ABSTRACT

On Science and Atheism: Whether Atheistic Belief is Scientifically Motivated

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The intent of this paper is to explore the motivation behind the rejection of theistic religious faiths by modern atheist scientists, and whether it is justified to claim that this rejection is scientifically motivated. First, a brief background of the development of the contemporary schism between faith and science is given, noting in particular changes in belief amongst the scientific community. Next, an exposition on the motivations for scientists' convictions concerning God is laid out, followed by an address to the question of whether atheistic scientists reject all properties of God, or only certain of them. Based on analyses of personal statements, statistical data on beliefs, and developments in twentieth-century physics and mathematics, it is concluded that modern scientists who reject theism are not overwhelmingly motivated by science, and that they in fact do not reject all ideas of God.

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ON SCIENCE AND ATHEISM: WHETHER ATHEISTIC BELIEF IS SCIENTIFICALLY MOTIVATED

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By

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To my parents, Stephen and Kellie Jester, whose support and encouragement made this possible.

CHAPTER ONE

Introduction

In the Brothers Karamazov, Dostoevsky's character Dmitri brazenly exclaims, "Move over a little, Your Reverence, there's no help for it, chemistry's coming!"[1] Though Dostoevsky regarded himself as prophetic, it is remarkable to observe not only the realization of his mid-nineteenth century words, but also the alacrity with which it came about. Prior to the nineteenth century, open rhetoric putting religion in conflict with science was rather uncommon; by the mid-twentieth century, the so-called "conflict thesis" was in full swing. Though the conflict thesis has been rejected by modern academics inasmuch as it posits an inherit intellectual conflict between science and religion, it remains publicly popular and appears to be in concordance with the religious beliefs of scientists as compared to the general public. A 2009 Pew Research Center poll found that the rate of disbelief in either God or some higher power measured at 4% for the general public, versus 41% for scientists.[2] Similarly, 95% of the public expressed belief in God or a higher power (83% and 12%, respectively), compared to 51% of scientists (33% and 18%, respectively). This stark contrast seems to suggest that there is motivation for rejecting theistic belief amongst the scientific community in particular, and the primary focus of this essay will be to determine whether such motivation is scientifically based.

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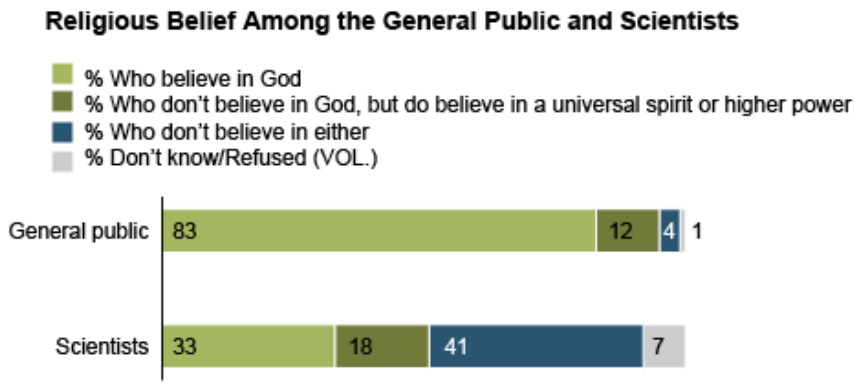
[1] Dostoevsky, Fyodor, Richard Pevear, and Larissa Volokhonsky. *The Brothers Karamazov*. New York: Farrar, Strauss and Giroux, 2002. Print. (589)

[2] Pew Research Center's Religion & Public Life Project. 'Scientists and Belief'. N.p., 2009. Web. 16 June 2015. Figures 1-4 are taken from original, by permission.

Figure 1



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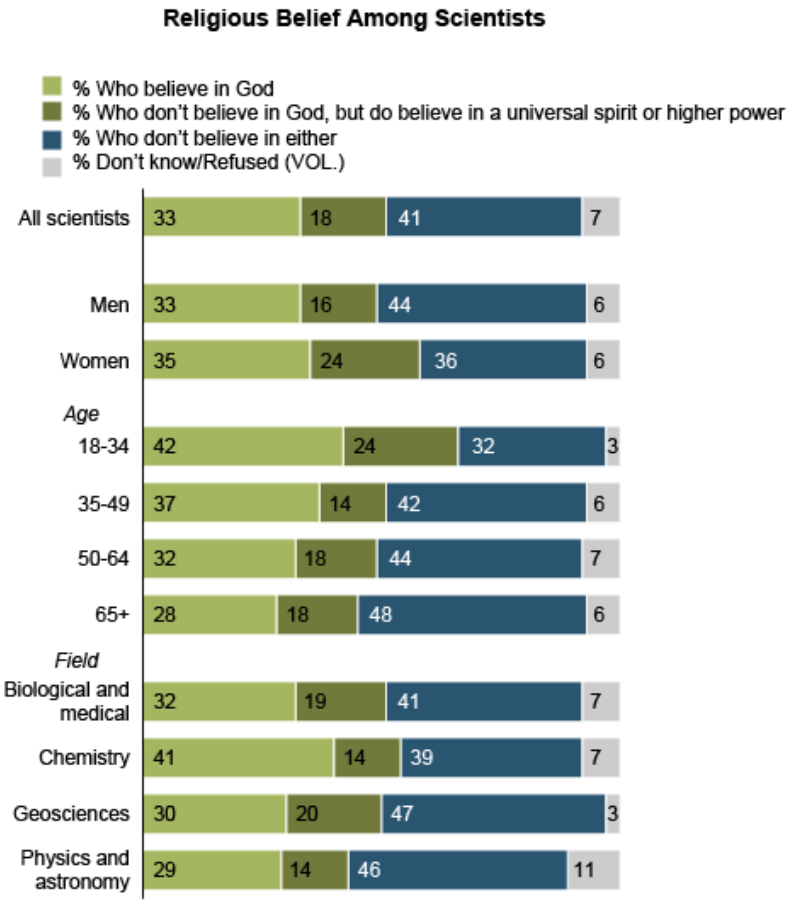

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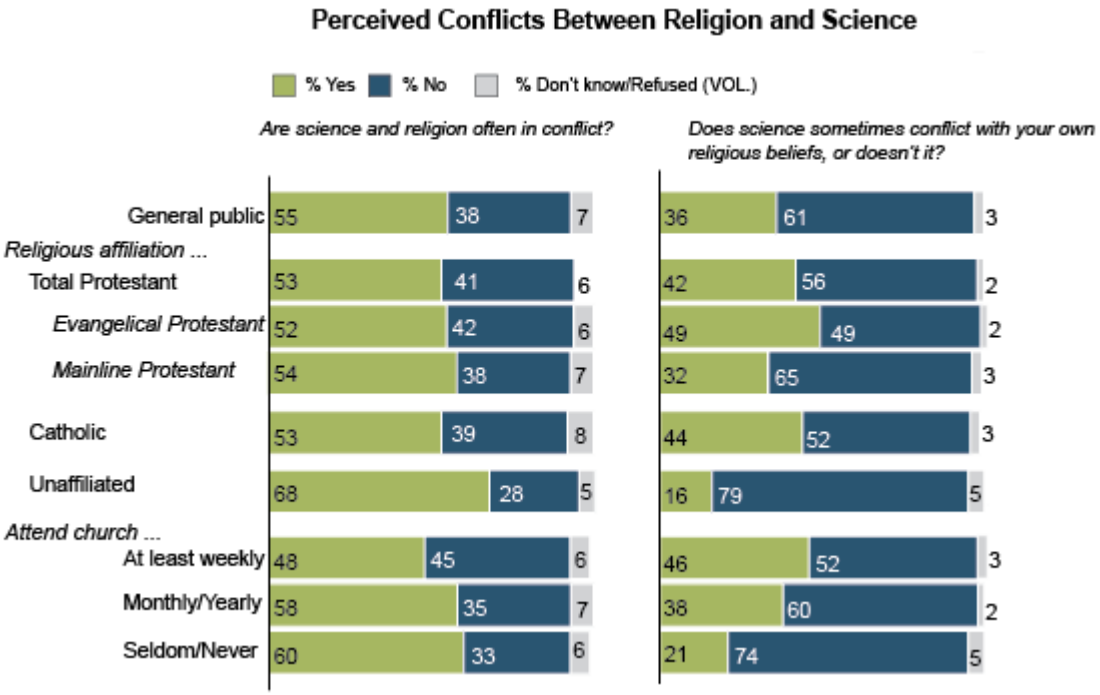

