

## **RELIGION AND EXTRATERRESTRIALS**

### *An Astrosociological Perspective*

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In the twentieth century, questions about the existence of extraterrestrial life became firmly rooted in scientific endeavors. The formal search for extraterrestrial intelligence (SETI, 1959), early messaging projects like Eupatoria (1962) and Arecibo (1974), the discovery of exoplanets in the 1990s, and the nascent fields of astrobiology and astrochemistry all put the question of extraterrestrial life, whether tangentially or directly, into the purview of science. This was not always the case. For most of recorded history, questions about extraterrestrial life, and in particular about

extraterrestrial intelligence (ETI), were the subject of theological debate and imagination.

This article investigates if and how views of ETI are associated with religious beliefs, as well as how people think the discovery of ETI would affect religious beliefs. To this end, we analyze the results of a survey we created to explore these questions. By grounding our study in an historical context and combining cultural interpretation with social scientific research, we gain a compelling perspective that is able to both place these questions within a landscape of shifting paradigms, as well as to ascertain current trends today. This approach, we propose, can appropriately be called an astrosociological perspective.<sup>1</sup>

### **A Brief and General History of the Plurality of Worlds<sup>2</sup>**

Scholars date the first historical records of lunar observations to cave paintings made in the seventh millennium BCE and surmise that such pictographs are evidence of cosmic contemplation.<sup>3</sup> While it is a comparatively recent development to use scientific means to actively search for an answer to the question ‘Are we alone?’, the concept of other life is baked into the foundations of Western thought. In the Western tradition, the genesis of the religious debate about ETI appears to date back to at least the fourth century BCE. At the time, what has become known as the Aristotelian worldview of a static and unique Earth at the center of a finite and bounded

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<sup>1</sup> Jim Pass, in *Redefining the Definition of Astrosociology Utilizing Three Perspectives* (2010), defines astrosociology as the study of “the social, cultural, and behavioral patterns related to outer space” (p 4). We hold with this definition.

<sup>2</sup> For a much fuller discussion on the plurality of worlds see Michael Crowe’s *The Extraterrestrial Life Debate, Antiquity to 1915* (2008), Steven Dick’s *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant* (1982), and David Weintraub’s *Religions and Extraterrestrial Life: How Will We Deal With It?* (2014).

<sup>3</sup> Norriss S. Hetherington, *Encyclopedia of Cosmology: Historical, Philosophical, and Scientific Foundations of Modern Cosmology* (New York: Routledge, 2014).

universe contended against Atomist conceptions like those of Leucippus, Democritus, and Epicurus, which adopted Anaximander's infinite universe and posited a plurality of worlds.<sup>4</sup> Given the nature of infinity, at least some of these worlds were thought to be inhabited.<sup>5</sup> The physics and cosmology of Aristotle largely prevailed and laid the groundwork for Ptolemy's geocentric universe, and, though these writings were lost to Europe for nearly 1,000 years, their ideas held sway and were folded into emerging Christian doctrines and subsequent theological debate. While the Aristotelian universe was generally accepted, some medieval scholars like John Buridan (c. 1295–1358), Nicole Oresme (1325–1382), and Nicholas of Cusa (1401–1461) posited that it was within God's power to create other worlds and (at least in the understanding of Nicholas) populate them, whether or not one could reasonably believe Him to have done so.<sup>6</sup>

Similar debates on the plurality of worlds arose among Jewish<sup>7</sup> and Muslim<sup>8</sup> scholars. While Aristotle's and Ptolemy's texts were lost

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<sup>4</sup> Michael J. Crowe and Matthew F. Dowd, "The Extraterrestrial Life Debate from Antiquity to 1900," in *Astrobiology, History, and Society*, ed. Douglas Vakoch (Berlin: Springer, 2013), 3-56.

<sup>5</sup> David Weintraub, *Religions and Extraterrestrial Life: How Will We Deal With It?* (Cham: Springer International, 2014).

<sup>6</sup> Michael J. Crowe, *The Extraterrestrial Life Debate, Antiquity to 1915: A Source Book* (Notre Dame: University of Notre Dame Press, 2008); Steven J. Dick, *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant* (Cambridge, UK: Cambridge University Press, 1982).

<sup>7</sup> For example, Moses Maimonides (1135-1204 CE) wrote in his *Guide for the Perplexed*: "Consider how vast are the dimensions and how great the number of these corporeal beings ... The species of man is the least in comparison to the superior existents—I refer to the spheres and the stars. As far as comparison with the angels is concerned, there is in true reality no relation between man and them. Man is merely the most noble among the things that are subject to generation, namely, in this our nether world" (Weintraub 2014, 13).

