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THEORETICAL ARTICLE

Why is Intelligence Negatively Associated with Religiousness?

Edward Dutton[1] · **Dimitri Van der Linden**[2]

Abstract We present three models which attempt to explain the robust negative association between religion and intelligence: the Irrationality of Religion Model, the Cultural Mediation Hypothesis, and the Savanna-IQ Interaction Hypothesis. We highlight problems with each of them and propose that the negative religion-IQ nexus can be understood through substantially revising the Savanna-IQ Interaction Hypothesis. We argue that religion should be regarded as an evolved domain or instinct. Intelligence, by contrast, involves rising above our instincts. It follows that an inclination toward the non-instinctive will thus be an aspect of intelligence because it will help us to solve problems. Thus, intelligence will involve being attracted to evolutionary mismatch, to that which we would not be instinctively evolved to be attracted to. It is this, we argue, that is behind the negative religion-intelligence nexus. We respond to potential criticisms of our model and we examine how this model can be further tested.

Keywords Religion · Cultural Mediation Hypothesis · Savanna-IQ Interaction Hypothesis · Evolutionary mismatch · Intelligence

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Introduction

It was widely remarked upon in Classical Greece and Rome that "fools" tended to be religious while the "wise" were skeptics. Euripides (440–406 BC) has his eponymous hero, Bellerophon, ask: "Doth someone say that there be gods above? There are not; no, there are not. Let no fool, led by the old false fable, thus deceive you" (quoted in Symonds 1902, p.87). It is recorded in Acts 17:18 that, "A group of Epicurean and Stoic philosophers disputed with (St. Paul) and asked, 'What is this babbler trying to say?'", implying they regarded his religion as ludicrous. St. Paul implies in his first letter to the Corinthians that academics, in particular, are highly doubtful of his message: "For the message of the cross is foolishness to those who are perishing … Where is the wise person? Where is the teacher of the Law? Where is the philosopher of this age? Has not God made foolishness of the wisdom of the world?" (I Cor. 1:18–20).

From the 1920s onwards, these Classical impressions began to be confirmed by empirical data. Specifically, since then a large number of studies (e.g., Gilkey 1924; Howells 1928) have documented a negative correlation between religious belief and intelligence and between religious attendance and intelligence (see Zuckerman et al. 2013; Dutton 2014). This robust association is weak but significant and in population samples it is around −0.2. This negative association has also been found using many proxies for intelligence including educational level and income (Meisenberg et al. 2012). National average IQ has been found to be significantly negatively associated with national levels of religiousness (Lynn and Vanhanen 2012). The same nexus, using education and income as a proxy, has been found in countries throughout the world with only a handful of national exceptions (Meisenberg et al. 2012). The association holds both among young and elderly samples (Ritchie et al. 2014).

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Webster and Duffy's (2016) meta-analysis has found that, in all-male and pre-college samples, the strength of the nexus seems to decline over time and is non-significant (though still negative) among samples collected after 2010. However, it is in the expected direction. So, the decline over time and the absence of significance post-2010 are likely to reflect the spread of atheism to individuals with lower IQ levels—due to the place of atheism in popular ideologies such as postmodernism (see Scruton 2000)—rather than the rise of religiousness among the more intelligent.[1] This, indeed, is consistent with former Communist countries being outliers in the extent of their atheism; tending to be far more atheistic than would be predicted by their average national IQs (Lynn and Vanhanen 2012, Ch. 10). In addition, research from the USA has found that low intelligence is specifically associated with fundamentalist Christianity (Lewis et al. 2011). Nyborg (2009) has shown that, on average, the more fundamentalist a denomination is, the lower its average IQ is. Atheists predominate among groups with very high IQ, such as among leading scientists, where only 3.3% of the members of the Royal Society believed in God 20 years ago (Larsen and Witham 1998).

Clearly, then, it can be agreed that there exists a robust negative correlation between religion and intelligence. There is, however, surprisingly little agreement on why this association exists. It is this question which we will examine in this study. We will explore each of the main theories which aim to explain the association and note the difficulties with each of them. We will then propose a substantially revised version of Kanazawa's (2012) "Savanna-IQ Interaction Hypothesis." We will argue that religion may be considered an instinct, an evolved domain-specific adaptation. An aspect of intelligence is attraction to the non-instinctive or to evolutionary mismatch. This model—which we will call the Intelligence-Mismatch Association Model—would seem to neatly explain why intelligence is negatively associated with religiousness.

Models Explaining the Religion-IQ Nexus

The Irrationality of Religion Model (IRM)

What we call the "Irrationality of Religion Model" is, superficially at least, the most obvious way of explaining the negative religion-IQ nexus. Advocates argue that it is more rational to not believe in God than to believe in God (e.g., Dutton 2014; Nyborg 2009). As intelligence predicts elevated ability in rational thought (see Jensen 1998, p.75), it, therefore, follows that the more intelligent you are, the less religious you will be, all else being equal. For example, Nyborg (2009) argued that most people wish to reduce uncertainty and will settle at the means of doing this with which they can intellectually cope. Accordingly, the highly intelligent will reduce uncertainty through science and reason because they are sufficiently intelligent to be able to do so. The less intelligent, lacking this intellectual means of protection from uncertainty, may gravitate toward religion. Similarly, Dutton (2014, pp.156–159) argues that intelligent people are attracted to reason, and therefore atheism, because this is more logical than theism. Belief in God is inherently illogical because God's existence cannot be logically proven and there are convincing rational arguments, embodied in the Problem of Evil, against the existence at least of the Christian conception of God.