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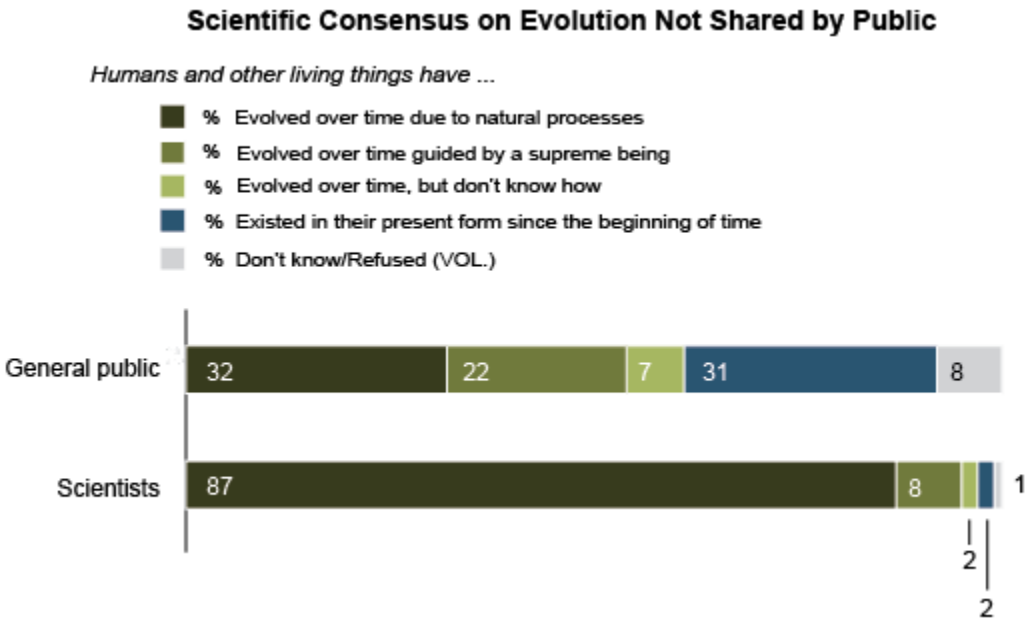

A Brief History of Atheism

This essay will begin with a brief history of the development of scientific atheism. The term scientific atheism here refers to the prevalence of atheistic beliefs in the scientific community. For the purposes of this essay, the term "atheist" will in general refer to an atheistic scientist, and a "scientist" will be considered one who works in a field based on direct empirical evidence, which understanding will include mathematicians. The working definition of "God" will be the following, taken from Merriam-Webster's dictionary: "the being perfect in power, wisdom, and goodness who is worshipped as creator and ruler of the universe." Finally, the terms "religion" or "religious" will, unless otherwise specified, refer to theistic belief, especially the monotheism of the Christian religion.

Atheism, as a philosophical belief, has existed in some form for thousands of years. One of the first openly anti-religion schools of thoughts was that of the Charvakas in ancient India, beginning in the 6th century BC. Like modern science, the Charvaka epistemology maintained that evidence was a necessary facet of knowledge. For the Charvakas, knowledge that could be gained was based on perception, and any knowledge that is based upon inference—no matter how reasonable—cannot be without doubt. Consequently, the Charvakas rejected most aspects of religion, including the afterlife, morality, and the existence of any persons beyond our world:

> There is no heaven, no final liberation, nor any soul in another world…while life remains let a man live happily, let him feed on ghee even though he runs in debt; when once the body becomes ashes, how can it ever return again? If he who departs from the body goes to another

world, how is it that he comes not back again, restless for love of his kindred?[3]

Not to be outdone in the origins of any philosophy, the Ancient Greeks also left their mark on the history of atheistic thought. In Euripides' *Bellerophon*, the namesake of the play expresses dismay at all that he has suffered and persuades himself that there are no gods. "Does someone say that there are gods in heaven? There are not," he laments, "There are not, if any man wishes not to be a fool and believe the ancient story."[45] We shall return to this problem of suffering—the idea that the existence of suffering proves that God is either unjust, or not perfectly good or powerful—in Chapter 2 of this essay, but for now it is interesting to note that Bellerophon renounces his words before his death, but the problem of suffering is left unsettled.

Cicero, in his work *de Natura Deorum*, attributes to Protagoras, a fifth century BC contemporary of Euripides, the agnostic expression that "concerning the gods, [one has] no means of knowing whether they exist or not, nor of what sort they may be."[6] While Euripides did not in fact espouse the ideas given voice by his character Bellerophontes, Protagoras, it seems, was audacious enough to publicize his own views. The former was punished only satirically by Aristophanes, of whom even Socrates was victim, whereas

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[3] Mādhava, et al. *The Sarva-Darśana-Saṃgraha; Or, Review of the Different Systems of Hindu Philosophy*. London: Trübner & Co., 1882. Print.

[4] Riedweg, Christoph. "The "Atheistic" Fragment from Euripides' "Bellerophontes" (286 N ^{2})". *Illinois Classical Studies* 15.1 (1990): 39–53. Web. 22 July 2015.

[5] The translation is the author's. The original text reads:

> φησίν τις εἶναι δῆτ' ἐν οὐρανῷ θεούς;
> οὐκ εἰσίν, οὐκ εἴσ', εἴ τις ἀνθρώπων θέλει
> μὴ τῷ παλαιῷ μῶρος ὢν χρῆσθαι λόγῳ.

[6] Cicero, Marcus Tullius, and P. G Walsh. *The Nature of the Gods*. New York: Clarendon Press, 1997. Print.

the latter was exiled from his own city and warranted the destruction of his writings. It was a third contemporary of theirs, however, who has earned himself the moniker of "the first atheist": Diagoras of Melos. Diagoras is the earliest individual to whom the distinction of openly denying the existence of gods can be attributed, and it seems that he was a true precursor to the modern, given his ready snark. Again, Cicero informs anecdotally that Diagoras, at sea, was blamed for an encountered storm because of his well-known impiety; Diagoras, in turn, wondered if the other ships in the tempest were bearing a Diagoras as well. The scholar J. M. Robertson succinctly describes Diagoras' reason for rejecting the gods, his personality, and what became of him:

> Diagoras of Melos was proscribed for atheism, he having declared that the non-punishment of a certain act of iniquity proved that there were no Gods… Diagoras, who was further charged with divulging the Eleusinian and other mysteries, and with making firewood of an image of Herakles, telling the god thus to perform his thirteenth labour by cooking turnips, became thenceforth one of the proverbial atheists of the ancient world, and a reward of a silver talent was offered for killing him, and of two talents for his capture alive; despite which he seems to have escaped.[7]

If the previous three examples stand out for their relative obscurity and the ends with which their ideas were met, it is because they, like atheists throughout most of history, were the exception rather than the norm. Accordingly, their impact on modern atheism is much less than that of particular schools of thought that concurrently developed in the Greek tradition. Led by Democritus, the Atomists developed one of the earliest materialistic philosophies. Most atomists maintained that the world was composed of void and indivisible particles that interacted at random; while most did not deny the existence of gods, they readily denied that the gods interacted with the world,

[7] Robertson, J.M. *A History of Freethought, Ancient and Modern, to the Period of the French Revolution*. 4th ed. London: Watts, 1936. Print.

millennia before Deism was popularized in the West. Following the atomists, another materialistic school of thought emerged with Epicurus in the late fourth century BC. Epicureanism, as one of the earliest examples of hedonism, held pleasure to be the highest good. In his work *On the Nature of Things*, Lucretius, a follower of Epicurus, explained that fear of divine justice or punishment was a chief cause of unhappiness among humans, and that such fear was illogical, as the gods did not concern themselves with human affairs.

The last of the Greeks it will benefit us to mention are Xenophanes and Euhemerus, who both implied, each in his own way, that the gods were constructs of man. Euhemerus believed that the common gods were deifications of powerful men, as separate from the true, prehistoric gods that had existed for eternity. In the same manner, Xenophanes is famously cited in the *Stromata* by Clement of Alexandria—who in the same work calls Epicurus "the leader of atheism"—as having claimed that "were beasts to draw the semblance of the gods, the horses would them like to horses sketch, to oxen, oxen, and their bodies make of such a shape as to themselves belongs."[8] That is, the gods are created in man's image rather than man in the gods' image. Though neither of these two was himself a true atheist, the belief that the idea of God and religion in general were inventions of man is, naturally, the common belief of modern atheists.