<sup>8</sup> For example, Fakhr al-Din al-Razi (1149–1209 CE) wrote in his commentary on the Qur'an known as *The Keys to the Unknown*: "It has been proven by evidence that God, the Exalted, is capable of actualizing all possibilities ... of creating thousands and thousands of worlds beyond this world, each of which would be

to Europe, they were translated and read throughout the Arab world. During the latter half of the first millennium CE, Islamic scholars were commenting on the Aristotelian and Ptolemaic systems and attempted to reconcile the possibility and implications of multiple worlds. However, neither Islam nor Judaism had a fundamental conflict with the possibility of plurality because adherents of both understood God to be omnipotent, omnipresent, and ultimately unfathomable. Other worlds, inhabited or otherwise, would also be considered God's creations and would not affect the Earthly relationship to the divine.<sup>9</sup>

Largely due to the work of astronomers and scientists, such as Nicolaus Copernicus, Giordano Bruno, Galileo Galilei, Johannes Kepler, and Isaac Newton (many of whom were devout), heliocentrism was gradually accepted by the majority of the Western world – including, eventually, the Catholic Church. As the center of the universe moved from the Earth toward the sun, the plurality of worlds turned from debate into assumption. The question that remained was habitation. Scientific writings on the subject in the seventeenth and eighteenth centuries were often tied to theological assumptions and tended to fall into two camps: the Principle of Mediocrity and the Principle of Plenitude,<sup>10</sup> which both arrived at similar conclusions. The Principle of Mediocrity put forth the idea that Earth was not so special after all, and that other parts of the universe would be similar to what we find here. Therefore, if life existed here, it likely did elsewhere. The Principle of Plenitude posited a universe teeming with life. This position was often based

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greater and more massive than this world ... and the argument of the philosophers for the uniqueness of this world is weak and poor, being based on invalid premises" (Weintraub 2014, 165).

<sup>9</sup> Michael Ashkenazi, "Not the Sons of Adam," *Space Policy* 8, no. 4 (1992): 341-349.

<sup>10</sup> Crowe and Dowd, "The Extraterrestrial Life Debate from Antiquity to 1900," 2013.

on the claim that God values life, is all powerful, and would therefore fill the universe with living creatures. The argument did not always center on the divine; nature or other physical organizing principles were also cited as the genesis of plenitude. Among scholars and theologians, the general consensus by the end of the eighteenth century appeared to be that the other celestial bodies in our solar system, including the moon and sun, were inhabited.<sup>11</sup>

It is important, for the purpose of contextualizing our research, to draw attention to the shift that occurred in this evolving debate, from understanding the outside world through reason and scriptural argument to understanding based on observation and repeatable experiments. In this regard, it is imperative to mention Charles Darwin, whose 1859 publication of *On the Origin of Species* introduced the so-called 'dangerous' idea that life, the world, the mind (and, as some would later argue, the cosmos) do not need a designer to achieve plurality and plenitude.<sup>12</sup>

In the second half of the nineteenth century, shortly after Darwin's groundbreaking biological theory saw print, improved observational technologies, spectroscopy, and the subsequent advent of astrophysics allowed astronomers to do more than track the motion of celestial bodies. By measuring the light emitted from or reflected off of these objects, scientists could for the first time gather empirical data about their composition.<sup>13</sup> These observations validated the idea that the distant universe is made up of the same stuff as matter on Earth. Regarding extraterrestrial life, observations of the moon revealed a stark contrast between the lit and unlit portions, suggesting it had no atmosphere and therefore no air, no

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<sup>11</sup> Crowe and Dowd, "The Extraterrestrial Life Debate from Antiquity to 1900," 2013.

<sup>12</sup> Daniel C Dennett, "Darwin's Dangerous Idea," *The Sciences* 35, no. 3 (1995): 34.

<sup>13</sup> John Lankford and Rickey L. Slavings, *American astronomy: Community, careers, and power, 1859-1940*, (Chicago: University of Chicago Press, 1997).

water, and no life. Similar considerations began crossing other potential hosts off the list of possibilities. By the 1870s, scientific study and debate had rejected potential life on the sun, moon, and every planet except Mars.<sup>14</sup> Previous observations of Mars had revealed polar ice caps, what appeared to be a system of canals, and speculation of an atmosphere and even vegetation.<sup>15</sup> These observations, along with the recurrent appearance of Martians in literature, breathed a few more decades of life into the potential for ETI in our solar system. However, as the ice caps were shown to be composed of carbon dioxide instead of water, the vegetation nonexistent, and the canals a wishful interpretation, it seemed we were truly alone, at least in this neck of the woods.