The IRM, however, suffers from certain deficiencies. Firstly, it conflates the acceptance of "science" and "the ability to reason in a complex way" with atheism. It assumes that atheism is inherently more logical than theism. Although some scholars might accuse us of playing Devil's Advocate here, it seems that this viewpoint is, at the very least, open to question. It has been argued by the British philosopher Bertrand Russell (1872–1970) that there is no persuasive proof for God's existence and, thus, the burden of proof must be on those who propose His existence. This is because if the burden of proof is on the skeptic then it could be asserted that, "between the Earth and Mars there is a china teapot revolving about the sun in an elliptical orbit" that was "too small to be revealed even by our most powerful telescopes" and it would be acceptable to believe this until someone could disprove it, which would be impossible (Russell 1952, pp.547–548). But it could be countered that nobody is seriously entertaining the possibility of this teapot micro-asteroid, whereas, for much of known human history, people have believed in God and many even claim to have undergone divine experiences. Russell's "science," the religious might argue, is based on the belief, which sometimes betrays you if you are mentally ill, that what you are perceiving through

[1] The lack of significance in pre-college samples may be because those who are younger have been more exposed to atheistic ideologies, especially at an earlier age. In addition, it may be due to a restriction of range caused by the fact that, in the samples in question, belief in God was extremely high among those under the age of around 14. For example, in Turner (1980), who used a Northern Irish sample, the nexus was significant among 14-, 15-, and 16-year-olds, but not among those who were younger. The finding of non-significance in the six all-male samples is due to sampling anomalies. Three of the studies (two from the USA and one from Brazil) used church membership/attendance rather than religious belief (Bender 1968; Kosa and Schommer 1961 and Szobot et al. 2007). This is problematic as a measure of religious belief because social conformity and virtue signaling may play a role in church attendance especially in 1960s USA and strongly Catholic Brazil. In addition, the correlation with church attendance is typically half that of belief and samples were small, ranging from 96 to 361. Feather (1967) uses a sample of only 40 and they are "pro-religion" (30) and "anti-religion" (10), which is not the same as "theist" and "atheist." Finally, Turner (1980) uses an all-male pre-college sample. As discussed, his finding would seem to reflect a restriction of range due to overwhelming religious belief among pre-pubescent Northern Irish children. Webster and Duffy's finding of non-significance when correlating national IQ with national religiousness seems to reflect their controls being too strict. They control for life quality index and whether countries are close to each other. By doing this, they are taking away a large share of the variance.

your senses is real and has discernable patterns. This, certain religious apologists might argue, is something of a scientific article of faith, little different from religious belief (see Jenkins 2009 on the "faith" aspect of science).

The response, following the American philosopher William James (1842–1910) (James 1907), is the test of pragmatism. A philosophical impasse can be solved by highlighting a practical difference to one or other side being right. From a pragmatic perspective, we could not live if we did not accept the empirical world as real and so we must do so. However, by extension, it could be argued that humanity and civilization may have only survived up until now by believing in God (or gods or spirits) and there are many philosophers who argue that when civilizations stop being religious, they collapse because they become less ethnocentric and less united (see Turchin 2007). So, if one does not want civilization to collapse, it may indeed be the better option in terms of practicality to force oneself—through "effortful control"—to believe in God. "Effortful control," also known as "self-regulation," in this case refers to the ability to overrule emotional or habitual response tendencies in favor of a more appropriate (or rational) response in a specific context (see Eisenberg 2012). Indeed, it has been indicated that people are able to suppress moral feelings if their rational interest in doing so is sufficiently strong (MacDonald 2010). It follows that they could do the same with feelings of atheism or feelings that might be socially unacceptable (Woodley 2010).

The proposal to force oneself to believe in God is congruous with James' essential argument known as the "Will to Believe." James argues that religion posits that some things are eternal and we are better off, in the now, if we believe some things to be eternal. If we do not believe this, James avers, there is simply no point in living or in doing anything and we will be less happy. So we should "will ourselves" to believe in God (James 1896). Following James, it could be argued that we "will" ourselves to believe that we and others have free will and certainly act as though we do, despite evidence that it is most unlikely that meaningful free will is possible (see Wilson 1998). It would be consistent, therefore, to "will" the belief that life has eternal significance.

Furthermore, it could be argued that there are many situations where it is quite logical to carry on doing something you have always done until somebody can persuade you to do otherwise, because it has worked—in terms of survival—up until now. This would be true of believing in our senses, and, perhaps, of believing in God, because it has worked for civilization up until now. Traditionalist philosophers argue that ultimate truth and certainty come from divine revelation, as there can be no objective truth without a metaphysical realm to certify that it is objectively true. Traditional religions are responses to this perennial truth of a metaphysical realm, it is passed on by religious tradition, and humans are content when they are part of such a tradition. This being the case, the fact that something is a tradition in a religious society is a justification of it. Thus, traditionalist philosophers would aver that the burden of proof should always be on the person who advocates change and the fact of something being traditional should generally be sufficient to continue with it. Moreover, from a pragmatic perspective, traditionalists argue, if one believes in truth one must accept that there is a metaphysical realm or else there is nothing to finally verify that anything is true. This being so, they argue, all religions are a response to experiences of this realm; this objective metaphysical reality (see Sedgwick 2009). Many readers may find these arguments very strange (for critiques of them, see Jordan 2013) but they are at least thought-provoking, and they imply that atheism may not necessarily have the monopoly on rationality, though more specific religious dogmas are quite another issue.