A millennium beyond the Greeks, a handful of Arab thinkers and scholars promoted atheistic ideas soon after the advent of Islam. Ibn al-Rawandi (أبو الحسن أحمد بن يحيى بن إسحاق الراوندي) was a ninth-century scholar who, after abandoning Islam, became

[8] Knight, Kevin. 'Church Fathers: The Stromata (Clement Of Alexandria)'. *NewAdvent.org*. N.p., 2009. Web. 17 July 2015.

an outspoken critic of religion and the idea of prophecy. In the same vein, Abu 'Isa al-Warraq (أبو عيسى محمد ابن هارون الوراق), another ninth-century scholar and friend of al-Rawandi's, believed religious revelation to be unnecessary, and admired the ability of the mind to develop scientific knowledge, as exemplified by astronomy. This represents a dramatic shift in the history of atheistic thought; moving beyond simple denial of the existence or relevance of God, al-Warraq was one of the first to posit that scientific understanding was not only good in its own right, but superior to any understanding revealed through religion. In the eleventh century, the philosopher and poet Al-Ma'arri (أبو العلاء المعري) also rejected Islam, believing all organized religions to be falsehoods, and recognizing the location dependency of one's religion. He divided all men into two categories: "those with brains, but no religion, and those with religion, but no brains."[9] For Al-Ma'arri, reason was to be valued greater than tradition.

Following these Arab scholars, the next developments in atheistic thought came during the late Renaissance and early Enlightenment periods. As with the Greeks, we begin with noteworthy influences from individuals who were not themselves atheists, beginning with seventeenth-century Dutch philosopher Baruch Spinoza. Spinoza, a naturalist, preceded classical deism but advocated its principle tenet, namely that the world was organized by natural laws established by God, who does not intervene in the world. Spinoza is well-known for his association of Nature with God; he did not view them as equivalent, but rather viewed the natural world as part of—or existing in—God. The impact of his philosophy was such that nearly three hundred years later, world-renowned physicist Albert Einstein claimed to "believe in Spinoza's God who reveals

[9] Glassé, Cyril. *The New Encyclopedia of Islam*. Walnut Creek, CA: AltaMira Press, 2001. Print.

himself in the orderly harmony of what exists, not in a God who concerns himself with fates and actions of human beings."[10] Spinoza's ideas, though unorthodox and controversial, were largely a product of his time. The Reformation begun by Martin Luther in the previous century had loosened the Catholic Church's stranglehold on European society, and the further impact of scientific inquiries opened the possibility of greater intellectual freedom. Copernicus alleged, contrary to church doctrine, that the Earth revolved around the sun; Galileo affirmed the same, adding remarkable mathematical insight to observed phenomena with the aid of a telescope. Galileo further challenged the authority of scripture in the realm of empirical knowledge, writing in a letter to Duchess Christina Lorraine the following:

> I think that in discussions of physical problems we ought to begin not from the authority of scriptural passages, but from sense-experiences and necessary demonstrations; for the holy Bible and the phenomena of nature proceed alike from the divine Word, the former as the dictate of the Holy Ghost and the latter as the observant executrix of God's commands… [Nature] is inexorable and immutable; she never transgresses the laws imposed upon her…For that reason it appears that nothing physical which sense-experience sets before our eyes, or which necessary demonstrations prove to us, ought to be called in question (much less condemned) upon the testimony of biblical passages which may have some different meaning beneath their words. For the Bible is not chained in every expression to conditions as strict as those which govern all physical effects; nor is God any less excellently revealed in Nature's actions than in the sacred statements of the Bible.[11]

The impact of such writing on the philosophy of Spinoza is clearly evident: sensory observation, not scriptural revelation, is the proper means by which Nature is comprehended, and Nature is to be understood as God's excellence and Word.

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[10] Einstein was replying via telegram to the question of Rabbi Herbert Goldstein, who inquired whether he believed in God. See Clark 413.

[11] Interdisciplinary Encyclopedia of Religion & Science. 'Galileo's Letter to Madame Christina of Lorraine, Grand Duchess of Tuscany'. *Inters.*org. N.p., 2015. Web. 26 June 2015.

Beyond Spinoza, Voltaire and his popular satire *Candide*, which denigrated the church and the notion that ours is "the best of all possible worlds," helped spread deism in eighteenth-century Europe. Baron d'Holbach, a French philosopher, openly espoused atheism in his treatise *The System of Nature*, and maintained intellectual discourse in Paris with several other prominent and irreligious minds of the day including David Hume and Denis Diderot. The common theme among these intellectuals was, as with their predecessors, the preeminence of reason in lieu of faith. Increasingly, reason came to be associated with the scientific process, itself dependent on sensory perception and observation. Untestable demonstrations of logic—for example, St. Anselm's ontological argument and even Rene Descartes' own argument for the existence of God—became less valuable than the demonstrable truths of science and especially mathematics. As German philosopher Immanuel Kant summarizes in *A Critique of Pure Reason*, "all our knowledge begins with the senses, proceeds then to the understanding, and ends with reason. There is nothing higher than reason." Any knowledge not subject to doubt, religion in particular, was contrary to the very essence of the age of Enlightenment, which Kant describes in his brief essay *What is Enlightment?*:

> Enlightenment is man's release from his self-incurred tutelage. Tutelage is man's inability to make use of his understanding without direction from another. Self-incurred is this tutelage when its cause lies not in lack of reason but in lack of resolution and courage to use it without direction from another. Sapere aude! 'Have courage to use your own reason!'- that is the motto of enlightenment.[12]

[12] Kant, Immanuel. 'Answering The Question: What Is Enlightenment?'. *Berlinische Monatsschrift* Dec. 1784: n.p. Print.

The emphasis on independent reasoning, or freethinking, is critical in the history of atheism. No longer dependent on any but himself, man becomes free to judge for himself what is true, based upon whatever foundation he finds most compelling.

It is not coincidence, then, that soon after Kant in the late eighteenth century, we find the infamous German philosopher and atheist Friedrich Nietzsche. Nietzsche, the most influential atheist discussed up to this point, takes perspectivism to the extreme. He argues that because each individual has the ability to reason and interpret uniquely, there is necessarily no consensual or abstract truth. He writes: "You have your way. I have my way. As for the right way, the correct way, and the only way, it does not exist."[13] Applying this moral relativism to general statements of knowledge, Nietzsche contends that "there are various eyes. Even the Sphinx has eyes: and as a result there are various truths, and as a result there is no truth." Though Nietzsche and two of his equally notorious German atheist contemporaries, Karl Marx and Ludwig Feuerbach, were remarkably influential in the history of philosophy and atheism, none of them was a scientist. As a consequence, their impact on modern scientific atheism is less impactful than that of their renowned English contemporary, Charles Darwin. Darwin was, perhaps ironically, not an atheist.[14] His theory of natural selection, as expounded in his magnum opus, *On the Origin of Species*, is one of the most revolutionary scientific treatises of all time not only for its impact on scientific doctrine, but for its greater philosophical implications in the relationship between science and religion. Here, for the first time, we

[13] Nietzsche, Friedrich Wilhelm, Walter Arnold Kaufmann, and R. J. Hollingdale. *The Will to Power*. New York: Random House, 1967. Print.

[14] In a letter dated May 7, 1879, Darwin wrote to John Fordyce: "I have never been an atheist in the sense of denying the existence of a God…an agnostic would be the most correct description of my state of mind." See Darwin Correspondence Project.

witness an attempt to explain the very origins of humanity by purely natural processes. Where Newton and Galileo allowed for God's action in ordering the universe, Darwin allows for the inaction of God, a seemingly accidental process by which human life can be explained. This perceived removal of design in nature led Darwin to become increasingly skeptical of his faith, and would have the same impact on many after him. Among the twenty-first century public, no issue in the discussion of science and religion is as salient as evolution; the difference in its reception by the public and the scientific community gives testimony to the alleged conflict between science and religion (see Figures 3 and 4).

Up to this point, the prominent scientific figures we have considered have all been religious. Nicolaus Copernicus held clerical positions and devoted some of his astronomical efforts to establishing the liturgical calendar at the bequest of Pope Paul III, noting in a letter to the same that the world "has been built for us by the Best and Most Orderly Workman of all."[15] Galileo, as noted earlier, was deeply concerned with theological understanding and reconciliation of science with beliefs. Descartes, a Catholic, in his *Meditations on First Philosophy* describes his "belief that there is a God who is all powerful, and who created [him]…[which] has, for a long time, obtained steady possession of [his] mind,"[16] and gives multiple proofs for the existence of God. Darwin, as we have seen, was not an atheist, but the changing course of his beliefs during his life reflects in a significant way the changing course of beliefs among scientists as the

[15] Benton, William (Publisher). *The Almagest, By Ptolemy: On the Revolutions of the Heavenly Spheres, By Nicolaus Copernicus*. Chicago, IL: University of Chicago, 1952. Print.

