the key mechanisms promoting prosocial intentions, and not the theistic content per se (Yilmaz & Bahcekapili, 2015a). Similarly, priming people with fear and catering to social anxiety is a tactic often used in elections to sway a voter base to vote for a particular political party in order to alleviate fears of violence and change, even in instances those fears are merely the result of propaganda (Mutz, 2018, but see Vasilopoulos, Marcus, Valentino, & Foucault, 2019). Therefore, big gods and big governments can be swapped out components of the worldviews of theists and atheists when considering some of the mechanisms contributing to prosocial behavioral intentions (Norenzayan, 2013). Although religions may have functioned to increase coordination and cooperation at points in history (though for challenges to this claim,

see Baumard, Hyafil, Morris, & Boyer, 2015; Whitehouse et al., 2019), the catalyst for this effect—the threat of punishment—is sustained today in the form of secular social institutions.

6.1.4. *Meaning in life*

Researchers have long known that the development of meaning in life is associated with positive physical (Reker, Peacock, & Wong, 1987; Czekierda, Banik, Park & Luszczynska, 2017) and mental health outcomes (Schnell, 2009; Zika & Chamberlain, 1992). Several studies have found either no differences or comparable levels of meaning in life between atheists and theists (Caldwell-Harris et al., 2011; Speed, Coleman, & Langston, 2018; Wilkinson & Coleman, 2010), which suggests atheists draw on other sources of meaning than those traditionally afforded by religion. Nevertheless, in one recent study, atheists were slightly more likely than theists to report statements that life has no objective meaning. However, an additional finding was that atheists were more likely than theists to report a variety of sources of meaning that did not fit the researcher's coding scheme, which they labeled as "other" (Nelson, Abeyta, & Routledge, 2019b; also see Schnell & Kenan, 2011). This makes sense, given that we also know that atheists are more likely than theists to view meaning in life as a process of self-construction (Caldwell-Harris et al., 2011; Coleman, Silver, Hood, 2016; Speed, Coleman, & Langston, 2018), and may therefore report more varied and individualized sources than what theists commonly appeal to. Although the relationship between meaning in life and nonbelief has nuances that have only recently undergone exploration, meaning in life, as an adaptive outcome of worldviews in general, can be identified within atheist worldviews.

6.1.5. *Belief in science*

In a study exploring the worldviews of atheists across ten diverse countries, science was the most frequently mentioned component of atheist worldviews (with humanism coming in second; van Mulukom et al., 2020). Research also suggests that belief in science can serve a similar function as religion, such as by decreasing anxiety in stressful situations (Farias, Newheiser, Kahane, & de Toledo, 2013; although see Farias and Newheiser [2019]) and by providing purpose in life and hope, which predicts an increase in subjective wellbeing (Aghababaei, Sohrabi, Eskandari, Borjali, Farrokhi, & Chen, 2016). Moreover, other studies have found belief in science positively associated with self-esteem, psychological wellbeing (Aghababaei, 2016), and empathy (Francis, Astley, & McKenna, 2019). Belief in science has also been shown to increase moral sensitivity (Ma-Kellams & Blascovich, 2013; Yilmaz & Bahcekapili, 2015b); that is, science can serve as a reminder to maintain normative moral actions. These studies suggest that one component of an atheist worldview, belief in science, can exhibit some of the adaptive benefits commonly attributed to religious worldviews.

6.1.6. *General effects of atheist worldview*

Despite the relationship between atheism and health receiving a bad rap in early research (for example, see Schumaker, 1992), atheism is associated with lower levels of death anxiety (for a meta-analysis, see Jong et al., 2018) and an increase in general psychological wellbeing (Galen & Kloet, 2011; Moore & Leach, 2016; for a review, see Galen, 2018). The exact mechanism(s) behind these positive effects is unlikely to be a result of the mere absence of belief. Rather, the effects stem from a combination of the *conviction* of one's ontological stance on gods, with alternative

nontheistic, beliefs, values, activities, and social groups. In other words, many of the positive effects of religion can be found in resources that are areligious. Atheism does not appear less adaptive when compared with religious worldviews, however it just is not as clear what facets, beliefs, and mechanisms make up atheist worldviews—particularly because there are many different types of atheists (Baggett, 2019; Lindeman et al., 2019; Silver et al., 2014). It becomes clear, as we increasingly acknowledge secular beliefs and institutions that fulfill the functional and adaptive roles traditionally associated with religion, that atheism can be similarly adaptive (as compared to theism), which is of course one of the reasons why non-belief persists.