Secondly, there is evidence that intelligence predicts the ability to better superficially rationalize that which you want to believe to be true. For example, Stanovich and West (2008) have found that certain kinds of bias—myside and one-sided bias—are not significantly related to intelligence. West et al. (2012) found that the "bias blind spot" (the inability to note bias in one's own thinking) is even very weakly, *positively* associated with intelligence, which seems to indicate that intelligent people may have slightly *more* difficulty noticing that their views on the world may be biased. As such, we should not necessarily expect more intelligent people to be better at overcoming certain kinds of emotional biases than less intelligent people. They will, however, be better at intellectually justifying these biases, to themselves and to others. Thus, if we define "rational" as relating to the use of "reason or logic" then intelligence predicts rationality, but it also predicts a reduced ability to see when one is being only superficially rational, and it has no association with lack of general bias in one's thinking. Accordingly, when it comes to highly personal or emotional questions where one must be acutely aware of one's own biases—such as, for some people, the existence of God—we might argue that intelligence would not necessarily predict greater rationality and might, within certain bounds, predict *reduced* rationality, insomuch as intelligence predicts being less able to spot one's own personal bias. Accordingly, it becomes difficult to maintain the view that the heightened rationality inherent in intelligence explains why more intelligent people are less likely to believe in God.

Thirdly, there is evidence that, at the undergraduate level, students of the hard sciences are *more* religious than students in social sciences and humanities, despite the fact that hard science students have higher average IQ and hard science can be understood to be more rational (see Dutton and Lynn 2014; Nyborg 2009). It could be argued that this is a function of average personality differences, insomuch as science students are higher in Conscientiousness and Agreeableness (see Dutton and Lynn 2014) and these traits also weakly predict religiousness, at least in US samples (e.g., Saroglou 2002). In

line with this, Dutton and Lynn (2014) have found that among postgraduates and university lecturers, the situation is reversed and it is the social scientists and humanities scholars who are more religious, consistent with social science and humanities PhD holders having average IQs up to 13 points lower than those who hold doctorates in the hard sciences. Meisenberg et al. (2012) have presented a different explanation for science students being more religious than humanities students, which we will look at below.

The Flynn Effect and Secularization

One interesting possibility is that, in accordance with the IRM, the Flynn effect may relate to the increase in atheism which we have already alluded to. The Flynn effect refers to the secular rise in IQ scores across the twentieth century. Based on the IRM, if IQ is increasing, one would expect levels of religious belief to be decreasing due to the negative intelligence-religion nexus. The twentieth century, in the UK for example, has witnessed the collapse of weekly church attendance and church membership. In 1900, 27% of the population were either members of a free church or attended an Anglican church each week. By 2010, this figure was 11% (Brierley 2010). However, the decline in actual religious belief may have been more modest. A Gallup poll in 1957 found that 78% of British people believed in a "spirit/life-force/personal God." By 1993, this was down to 70%. Similarly, a Gallup poll in 1948 found that 95.5% of Americans believed in God. By 2004, this had fallen to 89.5% (see Dutton 2014, pp.248–249).

However, this apparent correlation between increase in IQ score and decline in religious belief does not evidence the accuracy of the IRM. Flynn (2012) has observed that although the Flynn effect refers to increases in scores on IQ tests, it does not appear to be on "general intelligence" (*g*), which is assumed to reflect the latent ability to solve complex and novel problems. In contrast, the Flynn effect mainly seems to occur on the less *g*-loaded parts of the IQ tests; those which measure specific abilities (*s*) which only weakly correlate with *g*. Specifically, it has occurred on "similarities"—in effect "abstract thinking"—and it has done so to such an extent that it has shown up as a secular rise in overall IQ score. Flynn argues that this has been caused by industrial society forcing us to think in a more analytic way, thus pushing "abstract thinking" to its phenotypic limit. This limit was seemingly reached in the late-1990s in Western countries and we are now witnessing a "Negative Flynn Effect" (a secular *decline* in IQ scores) and this *is* happening on *g* (see Dutton et al. 2016a). So, it may be the case that the modest decline in religious belief is caused by an increased ability to think analytically. However, this is not primarily a function of intelligence. Indeed, evidence has been present indicating—based on proxies for intelligence—that *g* has been *decreasing* during the twentieth century, but this has been cloaked, on IQ tests, by massive gains in *s*: something known as the Co-occurrence model (see Dutton et al. 2016b; Woodley of Menie and Fernandes 2015).

Accordingly, the fact that the Flynn effect has been paralleled by a modest secular decline in religious belief is not evidence of the accuracy of the IRM because the Flynn effect is not happening on general intelligence. The decline in religious belief is likely to be caused by other factors set in motion by the Industrial Revolution. One possibility would be decreased levels of stress, with stress being a robust predictor of religiousness (see Dutton 2014, Ch. 10), consistent with the saying, famously quoted by President Eisenhower, that "There are no atheists in foxholes" (Murashko 2013).[2] If, as appears to be happening in industrialized societies, intelligence begins to fall, we would expect levels of religiousness to start to rise, and there is evidence that this is indeed happening (see Ellis et al. 2017). But this has no bearing on the veracity or otherwise of the IRM.

The Cultural Mediation Hypothesis (CMH)

An alternative model was originally presented by Woodley (2010) and further expanded by Woodley of Menie and Dunkel (2015) in light of criticism by Dutton (2013a). Woodley (2010) argued that the more intelligent would be better at "norm mapping" and could through "effortful control" better convince themselves to accept the dominant perspective in society. Accordingly, they could attain the benefits of being on the winning team. So, the Cultural Mediation Hypothesis (CMH) averred that the more intelligent are more likely to accept the dominant way of thinking. By implication, where this is atheism, we can expect the more intelligent to adopt atheism, but where it is religiousness we can expect the more intelligent to be highly religious. In response to Dutton's critique, Woodley of Menie and Dunkel (2015) presented evidence that IQ among youngsters is less predictive of adult political orientation than IQ measured later in life. They found that the correlation between Leftism (measured in adulthood) and IQ rises from 0 to significantly positive between the ages of 4 and 18. This can be seen in Table 1.