[16] Descartes, René, and Donald A Cress. *Discourse on Method and Meditations on First Philosophy*. Indianapolis: Hackett Pub., 1998. Print.

twentieth century arrived. In this century, for the first time, we find both some of the most distinguished scientists of the time who are atheists, and some of the most notable atheists of all time who are scientists. Marie Curie, the only individual to ever win the Nobel Prize in two separate natural sciences (Physics, 1903 and Chemistry, 1911), confessed to practice no religion. Bertrand Russell, an English mathematician, logician, and philosopher, is best known for his brief essay, *Why I am Not a Christian*, as well as his book *Religion and Science*, which advocates the conflict thesis and was integral in his winning of the Nobel Prize in Literature. Famed scientists Neils Bohr, Alan Turing, and James Chadwick were all atheists. The especially well-known and outspoken scientists Stephen Hawking and Richard Dawkins are both avowed atheists, and have given significant attention to disproving the need for God via scientific reasoning. This is not to say, however, that all of the most eminent scientists of the past century were atheists; Einstein, J. J. Thompson, and Ernest Rutherford were not. Max Planck, Nobel laureate in Physics and originator of quantum theory, claimed that "both religion and science require a belief in God. For believers, God is in the beginning, and for physicists He is at the end of all considerations…To the former He is the foundation, to the latter, the crown of the edifice of every generalized world view."[17] This stark division in scientists' beliefs seems to have rapidly arisen in the past 150 years. American psychologist James Leuba first statistically analyzed scientists' belief in God in a 1914 survey, finding the then-astounding result that 41% of scientists rejected belief in a personal God, while a similar

[17] Planck, Max, and James Vincent Murphy. *Where Is Science Going?*. New York: W.W. Norton & Co, 1932. Print.

percentage did not, with the remainder falling under the agnostic or doubtful category.[18] Though Leuba concluded that theistic belief in the scientific community was on its way out, an exact, replicated survey of scientists in 1996 by professor Edward Larson and journalist Larry Witham found strikingly similar results: 39% of scientists claimed belief in a personal God, while 45% did not (see Table 1). It must be pointed out, however, that the phrasing used in both surveys may have significantly impacted the results. Leuba's question only allowed for belief "in a God in intellectual and affective communication with humankind, i.e. a God to whom one may pray with expectation of receiving an answer," disbelief in a God defined as such, or "no definite belief regarding this question."

In a more recent study completed in 2006, researcher and sociology professor Elaine Ecklund collected statistical data on beliefs from over 1600 academic scientists. Her findings revealed a similar percentage of belief yet again, with 48% of those surveyed identifying with a religious tradition.[19] This survey was not without its own potential biases; universities included were overwhelmingly non-religious, located almost exclusively on the eastern and western coasts, and those surveyed included social scientists in addition to natural scientists. Ecklund points out that her "findings, however, do not reveal vast discrepancies in religious belief and practice among disciplines and fields." In the following chapter, we will exam reasons for this contrast in religious

[18] Leuba, James H., Edward J. Larson, and Larry Witham. 'Nature, "Leading Scientists Still Reject God" July 23, 1998'. *StephenJayGould.org*. N.p., 1998. Web. 16 July 2015.

[19] Ecklund, Elaine. 'Religion and Spirituality among University Scientists'. *Religion.ssrc.org*. N.p., 2007. Web. 14 July 2015.

beliefs between the public and scientists, and see whether it is the influence of science, as Dostoevsky feared, that is chiefly at cause.

Table 1

Table 1 **Comparison of answers to questions in 1916 and 1996 surveys**

Topic of question	*1916*	*1996*
Belief in personal god		
1. Personal belief	41.8	39.3
2. Personal disbelief	41.5	45.3
3. Doubt or agnosticism	16.7	14.5
Belief in human immortality		
1. Personal belief	50.6	38.0
2. Personal disbelief	about 20*	46.9
3. Doubt or agnosticism	about 30*	15.0
Desire for immortality		
1. Intense	34	9.9
2. Moderate	39	25.9
3. Not at all	27	64.2

*Results published graphicallly by Leuba. All figures are percentages.

CHAPTER TWO

Why I am an Atheist

In the aforementioned essay by Bertrand Russell, *Why I am Not a Christian*, he unhesitatingly makes clear his reasons for rejecting Christian faith. He elaborates his thoughts on the question of God's existence, and the First Cause argument:

> I may say that when I was a young man and was debating these questions very seriously in my mind, I for a long time accepted the argument of the First Cause, until one day, at the age of eighteen, I read John Stuart Mill's Autobiography, and I there found this sentence: "My father taught me that the question 'Who made me?' cannot be answered, since it immediately suggests the further question `Who made god?'" That very simple sentence showed me, as I still think, the fallacy in the argument of the First Cause. If everything must have a cause, then God must have a cause. If there can be anything without a cause, it may just as well be the world as God, so that there cannot be any validity in that argument.[1]

The First Cause argument is a philosophical argument for the existence of God. Acknowledging that all we observe has before it a cause, the argument suggests that this train of causes may be followed back in time to arrival at the First Cause, itself uncaused, which is concluded to be God. While Russell's rejection of the First Cause argument is by no means his only example of why he finds fault with religion, his recollection here demonstrates the point at which his convictions changed. Formerly a theist, his perceived fallacy to an argument that had once persuaded him was, it seems, enough to then dissuade him. His was not a case of scientific understanding leading to a problem with faith; rather, it was a philosophical application of reasoning. This immediately begs

[1] Russell, Bertrand. 'Why I Am Not A Christian, By Bertrand Russell'. *Users.drew.edu*. N.p., 1927. Web. 20 June 2015.

several questions. Was it his appreciation of scientific understanding that led him to reason as he did? Did his natural manner of reasoning incline him towards an appreciation of scientific thinking? Did his initial rejection of theism motivate him to consolidate a set of additional arguments against theism, or did the collective set of arguments give motivation for his initial rejection? These questions are not easily answered, and there exists no comprehensive study on the motivations for acceptance or rejection of the existence of God among scientists. It is with this in mind that we will proceed further with anecdotal evidence, exploring whether it is the development of science itself or some other phenomenon that has led to augmented atheism in the scientific community.

Case One

The first type of scientist we will examine is the one who, like Thomas Edison, claims to "have never seen the slightest scientific proof of the religious theories of heaven and hell, of future life for individuals, or of a personal God."[2] Edison himself, perhaps to avoid public controversy, did not call himself an atheist, but claimed belief in a "Supreme Intelligence," one mathematically-minded and equivalent in his mind to Nature. Scientists in this camp are those who reject theistic religion because of lack of scientific evidence or proof. It is not by accident that we begin with Edison, as his deification of a mathematical Supreme Intelligence sheds light on a concession not admitted by most atheist scientists: namely, that mathematics is generally given godlike qualities in the

[2] Marshall, Edward. '"No Immortality Of The Soul" Says Thomas A. Edison'. *New York Times* 1910: 1, 15. Print.

sciences. Scientists in this category desire scientific proof—which necessarily implies mathematical proof, if we take the liberty of applying Kant's definition that "in any special doctrine of nature there can be only as much proper science as there is mathematics therein"[3]—for any proposed truth statement, without recognizing the necessity of unprovable axioms in any consistent mathematical system. That is, both the statement "there is a God" and the statement "there exists a point" are equally unprovable with mathematics, yet the former statement is subsequently rejected as possible while the latter is held to be axiomatic. Despite this, lack of scientific evidence for God is one of the most frequently given reasons for lack of belief amongst atheists. If the existence of God is to be considered axiomatic, however, then it is certainly more justifiable to claim lack of scientific evidence *of* God than evidence *for* him, noting that in either case one makes the assumption that there must be an association between God and science.

We will include in Edison's category those who take either of these approaches concerning God. Where Edison failed to see proof for existence, some fail to see the need of God's existence, and thus eliminate it as an axiom in light of gained scientific knowledge, just as Euclid's fifth postulate was found to be unnecessary in the discovery of hyperbolic geometry. Famed physicist Stephen Hawking champions this cause, as relayed in a 1988 interview with the German news magazine Der Spiegel:

> What I have done is to show that it is possible for the way the universe began to be determined by the laws of science. In that case, it would not be necessary to

[3] Watkins, Eric, and Marius Stan. 'Kant's Philosophy of Science'. *Plato.stanford.edu*. N.p., 2003. Web. 22 June 2015.

> appeal to God to decide how the universe began. This doesn't prove that there is no God, only that God is not necessary.[4]

Hawking's work has led him to believe that M-theory, combined with multiverse theory, offers the only possible complete theory of our universe—and that it can explain how everything came into being from nothing but the observed physical laws. The existence of these laws, as our universe's axioms, is not called into question. For Hawking, spontaneous creation is both allowed and preclusive to any First Cause argument:

> Before we understand science, it is natural to believe that God created the universe. But now science offers a more convincing explanation. What I meant by 'we would know the mind of God' is, we would know everything that God would know, if there were a God, which there isn't.[5]

This quote, taken from an interview with Spanish newspaper El Mundo, is in reference to a passage in his book *A Brief History of Time* that once led some to speculate whether he was religious. Clarifying, he denotes a subtle shift from the idea espoused in his earlier words to Der Speigel. Before, Hawking claims that science has ruled out the necessity of God. Here, he claims that by ruling out the necessity of God, science in fact presents positive evidence against the existence of God.