Almost two decades into the twenty-first century, humans have sent spacecraft to every planet in our solar system, the largest of Jupiter's and Saturn's moons, and have even caught a close-up glimpse of Halley's Comet. While the places for extraterrestrial life to hide in our solar neighborhood are shrinking, its potential homes within our galaxy are expanding. The discoveries of a few thousand exoplanets since 1992 constitute a new phase in the search for ETI. The sheer quantity of potentially habitable planets, the documented ones being only a fraction, reignite the possibilities of life despite the unique position Earth occupies in this solar system.

### **ETI in Popular Culture**

The topic of ETI is not restricted solely to rarefied debates among theological elites or scientific experts. It is also firmly established within popular culture. The briefest of online searches reveals over 500 movies featuring extraterrestrials.<sup>16</sup> The amount of literature

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<sup>14</sup> Crowe and Dowd, "The Extraterrestrial Life Debate from Antiquity to 1900," 2013.

<sup>15</sup> Percival Lowell, *Mars* (Boston: Houghton, Mifflin and Company, 1895).

<sup>16</sup> "List of films featuring extraterrestrials," Wikipedia, accessed March 14, 2018. [https://en.wikipedia.org/wiki/List\\_of\\_films\\_featuring\\_extraterrestrials](https://en.wikipedia.org/wiki/List_of_films_featuring_extraterrestrials).

associated with or based upon alien life—articles, books, novels, comics—far outstrips this number. These contributions fall within the purview of the genre broadly known as science fiction (SF).

There is an important distinction to draw between the possibility of life and that of *intelligent* life. Likewise, there is a relevant distinction between scientific considerations and the aliens that exist among us in the form of popular stories. Anthropologists such as Klara Anna Capova point out that, although extraterrestrial life could very well be microbiological in an early stage of development, popular portrayals typically focus on ETI as technologically advanced and scientifically robust spacefaring civilizations.<sup>17</sup> We can look to popular culture's preoccupation with extraterrestrials as the projection of a society grappling with its own nature and history. Noteworthy here is that much of SF assumes biological, cultural, as well as technological evolution, and that portrayals often divide along a binary of hostile (think *War of the Worlds* or *Independence Day*) or beneficent (think *Contact* or *Arrival*). Whatever the details of SF narratives—from the extremes of nihilistic catastrophe to paradisiacal deliverance—they all transcend the *conditio humana* and thus venture into an historically religious territory, which has increasingly become the subject of the sciences and social sciences.

Though SF themes can be traced as far back as the Mesopotamian *Epic of Gilgamesh* or the Sanskrit *Rigveda*, as an accepted literary term it is less than 100 years old.<sup>18</sup> Despite its common usage, the genre evades a definition as surely as ETI evades a definitive form in our collective imagination. From Hugo Gernsback's 1926 notion of 'Scientifiction' as "a charming romance intermingled with scientific

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<sup>17</sup> Klara Anna Capova, "The detection of extraterrestrial life: Are we ready?" in *Astrobiology, History, and Society*, ed. Douglas Vakoch (Berlin: Springer, 2013), 271-281.

<sup>18</sup> Adam Roberts, *The History of Science Fiction* (London: Palgrave Macmillan, 2016).

fact and prophetic vision”<sup>19</sup> to J. O. Bailey’s 1947 assertion that it must be “something that the author at least rationalizes as possible to science”<sup>20</sup> to Darko Suvin’s description of the “literature of cognitive estrangement”<sup>21</sup> and Norman Spinrad’s more pragmatic take, “science fiction is anything published as science fiction”<sup>22</sup> – the existence of SF is clear, though what exactly it is remains debatable. In *The History of Science Fiction*, Adam Roberts examines “the cultural and historical circumstances of the genre’s birth: the Protestant Reformation, and a cultural dialectic between ‘Protestant’ rationalist post-Copernican science on the one hand, and ‘Catholic’ theology, magic and mysticism, on the other.”<sup>23</sup> Through such a lens, we can view the genre, and therefore its treatment of ETI, as arising from the same source as the theological debate about the plurality of worlds and questions of mediocrity and plenitude.