This implies, they argued, that the more intelligent observe that Leftism is the dominant perspective and better understand the benefits of accepting it, as the CMH would predict. Accordingly, they persuade themselves to adopt leftist attitudes. It should be noted here that Woodley of Menie and

[2] Though this is the case in general, there is some evidence that very fervent atheists can become zealous in belief in "scientism" (the absolute and dogmatic belief in science) when under intense stress (Farias 2013). It could be argued that we are evolved to desire pattern and certainty (see Boyer 2001) and that this instinct can manifest itself in scientism with a minority of people. It has been argued that there are parallels between aspects of religion—fervent acceptance of dogma, for example—and scientism (see Jenkins 2009).

Table 1 Hierarchical regression predicting leftism at age 23 from IQ at ages 4, 11, and 18 (Woodley of Menie and Dunkel 2015, p.189)

Model	β	t	df
1 Leftism × IQ age 4	0.035	0.295	72
2 Leftism × IQ age 4	−0.172	−1.108	
Leftism × IQ age 11	0.309*	1.993	71
3 Leftism × IQ age 4	−0.182	−1.137	
Leftism × IQ age 11	0.268	1.269	
Leftism × IQ age 18	0.059	0.291	70

*$p = 0.05$

Dunkel are not arguing that people become more left wing with age, which would be incongruous with evidence of increasing political conservatism among older people (see Cornelis et al. 2008). They are arguing that among a sample of Western young people, the youngsters seem to learn that the "correct" way of thinking is Leftism and this is better imbibed by the more intelligent relative to the less intelligent of the same age. Conservatism does increase with age, but this is significantly mediated by declining Openness (Cornelis et al. 2008). People often also become less religious with age (with religiousness often a measure of "conservatism") up until their mid-thirties, at which point they start to become more religious, possibly, in part, due to intelligence decline from middle age onwards (see Dutton 2014, Ch. 9). So, Woodley of Menie and Dunkel's findings are not inconsistent with evidence that people in their sixties are more conservative than people in their twenties.

Even so, there are difficulties with this model. Firstly, it seems to be rather difficult to apply this to religion in general. If it could be so-applied then in highly religious societies, intelligence would predict being religious. However, it seems that it does not. Using the World Values Survey, Meisenberg et al. (2012) have shown that in all parts of the world, except Sub-Saharan Africa, there is a negative correlation between educational level and income (sound proxies for intelligence) and religiousness. This can be seen is Table 2.

In general, this also holds true across the world *within* religious groups: the more religious the individual members are, the less educated/wealthy they are. As such, the CMH does not appear to work in the context of whether the society is or is not religious, even if it works in other contexts. If it did apply, then religiousness would likely be positively associated with education/wealth in strongly Muslim countries, but this is not the case. In Africa, there is a very weak positive association. Similarly, Meisenberg et al. observed that religion and intelligence are positively correlated in South Korea. But there will always be outliers in surveys of this kind, so this should be of no concern. It should also be stressed that the authors used proxies for intelligence, not intelligence itself.

Table 2 Partial correlations of religious belief with education and income (Meisenberg et al. 2012)

Region	p.c. education	p.c. income	N
Prot. Europe	−0.043***	0.017**	32,231
Cath. Eur./Mediterranean	−0.087***	−0.003	30,582
English-speaking	−0.038***	−0.034***	26,637
Ex-communist	−0.089***	−0.040***	71,685
Latin America	−0.052***	−0.010	35,282
Middle East	−0.077***	−0.045***	32,004
South/Southeast Asia	−0.035***	0.016*	19,731
East Asia	−0.041***	0.017*	13,629
Africa (Blacks)	0.040***	−0.009	19,885
World	−0.045***	−0.022***	286,769
World excluding Africa	−0.051***	−0.022***	266,884

Sex, age, and country are controlled

p.c. partial correlation

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Interestingly, Meisenberg et al. ponder the possibility that religion may somehow be a "separate domain" (p. 115), arguing that:

> "many intellectuals assign scientific and religious explanations to separate domains: Science for explaining the material world and as the foundation for technology; and religion to give meaning to life and for ethical guidance. Religion is assigned to a realm in which rational analysis is either off limits, or is applied to axioms that are not supported by observation and are, in this sense, irrational. This separation of domains allows highly intelligent people to enjoy the emotional rewards of religion without abandoning their rational belief in science. The separation of cognitive domains can explain the repeated finding that students and practitioners of the applied sciences (medicine, accounting, chemical engineering, primary education) tend to be more religious, and that religiosity is lowest among psychologists…"

Irrespective of whether this explanation is valid, it may well be that religion itself is a separate domain and, thus, the CMH is not applicable to it. Accordingly, in a religious society, such as Early Modern England, the CMH may allow us to understand, to some extent, why some people decide to be Catholic or Protestant at certain times (i.e., adopt certain forms of religion under certain social pressures), but it cannot fully explain why some people are simply not religious at all because religiousness is a separate domain. It is, in effect, an instinct that may have evolved, partly, in response to selective pressures at the group level.