Case Two

This brings us to the second type of scientist we will consider: those who, instead of referencing lack of evidence for or of God, believe science presents evidence against God. As seen with Hawking, often there is little distinction between these two cases. The

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[4] Sheridan, Michael. "Stephen Hawking: There Is No Heaven, It's Just a 'fairy Story'" NY Daily News. N.p., 16 May 2011. Web. 20 July 2015.

[5] Jáuregui Narváez, Pablo. 'Stephen Hawking: 'No Hay Ningún Dios. Soy Ateo". *ElMundo.es*. N.p., 2015. Web. 8 Nov. 2015.

distinguished author, biologist, and atheist activist Richard Dawkins is arguably the greatest proponent of this view, though he claims he "cannot, of course, disprove God, just as [he] can't disprove Thor, fairies, leprechauns and the Flying Spaghetti Monster."[6] By "disprove" he here means scientifically, yet looking at the greater context of this quote reveals a different implication:

> *We explain our existence by a combination of the anthropic principle and Darwin's principle of natural selection*. That combination provides a complete and deeply satisfying explanation for everything that we see and know. Not only is the god hypothesis unnecessary. It is spectacularly unparsimonious. Not only do we need no God to explain the universe and life. God stands out in the universe as the most glaring of all superfluous sore thumbs… But, like those other fantasies that we can't disprove, *we can say that God is very very improbable*.[7] [Emphases added]

Dawkins' evident belief that God, as an unscientific hypothesis, cannot be disproved with science is contradicted with his attempt to argue scientifically for the improbability of God. That is, to assign probability to an assertion is to claim that it can to some degree be expressed mathematically, or as Kant would have it, scientifically; a starkly different claim from labeling it a superfluous fantasy. Nevertheless, it is clear that in either case Dawkins' intended argument finds its foundation in a scientific reasoning—in this case, the anthropic principle and natural selection.

The argument presented by Dawkins can be interpreted as an argument from parsimony, or an application of Occam's razor. Like Hawking, Dawkins believes that existing scientific theories adequately explain the universe as observed, and God, being an unnecessary addition, can thus be ruled out. Quite plainly, this is the only truly

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[6] Dawkins, Richard. 'Why There Almost Certainly Is No God'. *HuffingtonPost.com*. N.p., 2006. Web. 12 July 2015.

[7] See Dawkins, 'Why There Almost Certainly Is No God'

scientific argument based on empiricism offered by atheistic scientists against the existence of God. It is from such an understanding that Bertrand Russell, with whom we opened this chapter, gives us the so-called Russell's teapot: the notion that the burden of proof lies with the theists, not the atheists. Until evidence to the contrary shows that the God hypothesis is necessary to our understanding of the universe, Russell, Dawkins, Hawking, et al will continue to apply Occam's razor.

Case Three

In this final case we give mention to the converse of the previous two: scientists who believe that there is scientific evidence for God. Such evidence does not come in the form of data, or testable experimentation. Rather, it comes from reasoning applied to scientific knowledge, and taking exception to the notion that existing theories explain the entirety of the universe. Planck explains:

> As a man who has devoted his whole life to the most clear headed science, to the study of matter, I can tell you as a result of my research about atoms this much: There is no matter as such. All matter originates and exists only by virtue of a force which brings the particle of an atom to vibration and holds this most minute solar system of the atom together. We must assume behind this force the existence of a conscious and intelligent mind. This mind is the matrix of all matter.[8]

As an argument for the existence of God, Planck's words are hardly convincing, and easily construed as the controversial "God-of-the-gaps" mentality. His point, however, is twofold: that there are certain things that science can never prove nor explain, and that study of science makes this more evident. In an online article for *Time*, Israeli-American mathematician and author Amir Aczel directly contradicts the claim that science adequately explains everything we know about the universe. In particular, he claims that

[8] See Planck, *Where is Science Going?*

science “has not revealed to us why the universe came into existence nor what preceded its birth” and that “evolution has not brought us the slightest understanding of how the first living organisms emerged from inanimate matter…Neither does it explain one of the greatest mysteries of science: how did consciousness arise in living things?”[9] (Notably, Dawkins in his article unscientifically refers to each of these two latter events as “massive strokes of luck.”) Aczel then proceeds to the most common and convincing scientific argument for God: the seemingly fine-tuned design of the universe. Citing the events of the early universe, the precise nature of the weights and charges of fundamental particles, and the single-parameter calculation of Roger Penrose that “the probability of the emergence of a life-giving cosmos was 1 divided by 10, raised to the power 10, and again raised to the power of 123,” Aczel notes the absurd closeness of this number to zero. The theoretical multiverse, he allows, attempts to apologize for this probability, but leaves the same fundamental question of what the driving force, the creative mechanism behind the Big Bang and universe, is.

Aczel is by no means alone in belief that science argues in favor of God’s existence, nor is his argument—that of design, or fine-tuning—the only scientific argument used. In a similar vein, the observed complexity and order of the universe are often cited. Vera Kistiakowsky, the first woman to become a professor of physics at MIT, argues that "the exquisite order displayed by our scientific understanding of the physical world calls for the divine."[10] Darwin writes in his autobiography:

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[9] Aczel, Amir D. 'Why Science Does Not Disprove God'. *TIME.com*. N.p., 2014. Web. 15 July 2015.

[10] Margenau, Henry, and Roy Abraham Varghese. *Cosmos, Bios, Theos*. La Salle, IL: Open Court, 1992. 52. Print.

> Another source of conviction in the existence of God, connected with the reason and not with the feelings, impresses me as having much more weight. This follows from the extreme difficulty or rather impossibility of conceiving this immense and wonderful universe, including man with his capacity of looking far backwards and far into futurity, as the result of blind chance or necessity.[11]

Frank Tipler, a professor of mathematical physics at Tulane University, claims that the laws of physics and his particular field of studies led him from atheism to Christianity, and even the famed former-atheist Antony Flew claims (in his book aptly named *There Is a God: How the World's Most Notorious Atheist Changed His Mind*) that evidence "does point to a creative Intelligence almost entirely because of the DNA investigations…the almost unbelievable complexity of the arrangements which are needed to produce life, [suggests] that intelligence must have been involved." DNA is not the sole basis of Flew's reasoning, however, as he elaborates:

> Science spotlights three dimensions of nature that point to God. The first is the fact that nature obeys laws. The second is the dimension of life, of intelligently organized and purpose-driven beings, which arose from matter. The third is the very existence of nature. But it is not science alone that guided me. I have also been helped by a renewed study of the classical philosophical arguments.[12]

As the distinguished physicist and former President of the Royal Society William Thomson—better known as Lord Kelvin—précises, "if you study science deep enough and long enough, it will force you to believe in God."[13]

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[11] Darwin, Charles, and Nora Barlow. *The Autobiography of Charles Darwin, 1809-1882*. New York: Norton, 1969. Print.

[12] Flew, Antony, and Roy Abraham Varghese. *There Is A God: How the World's Most Notorious Atheist Changed His Mind*. New York: HarperOne, 2007. Print.

[13] Gray, Andrew. *Lord Kelvin: An Account of His Scientific Life and Work.* London: J. M. Dent & Co., 1908. Print.

NOMA

There are scientists who, predictably, do not fit within the trichotomy outlined above and maintain that there is no informative communication between science and religion whatsoever. American paleontologist and biologist Stephen Gould first described this as science and religion being "non-overlapping magisteria" (NOMA), and this categorization includes both theist and atheist scientists. Well before Gould, Ernst Haeckel, a German biologist, wrote that "where faith commences, science ends. Both these arts of the human mind must be strictly kept apart from each other."[14] There are also a number of atheist and theist scientists who adamantly reject the NOMA hypothesis, whether or not they believe science presents evidence for or against the existence of God. Francis Collins, leader of the Human Genome Project and author of *The Language of God*, did not convert to Christianity from atheism due to science, but he firmly believes that science and religion overlap. In a 2007 commentary for CNN, he writes that "reason alone cannot prove the existence of God. Faith is reason plus revelation… You have to hear the music, not just read the notes on the page. Ultimately, a leap of faith is required."[15] After this leap of faith, science and religion do not remain separate but become mutually informative. He concludes that "there is a wonderful harmony in the complementary truths of science and faith… God can be found in the cathedral or in the laboratory. By investigating God's majestic and awesome creation, science can actually

[14] Haeckel, Ernst, and E. Ray Lankester. *The History of Creation: Or he Development of the Earth and Its Inhabitants by the Action of Natural Causes*. London: Henry S. King & Co., London, 1876. Print.