6.2. Secularization as a result of adaptiveness redundancy

One of the explanations as to why atheism continues to spread in the West whereas religion continues to prosper in areas of the world with fewer resources and shared wealth, is that within prosperous nations the functions of religion (coping, improved affect, etc.) are fulfilled through other mechanisms (Lanman, 2012a). In one study, across seven years at a church in the American southeast, religious attendance declined whenever there were home football games earlier on Sunday morning, suggesting that secular engagement can serve as a substitute for religion, even among the religious (Cragun, Stinespring, & Tillman, 2019). In general, however, trends toward country-level secularization are associated with an increase in socioeconomic security and quality of life (Ruck, Bentley, Lawson, 2018; Storm, 2017). Although it is not yet known what is causing this effect (Ruck, Bentley, Lawson, 2018), as religion is shed, nonreligion and atheism become increasingly prominent, and this coincides with spreading socio-economic modernity. It is

possible that as religion declines, people simply invest their time and resources elsewhere, and the putative adaptive functions of religion become increasingly obsolete or redundant (Feierman, 2019).

When individuals feel that society is providing them with a comfortable living, with a way of connecting with others in the community, with a sense of order to the world, and with a morality (or they feel that they are able to construct their own morality)—then religious belief becomes less adaptive because it becomes redundant. In these instances, the adaptiveness of a secular, including specifically atheist, worldview, can replace the adaptive functions of religion, and this can contribute to a decline in levels of religiosity. In areas of the world where there are more daily struggles, including for food, income, and the maintenance of good health, there often are no secular institutions and programs in place to fulfil these needs, so then religious belief remains functionally adaptive.

7. Biophysiological contributions to the atheism

Although it has become clear that there is no such thing as a ‘God gene’ that can be turned on or off to determine one’s religiosity, there is increasing evidence that biological factors, including hormones and different areas of the brain, play a role in self-reported religiosity and experiences deemed religious. For example, there is evidence for the role of genetic factors in explaining levels of religious (dis)engagement (Donofrio, Eaves, Murrelle, Maes, & Spilka, 2001; Freeman, 2019; Koenig, McGue, Krueger, & Bouchard, 2005). In other examples, neuropsychological data suggest through studies of individuals with brain lesions, epilepsy (Tedrus et al., 2014; Devinsky & Lai, 2008), frontotemporal dementia (Miller et al., 2001), and Parkinson’s disease (Butler et al., 2010; McNamara et al., 2006) that specific activity

in certain brain regions plays a role in the extent to which a person is religious or not. However, what research has not yet concluded is the full extent of the relationship between brain regions and religious outcomes (Messick & Farias, 2019; Crescentini, Urgesi, & Fabbro, 2015; Devinsky & Lai, 2008; Mendez, Lauterbach, & Sampson, 2008).

There is increasing evidence, such as through studies of people with different forms of epilepsy, that neuropsychological traits are correlated with specific religious orientations (Johnstone, Holliday, & Cohen, 2016). Different theories have been applied for explaining the relationship between different areas of the brain and religiosity, as is the case with the ventromedial prefrontal cortex, which amongst other things is involved with doubt processing. Damage to this part of the brain can result in less doubt, and increased religiosity (Asp, Ramchandran, & Tranel, 2012). A link can be made here to how many deconvert from religion around adolescence, which is when this part of the brain develops further and doubt processing increases (Asp & Tranel, 2013). However, despite parts of the brain being associated with experiences that individuals view as religious or mystical experiences (Cristofori et al., 2016), no relationship has been found between the volume or changed volume of any areas of the brain and mystical experiences (van Elk & Snoek, 2020).

Damage to frontal and temporal brain regions have been associated, often causally, with hyper-religiosity and mystical experiences (Carmona-Bayonas, Jiménez-Fonseca, Olmos, & Villar, 2017; Cristofori et al., 2016). These changes are not always direct; for example, right parietal lobe dysfunction can result in increased spiritual transcendence as a result of decreasing self-awareness (Johnstone & Glass, 2008). Similarly, just as studies have pointed towards increased religiosity and mystical experiences as a result of changes to the brain, similar explanations

have arisen for decreases in religiosity. Some of these differences can be explained by the prevalence of the hormone dopamine, as dopamine-rich midbrain regions of the brain have been associated with shifts in belief, spiritual experiences, and belief formation (Schmack et al., 2015, Schwartenbeck, FitzGerald, & Dolan, 2016; Perroud, 2009). As an example, dopaminergic neurotransmission can account for individual differences in the formation of unfounded beliefs about conspiracy theories and beliefs about telepathy, among others (Schmack et al., 2015). When a deficit of dopamine is found, as is found in patients with Parkinson's disease, then those individuals sometimes show relatively lower levels of religiosity (Harris & McNamara, 2009).