The word "instinct" requires some comment. It is generally defined as "an innate, typically fixed, pattern of behaviour in

animals in response to certain stimuli" (*Oxford English Dictionary*). By implication, the behavior is present—to a greater or lesser extent—in all normal members of the species in question. Instinctive behavior is heightened at times of considerable stress. Thus, those who are extremely frightened will generally respond with predictable, instinctive behavior patterns (Steimer 2002), though there will be individual variation in how much stimuli is needed to induce these behaviors. "Instinct" appears to be very similar to the concept of an evolved domain-specific adaptation. One of the fundamental ideas of evolutionary psychology is that the mind consists of a number of modules which have been selected for because they aided survival in specific recurrent situations in the evolutionary past (Durrant and Ellis 2003, p.9). We suggest that religiousness is a similar evolved capacity (and will explore why below), which is, therefore, more likely to be observed during times of anxiety and stress. This would be in contrast to reasoning ability which, though highly heritable (Lynn 2011, p.101) and thus previously selected for, may not be considered a domain-specific instinct but rather broadly facilitates the ability to solve new problems or to be better able to deal with "old ones." Indeed, the presence of rationality and intelligence may permit one to override instincts.

Atheism in Early Modern England and in the Classical World

Returning, then, to difficulties with the CMH, secondly, the hypothesis is incongruous with albeit qualitative historical evidence. Early Modern critics already commented that atheists had great "wit" (a word which had a similar meaning to "intelligence") but not true "wisdom," as "wisdom" inherently involved accepting Christian doctrines (Marshall 2006, pp.262–263). Goodey (2011) discusses sources which appear to indicate that, in the seventeenth century, atheists were seen as "intelligent" in the modern sense. The Machiavellian, implicitly highly intelligent, Edmund in *King Lear* (c. 1606), for example, soliloquizes, "Nature, thou art my goddess" (Goodey, p.210), rejecting the Christian God. Likewise, King (2008, p.75) observes that in the seventeenth century, there were "legitimate and forbidden areas of knowledge, which meant that unbridled curiosity inevitably led to disastrous consequences." Christopher Marlowe (1564–1593) even implies in *Doctor Faustus* that it is intelligence, combined with a rash personality, which inclines people to reject religion: "Faustus is gone. Regard his hellish fall/ Whose fiendful fortune may exhort the wise/ Only to wonder at unlawful things/ Whose deepness doth entice such forward wits/ To practice more than heavenly power permits."

Watson (1994, p.23) has also observed that a discussion of the seventeenth century literature strongly implies that "atheists" (whose views are generally only preserved in biased critiques of them because publicly espousing atheism was a capital offence) were highly intelligent because otherwise there would have been no need to refute their arguments in such depth. Indeed, Watson provided further evidence that some significant critics accepted that atheists and skeptics were often highly intelligent (in the modern sense) even if they were considered irrational with regard to their views on God's existence. Medic Thomas Browne (1605–1682) in his 1672 book *Pseudoxia Epidemica* (Browne 1672, Ch. 5, par. 3) stated, with regard to atheism and skepticism, that "these conceptions befalling wise men" are "as absurd as the apprehensions of fools and the credulity of the people which promiscuously follow anything." In other words, the "wise" (a word that, to a great extent, is used in place of "intelligent" in this period) can be persuaded into atheism by their wisdom, leaving them on a par with "fools." Watson (p.23) summarized that, for Browne, "atheists are either too clever or too stupid" to see what should be obvious to any rational person: that God exists. Similarly, in Victorian England—where the majority of people were still officially religious—the leading scholars tended to be atheists. The philosopher John Stuart Mill (1809–1873) wrote in his *Autobiography* that, "The world would be astonished if it knew how great a population of its brightest ornaments—of those most distinguished even in popular estimation for wisdom and virtue—are complete sceptics in religion" (Mill 1909, p.34).

It could be counter-argued that in Early Modern England, intelligent people were actually manufacturing new and interesting forms of religion, and it is certainly true that heretics were often regarded as highly intelligent (Marshall 2006, p.262). Sir Isaac Newton (1642–1727) might be cited as an example of this, as he secretly believed many unorthodox religious ideas (see Snobelen 1999). However, it can be countered that Newton was a genius and thus an outlier who combined extremely high intelligence with moderately high psychoticism (see Dutton and Van der Linden 2015) and accordingly cannot be regarded as representative of the average intelligent person. Prepared to be burned alive for espousing trivial theological dissent, heretics can, likewise, hardly be seen as representative of intelligent people either. And, moreover, the movement among Early Modern intellectuals was toward deism: the belief that God created the world and then took no further part in it, almost as if it was a cold, rational experiment. This, indeed, has been argued to be Newton's view, as well as the philosopher John Locke's (see Hudson 2015). It could be argued that deism is, in effect, a step toward atheism in the sense that it is stripping God of a key dimension—the ability or desire to interact with the world—which He (or the gods) possesses in all major religions. This is, indeed, how deism was regarded in England in the seventeenth century, as, in essence, atheism: denial of the existence of God (Gaskill 2003, p.100). Likewise, as we have already seen, many Classical philosophers and writers advocated deism or even atheism (see Whitmarsh 2016), again in a broadly religious context, though not one as intense as pre-Enlightenment Western Europe. Thus, the reasonable conclusion would seem to be that there is a perennial association

between religiousness and atheism. The Cultural Meditation Hypothesis fails to explain this.