[15] Collins, Francis S. 'Collins: Why This Scientist Believes In God'. *CNN.com*. N.p., 2007. Web. 10 July 2015.

be a means of worship." Similarly, Dawkins rejects the notion that science and religion can be considered separate domains. He directly and convincingly addresses Gould:

> It is completely unrealistic to claim, as Gould and many others do, that religion keeps itself away from science's turf, restricting itself to morals and values. A universe with a supernatural presence would be a fundamentally and qualitatively different kind of universe from one without. The difference is, inescapably, a scientific difference. Religions make existence claims, and this means scientific claims.[16]

Interestingly, in rejecting NOMA, Dawkins and Collins make differing claims regarding the existence of God. The former asserts that it is not proven by reason alone (and hence relies on unscientific proof), while the latter claims that it is a scientific question by nature. This ultimately leads to the question of which is correct: that the existence of God is a scientific inquiry, or that it is not?

Reason and Motivation

We must call attention to the fact that Collins says "reason *alone*" is not sufficient. Evidently, reason, and thus science, may contribute to one's belief in God in part, even if it is not the final or sole deciding factor. Any good scientist is informed by reason, but the case may be made that a scientist's answer to this question has no bearing on his belief concerning God's existence. In the book *Scientists Who Believe*, editors Eric Barrett and David Fisher collect essays by twenty-one Christian scientists on how they came to believe. Nearly all express, like Collins, both a scientific influence and personal, unscientific experience in their becoming Christian; some emphasize one over the other. In the chapter *The Axiomatic God*, Anne Sweeney, an English lecturer in mathematics,

[16] Dawkins, Richard. 'When Religion Steps On Science's Turf & The Emptiness Of Theology'. *Free Inquiry* Spring 1998: 6. Print.

takes a unique approach. In the midst of questioning the truth value of God's existence, she realizes that she "was trying to prove the existence of God like a mathematical *theorem*, but He is more like an *axiom*, a self-evident truth that needs no proof."[17] Whether it is a question of science or not is irrelevant if it is considered axiomatic. Even if it is not considered axiomatic, belief in God comes from a variety of views and experiences as evidenced by the scientists in this book. Likewise, atheists arrive at their beliefs concerning God's existence from both scientific and personal reasons. We have already examined those who are convinced of God's nonexistence by scientific evidence or lack thereof, but some are persuaded by problems such as the existence of suffering. How can a perfectly good (and omnipotent) God willingly allow suffering? Either he is unable to end it, in which case he lacks omnipotence, or he has no problem with it, in which case he lacks perfect goodness, the argument goes. Others are persuaded because of conflict between their faith and science, or perhaps the implausibility of miracles, or an absence of answer to prayer. As physicist and prolific author Victor Stenger asserts in his book *Has Science Found God?*, "thought, without the data on which to structure that thought, leads nowhere."[18] Without evidence of miracles or answered prayers, God becomes an unstructured and unproductive thought for some.

But where is the rhyme or reason in all this? If scientists affirm or reject the existence of God for multifarious reasons and independently of whether they consider it a scientific question by nature, where is the common thread in their decision making? What

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[17] Barrett, E. C., and David Fisher. *Scientists Who Believe*. Chicago, IL: Moody Press, 1984. 50. Print.

[18] Stenger, Victor J. *Has Science Found God?*. Amherst, NY: Prometheus Books, 2003. Print.

can explain the disparity in the rate of atheism amongst scientists versus the general public? To answer this question, we must first note that in every case, scientific thinking plays a role. Even if it is not science that helps determine one's belief concerning the existence of God, there *is* appeal made to science for justification of the belief. But does tendency towards this type of thinking make one more inclined to be atheist, as appears to be the case with modern scientists? In the most comprehensive study to date on this subject, Elaine Ecklund reaches an answer in the negative:

> Is knowledge of science somehow in conflict with being religious? Childhood religious background, not exposure to scientific education, seems to be the most powerful predictor of future irreligion. Those scientists raised in almost any faith tradition are more likely to currently be religious than those raised without any tradition. In addition, scientists who describe religion as important in their families as children are much more likely to practice faith currently.[19]

If it is not the study of science that leads to the increased rate of atheism amongst scientists, Ecklund seems to implicate that those who are raised atheist, or who are naturally more inclined towards atheism, seem to self-selectively enter science professions at a much higher rate than their religious colleagues, excepting those who are Jewish. There are many obvious possible explanations for this; for example, of those who are raised religiously, a number will enter careers in the church, or elect to study Theology or Religion and other related fields, where those who are raised atheist or agnostic will not. An in-depth examination of all such reasons would certainly merit its own study and have great contribution to make to this discussion, but for now it remains a largely unexplored area.

[19] See Ecklund, 'Religion and Spirituality among University Scientists'

This essay is primarily concerned with scientific atheists, and whether their claim to science-inspired atheism is warranted. Since any such claim inherently implies that a better understanding of science—or greater scientific intelligence—leads to the conclusion of atheism, Ecklund leaves us with another question: does greater intelligence incline one towards the study of science, and thus make one more likely to become an atheist? Without knowing the reasons behind why fewer persons of religion enter scientific fields, it is difficult to accurately assess or predict whether those who do enter scientific fields are the most intelligent. There also is no standard metric that tells which scientists are the most intelligent, by which a correlation between intelligence and atheism might be reached. The closest to such a metric might be the Nobel Prize, equally available to all scientists without regard to religion, and the most universally acknowledged recognition of superior scientific achievement. According to a study titled *100 Years of Nobel Prizes* by Baruch Shalev, from 1901-2000 atheists, agnostics, and freethinkers won 7.1% of the prizes in Chemistry, 8.9% in Medicine, and 4.7% in Physics while Christians won 72.5% of the prizes in Chemistry, 65.3% in Physics, 62% in Medicine and Jews won 17.3% of the prizes in Chemistry, 26.2% in Medicine, and 25.9% in Physics (with the remaining percentages going to others religious beliefs).[20] Considering that nonreligious scientists compose over 40% of the scientific community as seen in Figures 1 and 2—and that this percentage remained nearly constant over the course of the 20th century—this result is quite surprising, even allowing for such things as luck involved in some awards. The figures for religious and atheistic belief when

[20] Shalev, Baruch Aba. *100+ Years of Nobel Prizes and More*. Los Angeles, CA: Americas Group, 2010. Print.

considering the world community of scientists may be significantly different than those cited for American scientists previously. However, a further study by Harriet Zuckerman found that of American Nobel Prize winners from 1901 to 1972, 84% of those in Chemistry, 60% of those in Medicine, and 59% of those in Physics went to Protestant Christians alone, with Catholics and Jews the total at well over 80% for religious winners in the three categories—a significantly higher rate of religious belief than the general scientist population.[21] Perhaps there is something to the insight of Max Planck that "it was not by accident that the greatest thinkers of all ages were deeply religious souls."[22]

[21] Zuckerman, Harriet. *Scientific Elite: Nobel Laureates in the United States*. New York: Free Press, 1977. Print.

[22] See Planck, *Where is Science Going?*

CHAPTER THREE

On Whether Atheists Reject God or Religion

While it is common for the modern scientific thinker to find fault with religion and summarily reject it, the same cannot be said of his rejection of God. God is generally packaged with all that is associated with religion, and consequently rejected, but here we will examine whether this rejection comes from fault found with God or from God's association with religion. More specifically, we will examine whether the modern scientific atheist rejects those certain qualities associated with God—namely, omnipotence, omnipresence, and omniscience[1].

Omnipresence: A Word

Omnipresence is, by far, the easiest of these three to establish as unopposed by science. Since scientists first began to describe the universe in terms of inviolable natural law, beginning chiefly with the works of Kepler, Galileo, and Newton, there has been an understanding that these laws pertain to the universe in its entirety, wherever matter is found. In his formulation of the law of universal gravitation in particular, Newton concluded that every object necessarily exerts a force on every other object (though he wondered how such could be the case, lacking a medium of exchange). Inherit in this theory of gravity is the existence of this force throughout the universe, even in void space

[1] In the introduction, the definition given for God noted a "being perfect in power, wisdom, and goodness." The first two of these coincide with omnipotence and omniscience, respectively. We elect here to address omnipresence in lieu of goodness because it is also typically associated with the Christian conception of God, but not subjective by definition as is goodness.

between objects. Einstein, who would eventually supercede Newton's theory of gravity with his own theory of general relativity, helped popularize a more concrete concept of the fabric of space-time. Just as physical laws pervade the universe, so too does this space-time continuum. Perhaps the most explicit example of omnipresence in science is a further twentieth-century physics development, in quantum field theory. In quantum field theory, all existing particles are interpreted, in a very real sense, as simply excited states of underlying fields, e.g. electrons as excitations of a singular electromagnetic field. These fields exist everywhere, and moreover, they are everywhere mathematical. Indeed, physicist Werner Heisenberg remarked that "modern physics has definitely decided in favor of Plato. In fact the smallest units of matter are not physical objects in the ordinary sense; they are forms, ideas which can be expressed unambiguously only in mathematical language."[2] To end this brief discussion on omnipresence, we recognize that this ubiquity of mathematics is not limited to our world alone. Physics, accepting the application of universal laws to the universe, applies mathematics to its exploration of the possibility of multiple universes, or multiverses. Fundamental mathematics and mathematical laws, therefore, are not only omnipresent in our visible universe; they are necessarily so in *any possible world*.