To elaborate further, studies on people with Parkinson's disease propose that decreased striatal-prefrontal network functioning results in reduced ability to activate religious concepts (Butler et al., 2010; McNamara et al., 2006). However, the extent to which Parkinson's explains religiosity changes are dependent on the side of the brain where onset occurred, as left-onset patients experienced a severe inability to activate religious concepts and aesthetic-based cognition associated with religion (Butler et al., 2011; Butler, McNamara, & Durso, 2010), whereas those with right-onset Parkinson's had greater difficulty accessing ritual-based cognition (Butler, McNamara, & Durso, 2011). Brain lesion studies have found similar differences, as those with lesions to front of the cerebrum are often less religious than those with lesions to the back of the cerebrum (Urgesi, Aglioti, Skrap, & Fabbro, 2010).

There are several problems to consider when drawing inferences from the majority of these studies. First, as discussed earlier in this chapter, atheism is not merely the low end of a religiosity scale, and therefore using the data to extrapolate to atheists is only "less wrong". Second, they often do not measure religiosity prior to

lesions and other cognitive changes occurring, with the exception of some studies that measure before and after brain surgery (for example, see Urgesi et al., 2010). Third, even though measurements may show decreases in religiosity following the onset of conditions such as Parkinson's disease, qualitative measures still show that patients with these ailments continue to report their religiosity as important (Redfern & Coles, 2015; Edwards et al., 1997). Therefore, although the human brain (not just mind) surely plays a role in religiosity and experiences deemed religious, there is still much research needed to clarify how large that role is, and more replications are needed to identify the specific parts of the brain that are responsible for it, as currently, much of the research is conflicted or limited by the definitions, methodologies, and measurements used. As these roles are clarified, then we will gain a better understanding of how human brain evolution has impacted the development and maintenance of atheistic and theistic worldviews alike.

8. Conclusion

In this chapter, we have argued that evolutionary perspectives on atheism have thus far been constrained by a methodological commitment that places atheists at the low end of a religiosity continuum and/or assumes they are psychologically disabled for their rejection of theistic belief (e.g., Bering, 2002; Barrett, 2012). In contrast to those positions, we opted to explore the possibility that, like theistic belief, atheistic belief could be defined in "positive" terms, be linked to evolved psychological mechanisms, and be used to produce individual evolutionarily adaptive outcomes. Thus, we reviewed methodological considerations pertinent to the development of this position and used these to frame the influx of scientific research on atheism conducted over the past several years.

Our perspective is not without its own limitations. For example, if one imagines atheism as “just another religion,” so-to-speak, such as in one of the evolutionary scenarios postulated by Johnson (2012), then this interpretation might just as plausibly fit the data reviewed here as our own. Nevertheless, we believe this approach to be unhelpful when positioning atheism (and theism) theoretically, because it occludes important variation by reinforcing the notion of *homo religiosus*, as well as its apparent denial of the emic perspective held by most atheist individuals (i.e., that atheism is *not* a religion). In addition to this limitation, we have opted to avoid much more conceptually noxious questions, such as the possibility that atheism (or religion) is an “adaptation” or target of cultural group selection, in favor of making the softer case that atheist worldviews are adaptive. Therefore, our current approach has been to use evolutionary psychology as an interpretative and explanatory paradigm to elucidate the mechanisms, and effects of mechanisms, which shape our human psychology into individually adaptive systems (Tooby & Cosmides, 1989).

One promising direction for future evolutionary inquiry into atheism and its cognates that is amenable to both an evolutionary psychological approach as well as a cultural evolutionary approach comes from adopting a worldviews perspective (Taves, et al. 2018; Taves, 2019). As one way of conceiving of atheism in positive terms (Coleman et al., 2013; Coleman & Messick, 2019; Farias, 2013), we were only briefly able to discuss the worldviews perspective in the present chapter. However, this approach has additional benefits, such as offering a shared conceptual foundation enabling atheist-theist comparisons, and beyond, to be carried out in an evolutionary grounded framework (Taves et al., 2018). This framework has

generated exciting new questions that await further investigation. For one example, as Taves, Asprem, and Ihm (2018), ask:

In terms of physical and psychological health, is it better to have a more complex, systematized worldview or are lived worldviews of a fragmentary and episodic sort sufficient to generate a sense of meaning and purpose in life, make sense of stressful situations, and support physical and psychological health?

This is an empirical question that has direct implications for any sustained argument that atheism, or theism for that matter, is (mal)adaptive or the possibility that they are adaptations. Nevertheless, there are more things on earth than have been dreamt of in the philosophical and methodological assumptions exhausted so far, by evolutionary minded scientists studying atheism. In this chapter, we have argued that thinking about atheism differently illuminates some underexplored evolutionary perspectives on atheism, which we hope will spark further research and debate in the scientific study of nonbelief.

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