The Savanna-IQ Interaction Hypothesis

A third model to explain the negative intelligence-religion nexus has been presented by Kanazawa (e.g., Kanazawa 2012). According to Kanazawa's Savanna-IQ Interaction Hypothesis, intelligence is a domain-specific adaptation which has been selected for as humans have moved away from the (evolutionarily familiar) Savanna. As such, he proposes that "evolutionarily novel" behavior and "evolutionarily novel" preferences are correlated with high IQ. This is because intelligence is a domain-specific adaptation selected for specifically by evolutionarily novel environments, that is, environments other than the Savanna. Dutton (2013b) has presented a series of criticisms of this model, to wit: intelligence also predicts the ability to solve "evolutionarily familiar" problems such as social disputes, and that the distinction between "evolutionarily novel" and "evolutionarily familiar" is subjective, and, therefore, the evidence which Kanazawa presents can actually be used to point to the limitations of this hypothesis. For example, "belief in a moral God" could be regarded as "evolutionarily novel"—in the sense that primitive tribes generally do not adopt such a view on gods and religion—but "evolutionarily familiar," at least to a greater extent than atheism. And if we take the Savanna as the benchmark of evolutionary familiarity, then it is evolutionarily *novel*, not familiar.

That said, it may well be that there is something in the Savanna-IQ Interaction Hypothesis and that it simply needs to be framed differently. Cofnas (2016, p.507) has argued that "evolutionary novelty" (or "evolutionary mismatch") needs to be defined as "*deviations in the environment that render biological traits unable, or impaired in their ability, to produce their selected effects*." If "evolutionary novelty" is thus defined, argues Cofnas, then the ecology is changing and so is constantly "evolutionarily novel" and intelligence will help one to solve the problems it continuously presents, meaning that part of intelligence will involve reacting to this novelty. Indeed, as our evolved instincts will increasingly be "mismatched" with the environment, the ability to solve novel problems—the essence of intelligence (see Jensen 1998)—will involve being non-instinctive and attracted, therefore, to mismatches; to the evolutionarily novel. Thus, attraction to objects which instinct would make us repelled by would be an aspect of intelligence and intelligent people would thus be lower in what we might call "basic instincts." When defined in this way, it starts to make sense that intelligence predicts attraction to evolutionary mismatch, as being attracted to evolutionary mismatch means being attracted to that which is non-instinctive and being non-instinctive assists in solving new problems, because intelligence involves rising above instinctive reactions.

So, it could be argued that it is relevant to distinguish—in understanding the relationship between intelligence and preferences—between specific beliefs, which arise due to cultural context, and evolved domains. It may not be the specific expression of religion (e.g., Shia Muslim or Sunni Muslim) that may have been evolved as a separate domain in human behavior, but mainly the tendency to believe in something at all. Indeed, this would potentially explain why fundamentalism—dogmatic religious belief—is more strongly negatively related to intelligence than general religious belief and is also more strongly heritable, at around 0.6 as opposed to around 0.4 (see Dutton 2014 and Koenig et al. 2005). Thus, the type of religion one chooses may be mainly determined by the society in which one is raised and the belief system one is exposed to, whereas the strength with which one believes may relate to an evolved mechanism that also shows individual differences. Religiousness has been shown to be in the region of 0.4 heritable (Koenig et al. 2005), meaning that as with intelligence it is subject to evolutionary selective pressure.

Why Was Religiousness Selected For?

We can understand why religiousness would be *sexually* selected for. It would be a costly signal of altruism and impulse control and a signal of the membership of a beneficial group. It would show that a person was accepted by a group, obeyed the rules, and was prepared to make sacrifices for others (Blume 2009). It would be *individually* selected for insomuch as those who adhered to it would have reduced levels of stress and—believing themselves to be constantly watched by God or gods—increased levels of cooperation and altruism (Kay et al. 2010). These qualities would render punishment at the hands of the group less likely. Further, the tendency to "over detect agency" would be of benefit because if you hear a twig snap and wrongly assume it is an animal you have lost nothing, but if you wrongly assume it is the wind then you may be killed or fail to attain a useful quarry (see Barrett 2004).

Moreover, under conditions of harsh natural selection, we would expect religiousness to be *group selected* for. Religiousness is positively associated with positive ethnocentrism (the belief that your society is superior and a desire to make sacrifices for your society) and negative ethnocentrism (the belief that other societies are inferior and hatred of them) (Dutton et al. 2016b). Computer modeling has shown that more ethnocentric societies will eventually dominate less ethnocentric societies all else being equal (e.g., Hammond and Axelrod 2006). So, we would expect that during most of human history, both intelligence and religiousness were being selected for under conditions of Natural Selection. As an evolved domain, religion tends to hit in at times of intense stress. It is at these times—when adrenaline levels are particularly high—that

profound religious experiences occur (see Newberg et al. 2002). It has been further argued that increasing societal complexity has increasingly selected for belief in moralizing Gods—which demand pro-social behavior—over the gods which merely demand sacrifice (Norenzayan and Shariff 2008). This being the case, it can be argued that religiousness may be a separate domain which cannot be properly compared to ideological adherence, denominational adherence or more everyday preferences. Theories such as the CMH or, for that matter, Rational Choice Theory (where people supposedly rationally calculate what kind of world view to adopt) (see Young 2016) seemingly should not be applied to religion.

The Intelligence-Mismatch Association Model

It would seem to follow that we can develop an aspect of the Savanna-IQ Interaction hypothesis to understand more fully the relationship between religion and intelligence. If religion is indeed an evolved domain—an instinct—then it will become heightened at times of stress, when people are inclined to act instinctively, and there is clearly evidence for this (see Newberg et al. 2002). Moreover, intelligence would better permit people to rise above their instincts and possibly even make them anti-instinctive. It means we are better at being able to pause and reason through the situation and the possible consequences of our actions. The ability to solve problems involves the ability to move beyond our instincts and, as such, following Kanazawa's model, it would seem to follow that intelligent people would be attracted to forms of behavior which were non-instinctive or, at least, less instinctive than those which would attract the less intelligent. This would be because selection for intelligence would partly involve selection for acting in a (partly) non-instinctive manner and a person who was attracted to the non-instinctive would potentially be better able to solve a given problem. If we use the term "instinctive" and do not anchor Natural Selection on the Savanna—accepting that it continued apace right up until industrialization at which point it may become more heavily relaxed (see Woodley et al. 2013)—then we can usefully develop Kanazawa's idea.