Omnipotence: A Discourse

Arguments against the possibility of omnipotence are fairly common and well-known. The typical line of reasoning is a simple question: can God (an omnipotent being) create a boulder which he cannot move? Either he cannot, in which case he lacks

[2] Cassidy, David C. *Uncertainty*. New York: W.H. Freeman, 1992. Print.

omnipotence, or he can, in which case he still lacks omnipotence, lacking ability to move such an object. This, like any argument, has implicit assumptions that deserve elucidation. The first of these assumptions is what understanding of the meaning of omnipotence is implied, for which there are two possibilities: God is omnipotent in that he can perform any action described by a logical statement, or God is omnipotent in that he can perform any action (or realize any situation) described by any statement, logical or not. It seems that the latter must be the implication in this paradox, as it cannot be logical to state that an omnipotent being cannot do something. God, therefore, is assumed to have omnipotence that defies logic, and the paradox's understanding of the possibility that "God can create a boulder which he cannot move" must be met with the same understanding of the possibility of the statement "God moves a boulder which he cannot move."

It may be beneficial to attempt to translate this paradox into mathematics, where mathematics is understood to be able to prove whether or not any given number is rational. An equivalent statement might read as such: can mathematics prove whether i is rational? Either it can, which defies logic, or it cannot, in which case it is not mathematics. Clearly, imaginary numbers reside in a realm of mathematics entirely independent of rationality; mathematics is capable of proving the rationality of any real number, but the concept of applying rationality to an imaginary number is a non-issue. To God, then, should be permitted the realm of illogic, if the realm of imaginary numbers is permitted to mathematics.

These refutations are not meant to be exhaustive. Rather, their intention is to prove that the statement "I reject God because omnipotence defies logic" is unsound at

best, and hypocritical at worst, being stated by one who might reason using such expressions as $x^2 + 2 = 0$. These, though brief, might be sufficient to argue that omnipotence ought not to be rejected by a scientist. To prove emphatically that scientists do not reject the concept of omnipotence, one need only examine their use of mathematics and understanding of the universe. Bertrand Russell once noted that "mathematics takes us still further from what is human, into the region of absolute necessity, to which not only the actual world, but every possible world, must conform."[3] Such necessity would seem to imply that mathematics is, in the abstract, all-powerful. That our world is regulated by mathematical laws is accepted by the general, educated populace as readily as it is by all who practice the scientific method, and these latter in fact base their entire work on the belief that these laws are immune to exception. Indeed, belief in this immunity is held out by some to repudiate the idea of what some religions refer to as miracles, without realizing that doing so attributes to physical laws godlike authority. But why such veneration of physical laws, rather than acceptance of a god who might perform miracles? Science adheres to observation and reason, it is argued, whereas miracles are not observed and are contrary to reason. Ironically, this reason that trumps the possibility of an omnipotent being performing miracles unobserved not only implies the impossibility that it is self-consistent and complete, but also relies on its applicability to a world that is rational for no obvious reason.

[3] Russell, Bertrand. *Philosophical Essays*. London: Longmans, Green. 1910. Print.

Omniscience: An Obscurity

Omniscience, like omnipotence, is commonly cited in attempts to fault religious beliefs. Most frequently, it is posed as a contradiction to the concept of free will: an omniscient God, it is posited, precludes the existence of free will, or vice-versa. How can one have the freedom to make decisions if God already knows the decisions that will be made? A straightforward, if overly simple, example of a child and his father may show how foreknowledge does not necessarily preclude freedom of choice. Imagine that a child finds himself in a kitchen, wherein there are both a plate of cookies, and a plate of carrots. The father knows the kitchen and everything in it, as it is his creation; additionally, he knows his child very well, and that he both loves cookies and despises carrots. Does the father's knowledge that the child will eat some of the cookies imply that if—or when—the child does so, it is for lack of freedom of choice? Certainly not. We ourselves can very well predict the decisions we would make in given situations, yet we do not hold these predictions as indicators that we lack freedom of choice. Rather, we understand such predictions to be ordinary application of self-knowledge and probability.

If the previous example was unsatisfactory, we now move to a second attempt at reconciliation of omniscience and free will. God, by the usual definition of creator and eternal being, exists outside the human boundary of time. Therefore, removing ourselves from a chronology in which we view yet unmade decisions as being in the future, we can imagine that God, looking at our universe from the outside, can at once perceive all of our decisions over all of time. God does not have to wait for the future; he sees all of time just as easily as he sees all of space. In a third and final example, we consider the possibility that God simultaneously comprehends all possible decisions. God, in this

sense, can be seen to view the world as a level-three multiverse, or Everett multiverse, in which every possible outcome represents a branch point between different universes. To this last example scientists cannot object. If one can conceive of the existence of a universe for every possible outcome, then certainly an omniscient God can conceive every possible outcome.

Finally, to object to the quality of omniscience is, in a very serious sense, to object to the purpose of scientific inquiry. The end of science is to indefinitely expand the realm of knowledge, until, hypothetically, there remains nothing to be learned—it is not to reach the bounds of some finite limitation of knowledge. In Chapter Two, we gave mention to Hawking's attempt to find a complete theory of the universe—the so-called "theory of everything"—and his explanation of what he means by knowing the mind of God. In the same interview with El Mundo, he affirms that "in [his] opinion, there is no aspect of reality beyond the reach of the human mind."[4] This is hardly an objection to omniscience, though not all of the scientific community is in accord with Hawking. David Wolpert, a NASA researcher, has formalized a proof that for any given intellect within any universe, there always exists a quantity that cannot be known. According to an article by Scientific American:

> Wolpert proves that in any such system of universes, quantities exist that cannot be ascertained by any inference device inside the system. Thus, the "demon" hypothesized by Pierre-Simon Laplace in the early 1800s (give the demon the exact positions and velocities of every particle in the universe, and it will compute the future state of the universe) is stymied if the demon must be a part of the universe.[5]

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[4] See Jáuregui, 'Stephen Hawking: "No Hay Ningún Dios. Soy Ateo"'

[5] Collins, Graham. 'Within Any Possible Universe, No Intellect Can Ever Know It All'. *ScientificAmerican.com*. N.p., 2009. Web. 19 June 2015.

Wolpert relies on a variation of the liar's paradox, much like Austrian mathematician Kurt Gödel does in his incompleteness theorems. In both cases, the implication is that there is limit to what can be known. Even Heisenberg's famous uncertainty principal implies that a particle's precise position and momentum cannot simultaneously be known, as the uncertainties are inversely related. But Wolpert's theory makes claims only on entities within a given universe, not on any possible entities outside of it; Gödel's theorems only dispute the *provability* of truth statements within a mathematical system, not the value of the truth statements; and Heisenberg's uncertainty principle still leaves a finite bound within which the values must fall. While these all place restrictions on our ability to know something, they do not contradict the idea of knowing all possibilities, especially for observers outside the given system—and the search for a theory of everything remains alive and well in the physics community beyond just Hawking.

Equivalency: God and Mathematics?

As we have seen that scientists, in their treatment of science and especially mathematics, do not reject the "omni" properties of God, we will now make the case that the view of some equivalence between God and mathematics may be justified for the religious (specifically, Christian) and atheist scientist alike—and consequently, that atheistic scientists would appear not to reject God but the concept of religion, or personal attributes of God.

We begin first with the Bible verse Romans 1:20, which reads: "For since the creation of the world God's invisible qualities—his eternal power and divine nature—

have been clearly seen, being understood from what has been made, so that people are without excuse."[6] It is unlikely that any self-professed Christian would find fault with the biblical author's reference to "God's invisible qualities." As Christianity requires faith, according to both those who adhere to it and those who disregard it, and faith is commonly defined as belief in that which cannot be seen, the Christian has no reason to find fault with the assumption that God has invisible powers, especially ones referred to as "divine" and "eternal," which surely are words that can only be attributed to God. An atheist, professing an active disbelief in God, could not speak of divine nature without contradicting himself, nor would he have cause to believe that anything is eternal, when the meaning is understood to be without beginning or end; the universe, and consequently anything within it, from the motions of galaxies to the emotions of humans, is understood to have a beginning, and therefore cannot be described as eternal in this sense.[7] However conspicuous these truths may be, what is equally inconspicuous is how invisible qualities can be "clearly seen." Indeed, while the Christian may facilely find evidence of divinity in "what has been made," he has right to wonder how evidence of something eternal can be perceived by beings aware of not only their own temporal limitations, but those of all creation. Many philosophical objections could be given at this point, but perhaps before venturing into abstruse metaphysical reasoning, consideration should be given to how this evidence of eternal power is so "clearly seen…that people are without excuse."