Following Cofnas' reconceptualization of "evolutionary novelty"—which we have already discussed—we can say that in a changing ecology, the ability to solve problems will become associated with rising above our instincts, rendering us attracted to evolutionary mismatches. This would be consistent with the roughly 0.3 correlation between intelligence and the intellectual curiosity dimension of Openness-Intellect (see DeYoung et al. 2005). And this would help to explain why, across societies and across history, intelligence seems to be negatively associated with religiousness. With this model, we can also explain some of the other associations with intelligence which Kanazawa (2012) presents. These include favoring genetically unrelated others (i.e., low ethnocentrism) (Ch. 5), nocturnalism (Ch. 8), homosexuality (or, at the very least, experimentation with this) (Ch. 9), and not wanting to have any biological children (Ch. 12). It does not necessarily explain *all* of the pieces of evidence which Kanazawa presents for the Savanna-IQ Interaction Hypothesis. For example, drinking (Ch. 11) is problematic because the evidence for the positive association seems to have been cherry-picked and is contradicted by other evidence. However, on some of the most important pieces of evidence, it would appear to explain the negative religion-intelligence nexus, where what we are dealing with can be conceptualized as an instinct.

Kinds of Religion and the Intelligence-Mismatch Association Model

There are, however, a number of potential nuances that need to be discussed in relation to our model. Cofnas (2012) has proposed that general intelligence has co-evolved with more universalistic religions. The latter is characterized by membership through religious belief and practice rather than simply through being a member of a particular ethnic group. Intelligence predicts the ability and desire to cooperate, the ability to trust others, and the ability to innovate new ideas (see Jensen 1998). These factors would mean that the more intelligent populations would develop into larger groups with greater and greater levels of internal genetic diversity. These highly intelligent groups would also be group selected for. Able to produce better weapons, plan better, and cooperate better, they would be able to expand at the expense of less intelligent groups. As these more intelligent groups grew in size further, developing city states, people would find themselves interacting with complete strangers, something that they can be expected to find difficult. Thus, it would make sense that the society would increasingly develop a belief in a moral god, as He would compel people to be altruistic even to strangers. It would also follow that such a society would develop a universal form of religion because its members would increasingly be from diverse kinship and ethnic groups and the society would be continuously expanding into new ones. Adherence to a universalist religion would thus become the key marker that you were "one of us," that you could be trusted because you believed in the same (moral) God. The society that adopted this kind of religiosity would be better able to spread, becoming larger and larger.

We can see that this kind of society would necessarily be underpinned by an attraction to evolutionary mismatch because it would keep becoming more genetically and culturally diverse. In accordance with this, it has been argued that there are more "implicit" forms of religion, which may be evolutionarily older and are in line with traditional tribal animism, and more "explicit" forms of religion, which required an effortful adherence to moral values acquired through cultural or

formal tuition (MacDonald 2010). The latter is assumed to be more evolutionarily novel and may, therefore, be associated with higher intelligence than the former. This nuance would seem to open up a further research field in relation to the religion-intelligence nexus. It is consistent with Nyborg's (2009) and Lewis et al.'s (2011) finding that more "fundamentalist" denominations have lower average IQ than the more "liberal" ones, which tend to be less dogmatic and more intellectual. It is congruous with evidence that practitioners of the older religion, in a given country, tend to have lower intelligence. The older religion is more likely to be associated with older evolutionary tendencies. In the Netherlands, for example, in 1964, Catholics were, on average, less intelligent than Protestants, who were in turn less intelligent than agnostics (Verhage 1964). Catholicism, more so than Protestantism, involves syncretism with aspects of (even earlier) pagan, kinship-based religiosity (see Maroney 2006). An obvious example is ancestor worship, replaced by praying to saints and/or "blesseds" and "venerables" from one's own ethnic group,[3] or by organizing masses for the souls of one's ancestors. Another example is polytheism and animism, in which there are numerous spirits. This is evidenced in the worship of the Virgin Mary, the cult of the saints, martyrs, and angels, and belief in the Devil and assorted demons.

In addition, many religious people effectively believe in a veritable *smörgåsbord* of components of different religions. Thus, in Early Modern Europe, it was quite normal for rural people to be Catholic (or even Protestant) and concomitantly believe in ghosts (see essays in Gordon and Marshall 2000). In South Korea, the least intelligent (as measured by education and income) are Buddhists (the religion most syncretized with Korean animism), then Catholics and then Protestants (Meisenberg et al. 2012).

Religiousness and Personality

Although the present paper focuses on the association between intelligence and religion, it may be relevant to also take personality into account when trying to explain the dynamics of the intelligence-religion link. Much of the previous research on personality has applied models which assume multiple personality dimensions. Yet, in the present context, the shared variance among such dimensions may be of interest. Specifically, it has now been found in numerous studies that a general factor exists among personality dimensions. This general factor reflects a tendency toward socially effective or desirable behavior. This is often referred to as the General Factor of Personality (GFP) (for a review see Van der Linden et al. 2016).