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[6] *Holy Bible: New International Version*. Colorado Springs: Biblica, 2011. *BibleGateway.com*. Web. 30 June 2015.

[7] Excepting, for example, views of a cyclical universe expanding and contracting indefinitely, or other mathematical models of eternity. Acceptance of entities of indefinite past and future only supports the plausibility of an eternal God, however. See "Mathematics of Eternity"

That which is clearly seen is not some immutable fact upon which all men can agree. Whether stars appear in the sky may seem indisputable (without getting into the problem of perception), but a man who was blind from birth must take such claims on faith. Whether our beloved Earth exists seems unquestionable, but would be denied by the solipsist. In a quest for the most basic truth that may lead to a convergence of agreement amongst mankind, one may be inclined to proceed along a path of statements of increasing simplicity and generality, e.g.: The universe contains all matter. The universe contains something. Something exists. But words can be faulted for any perceived ambiguity (what does it mean to exist?). A better attempt may be demonstrated for us by Descartes, who, in his famous introspective questioning of all he considered to be true, came to the revolutionary conclusion "*cogito ergo sum*."[8] Yet some still have found cause to argue against Descartes. The best option yet may lie in the inspiration for his discourse: geometry. The relation between a line and the three angles of any triangle depends neither on meanings of words nor on rationale of thoughts (though it does matter, admittedly, whether one is within the realm of Euclidean geometry or not). The geometrical truths outlined by Euclid thousands of years ago remain as indisputably true—albeit based on certain, unproven axioms—as they were then and as they will be tomorrow, irrespectively of whether geometry was discovered or invented by man. If it was discovered, then its truth exists independently of human reasoning; if it was invented, it is nonetheless true, having been fashioned thusly. Turning from geometry in particular to mathematics in general, we can return to the question of that which is clearly seen. A mathematical statement as simple as two plus two equals four defies disputation

[8] See Descartes, *Discourse on Method*

regardless of creed[9]. This mathematical statement is as easily understood and agreed upon as can be hoped for in any quest for truth, and it takes only a series of elementary steps from this beginning to begin to comprehend that all creation is governed by mathematical laws. Furthermore, if truth pertains to God, then it is not only right but necessary to discern a relationship between God and mathematics. As English mathematician Hilda Phoebe Hudson once noted, "To all of us who hold the Christian belief that God is truth, anything that is true is a fact about God, and mathematics is a branch of theology."[10]

While it may not be justifiable biblical exegesis to imply that the writer of Romans had mathematics in mind when writing of God's clearly seen yet invisible qualities, it is not new to conceive of mathematics as having eternal and divine properties. As early as the sixth century B.C., some Greek thinkers found mathematics to be more than just utile reasoning. Writes Mario Livio in his book *Is God a Mathematician?*, to the Pythagoreans "mathematics was real, immutable, omnipresent, and more sublime than anything that could conceivably emerge from the feeble human mind…to [them]…*mathematics was God!* [emphasis in original]" Soon after the Pythagoreans, Plato formulated his idea of the world of mathematical forms where mathematical identities and truths exist separately and independently of our perceived universe. This notion, known modernly as Platonism, is both widely followed and widely debated

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[9] Excepting Dostoevsky, perhaps, who had his own thoughts: "Twice two makes four seems to me simply a piece of insolence. Twice two makes four is a pert coxcomb who stands with arms akimbo barring your path and spitting. I admit that twice two makes four is an excellent thing, but if we are to give everything its due, twice two makes five is sometimes a very charming thing too." See Dostoevsky, *Notes From Underground*

[10] Semple, J. G. 'Hilda Phoebe Hudson'. *Bulletin of the London Mathematical Society* 1.3 (1969): 357-359. Web.

amongst modern mathematicians and scientists. The question of Platonism, or whether mathematics is invented or discovered by man, is beyond the scope of this essay but does not affect the association of mathematics with the divine.[11] As Galileo would have it, mathematics is the language that describes the natural universe, and even if it is a manmade language it leaves unsatisfied the likes of Einstein, who once opined that "the eternal mystery of the world is its comprehensibility." Indeed, in a world where the question "why God?" is often raised, the question "why math?" remains unaddressed. Physicist Eugene Wigner famously published an article titled "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," in which he argues that "the enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious and that there is no rational explanation for it." The theist may easily agree with the words of Euclid, who says "the laws of nature are but the mathematical thoughts of God," but the atheist must concede with Dirac that "if there is a God, he's a great mathematician."

If one objects to the existence of God by claiming the unscientific nature of the properties discussed in this chapter, he must also call into question whether he in fact imputes these same properties to mathematics. Otherwise, he must answer whether it is possible that mathematics is, in fact, God (or treated as such). Rejecting the existence of

[11] The disparity in views is succinctly demonstrated by the following three quotes.

On Platonism: "One cannot escape the feeling that these mathematical formulas have an independent existence and an intelligence of their own, that they are wiser than we are, wiser even than their discoverers." –Heinrich Hertz. See Bell, *Men of Mathematics* 16

On a mixed view: "God made the integers, all the rest is the work of man." – Leopold Kronecker. See Gray, *Plato's Ghost* 153

Against Platonism: "Nature does not count nor do integers occur in nature. Man made them all, integers and all the rest, Kronecker to the contrary notwithstanding." –Percy William Bridgman, *The Way Things Are*

God on the grounds of finding fault with religion or a personal God, for example, would appear more defensible. Even if one argues that mathematics is not a creative or self-aware and intelligent force, and thus not akin to God, how can he explain the fact that when the universe came into being, it did so *mathematically*? To say, as Hawking does, that natural physical laws—via mathematics—explain the universe and its birth and therefore imply God is unnecessary is to say that in the beginning, there was no Logos, because in the beginning there was mathematics. Perhaps it is recognizing the two may coincide that leads Hawking to concede that although "the universe is governed by the laws of science," these same laws "may have been decreed by God, but God does not intervene to break [them]."[12] If mathematics can explain the universe and exist outside of it or even before it, why cannot God? Maybe they are, in effect, the same.

[12] Klotz, Irene. 'Hawking: Space Is Our Future'. *News.bbc.co.uk*. N.p., 2007. Web. 11 June 2015

CONCLUSION

This essay is an examination of the advent of modern scientific atheism and its claims towards a scientific rejection to the existence of God. To begin with, a history of atheism—from the ancient Charvakas in India and Epicureans in Greece, to the more recent Enlightenment thinkers and atheist scientists from the 19th century to the present—was given in order to understand the historical context of modern atheism as well as its development within the scientific community.

Following this history, the approach of scientists to the relation between science and theistic belief was examined anecdotally by presenting several cases. In Case One, scientists like Richard Dawkins and Stephen Hawking, who claim positive scientific evidence against God's existence, were presented. In Case Two, scientists who claim negative scientific evidence (or lack of evidence) for the existence of God were presented, noting that in both Case One and Case Two scientific evidence is the logical precursor to atheism. In Case Three, scientists who reach the opposite conclusion—theism—from scientific evidence were presented. These cases were followed by discussion of scientists who adhere to the NOMA view of science and religion, or who see no relation between science and theistic belief, and then reasons for the high rate of atheism among scientists were addressed. Citing a study by Elaine Ecklund, the conclusion that atheists self-select themselves into careers in science at a greater rate than their religious peers was reached, noting that greater intelligence does not appear to explain this phenomenon nor proclivity towards atheism. Further research addressing the

reasons behind pursuing scientific careers, as well as scientists' motivation for their beliefs, is desirable.

Finally, the case was made that atheists do not in fact reject the idea of God or his properties, as demonstrated by their use of mathematics in science. Omnipotence, it is seen, is ascribed to the natural laws governing the universe, as well as mathematics' ability to describe the universe. Omnipresence is seen in the application of mathematical laws to the universe independently of location, and in the permeation of fields through space-time. Omniscience is argued to be the end goal of science, and withstands certain scientific objections. Finally, in the milieu of these arguments, the plausibility of equivalence between mathematics and God was examined. An apology for such equivalence was given for both theists and atheists, and the final conclusion reached is that atheists are not justified in claiming a scientific rejection of God, inasmuch as they do not reject mathematics.

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