Religiousness has found to be positively associated with the GFP (Dunkel et al. 2015). Also, it seems that genius tends to be associated with outlier high intelligence combined with moderately low GFP (see Dutton and Charlton 2015). This may explain why a number of historical geniuses advocated deism: this would have been predicted by *both* high intelligence and low GFP, in the sense that low GFP predicts non-conformity. It makes us wonder what would happen if we tested the relationship between religion and intelligence but controlled for the GFP. This would be an interesting matter for a future study.

A further issue this raises is that we would expect high GFP to be "explicit," non-instinctive, and thus later in evolutionary history than low GFP. This being so, it seems rather counter-intuitive that high GFP would be positively associated with something "implicit" and instinctive, such as religiousness. We can, however, speculate on a possible explanation in terms of group selection, something we might call the IQ-GFP-Religion Optimal Co-selection Model. It can be argued that relatively high intelligence, GFP, and religiousness would all be of benefit in terms of group selection. It has been observed that, at the population level, more intelligent groups adopt a "slower Life History strategy," reflected, to some extent, in aspects of what is essentially high GFP (Rushton 2000). In the same way, Figueredo et al. (2006) used religiousness as a measure of slow Life History Strategy. So, intelligence, religiousness, and GFP would be group selected for as a bundle, even though we would regard religion as "instinctive" and GFP and intelligence as "mismatched." However, they would each have to be kept in evolutionary check. If the society became too intelligent, then it, perhaps, would start questioning its religiousness. This would leave it insufficiently ethnocentric, a point argued by Meisenberg (2007). It would also be too non-instinctive for its own good, potentially strongly attracted to not breeding at all, for example. If group GFP became too high for the ecology, the group would be insufficiently aggressive in the face of intergroup hostility. If religiousness became too universalist, group ethnocentrism could be undermined. We have already explored, in looking at Cofnas (2012), the negative consequences of religiousness being too instinctive. Thus, the society which would win in the battle of group selection would be the one which maintained the optimal balance between "instinct" and "mismatch." This selected optimum balance could potentially explain why religiousness is weakly negatively correlated with intelligence but weakly positively correlated with GFP.

[3] For example, a cult surrounding Padre Pio (1887–1968) took off after his death and is especially followed in southern Italy, where he came from (Hauschild 2011, p.15). He was beatified in 1999 and made a saint in 2002. In Catholic theology, you can pray to anyone in Heaven you like and ask them to pray to God for you (intercede). The first stage of canonization is to be declared a "servant of God." Stage two is to be declared "heroic in virtue" (Venerable). This means you might already be in Heaven. Stage three is to be beatified as "Blessed," meaning you have definitely entered Heaven (having served your time in Purgatory), and people can pray to you, certain that you can intercede on their behalf. To be beatified, your intercession must have led to one miracle or you must have been martyred. Finally, if your intercession leads to two miracles, then you are made a saint, unless you are a martyr in which case only one miracle is needed.

This also implies the fascinating possibility that built into the nature of intelligence is a kind of regulatory mechanism which means that the average intelligence of a population will never get so high for its ecology that the population dies out due to being too low in instinct. Drawing on analyses of the modern West and ancient Rome, Greece, China, and the Islamic world, Meisenberg (2007) argues that at a certain point of intelligence, the society will start questioning its religiousness, a process spearheaded by its more intelligent members. No longer seeing children as divine gifts or large families as God's desire, they will start limiting their fertility with contraception that the intelligent society has invented. Accordingly, average intelligence will decline, religiousness will increase, instinctiveness will increase, and the population will survive. But it is, of course, appreciated that this is speculative and needs to be pursued in greater depth in a future study.

Conclusion

The precise reason for the negative religion-intelligence nexus has evoked much debate and will likely continue to do so. However, with this theoretical study, we hope we have moved the issue forward toward some kind of tentative conclusion. The Irrationality of Religion Model is problematic because it remains philosophically questionable whether atheism is more rational than theism and because intelligence negatively predicts certain kinds of rationality when it comes to highly emotive issues. The Cultural Mediation Hypothesis has limitations because if it were correct then religious countries should display a positive religion-intelligence nexus, but they do not. Moreover, it is incongruous with historical evidence of the relatively high intelligence of deists and atheists. However, the puzzle may be solved if we conceive of religion as a separate evolved domain. The Savanna-IQ Interaction Hypothesis, in its original form, has limitations, such as the imprecise and questionable nature of the division between "evolutionarily novel" and "evolutionarily familiar." However, this hypothesis seems to have planted the seeds of a solution to understanding the negative religion-intelligence nexus, as long as we reconceptualize "evolutionary novelty" as "evolutionary mismatch" as Cofnas suggests. If religion is an evolved domain, then it is an instinct and intelligence—in rationally solving problems—can be understood as involving overcoming instinct and being intellectually curious and thus open to non-instinctive possibilities.

Future Research

The Intelligence-Mismatch Association Model, potentially, has important implications when understanding the behavior of religious people as against the behavior of intelligent people (though, of course, these categories can cross over). We can make numerous testable predictions, beyond those proposed and tested by Kanazawa (2012), that religiousness may be associated with many "instinctive" forms of behavior: forms of behavior which would have been "normal" under preindustrial conditions of Natural Selection. In this regard, it makes sense that religiousness predicts ethnocentrism (see Dutton et al. 2016b), and a desire to have a large family (Swenson 2008, p.73), when intelligence predicts the opposite (Kanazawa 2012). Islamic teaching specifically recommends not being nocturnal, i.e., going to bed early and getting up early (BaHammam 2011), and it would be interesting to see if religiousness, more generally, is negatively correlated with nocturnalism, as Kanazawa (2012) finds intelligence to be positively associated with nocturnalism. There are many possible avenues, therefore, through which our model can be further tested and, importantly, potentially falsified as well.

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