Taking Roberts’s theory of the origin of the SF genre and holding it alongside the epistemic shifts of the 1800s, we can perceive the debate about ETI as driven by, and as an embodiment of, science, technology, and rationalism. Through such a lens, we can re-imagine the conversation between religion and scientific research on ETI as a conversation between paradigmatic ways of knowing as embodied by scientific and religious thinking. This perspective greatly benefits from Constance Bertka’s classification of dispositions (‘integration,’ ‘conflict,’ and ‘independence’) toward the relationship between science and religion.<sup>24</sup> ‘Integration’ assumes people’s willingness and

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<sup>19</sup> Hugo Gernsback, “A New Sort of Magazine,” *Amazing Stories* 1 (1926): 3.

<sup>20</sup> J. O. Bailey, *Pilgrims Through Space and Time: A History and Analysis of Scientific Fiction* (New York: Argus Books, 1947), 10.

<sup>21</sup> Darko Suvin, “The SF Novel in 1969,” in *Nebula Award Stories "Five"* ed. James Blish, (New York: Doubleday, 1970), 158.

<sup>22</sup> Quoted in John Clute and Peter Nicholls, *The Encyclopedia of Science Fiction* (London: Orbit, 1993), 311-314.

<sup>23</sup> Roberts 2016, 3.

<sup>24</sup> Constance M. Bertka, “Christianity’s Response to the Discovery of Extraterrestrial Intelligent Life,” in *Astrobiology, History, and Society*, ed. Douglas



ability to accommodate their religious commitments and traditions with the implications of ETI. Conversely, ‘conflict’ assumes that religion and science make claims about the same subject from mutually exclusive axioms and are therefore irreconcilable. ‘Independence’ sees religion and science as focusing on different subjects: “science tells us how, religion tells us why, and therefore they cannot be in conflict.”<sup>25</sup> By applying Bertka’s tripartite theorization, we will thus be able to view our participants’ opinions about the effects of ETI on religion as projected social dispositions toward the wider relationship between scientific and religious thinking. In light of the data material generated in our survey, we propose a dichotomous division of Bertka’s tripartite scheme. The main difference we can empirically ascertain is seen between ‘independence’ and ‘engagement’ (which encompasses ‘conflict’ and ‘integration’); or, in other words, ETI will not affect religious belief or it will. In the discussion, we will speculate about the possible disentanglement of ‘engagement’ and the application of its two subtypes, ‘conflict’ and ‘integration.’

In the twentieth and twenty-first centuries, speculations about the existence of ETI became firmly rooted in popular culture and can thus be understood as expressions of collective storytelling, cultural biases, and different epistemological dispositions. These speculations have grown alongside the scientific establishment’s inquiry and debate. Government agencies have joined the investigation, though with an air of secrecy, as was recently reported by the *New York Times*.<sup>26</sup> Theologians still debate the question of religion and ETI, as they have done throughout the centuries. Yet,

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Vakoch (Berlin: Springer, 2013), 329-340.

<sup>25</sup> Bertka 2013, 34.

<sup>26</sup> Helene Cooper, Ralph Blumenthal, and Leslie Kean, “Glowing Auras and ‘Black Money’: The Pentagon’s Mysterious U.F.O. Program,” *The New York Times* (December 16, 2017), <https://www.nytimes.com/2017/12/16/us/politics/pentagon-program-ufo-harry-reid.html>.

their debate has now become reactive to current research in astronomy. What drives the contemporary discourse is the possibility of the scientific detection of ETI, and theologians who participate see themselves called upon to prepare for this possibility becoming a scientific reality. A central question in the theological discussion has revolved around the effects that a potential discovery of ETI would have on religion, mirroring the debates that arose about four centuries ago in the wake of the heliocentric theory.

Whereas doctrine, tradition, and holy texts are central to theological reasoning about the challenge posed by potential scientific discoveries of ETI, an important contribution to the overall debate can also be made by the social sciences. Using survey methods, researchers can find out what kinds of people (believers in different faiths or none) actually think about the relationship between religion and ETI. These beliefs might be quite different from theologians' normative reasoning about what one ought to think about the issue. Nonetheless, they would crucially shape societal reaction in case of ETI discovery or contact and, for that reason, are important to account for in theological debates.

### **Previous Surveys**

Past polls have indicated that nearly half of Americans believe that ETI exists.<sup>27</sup> The Brookings Report, a 1960 report commissioned by NASA on policy issues related to space exploration, concluded, in a subsection titled "The implications of a discovery of extraterrestrial life," that contact with ETI could disrupt human societies and that individuals' reactions to ETI would depend

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<sup>27</sup> Douglas Main, "Two Numbers: Americans are nearly as likely to believe in Intelligent Aliens as they are in Evolution," *Newsweek* (October, 7, 2015) <http://www.newsweek.com/2015/10/16/two-numbers-americans-are-nearly-likely-believe-aliens-they-are-evolution-380639.html>; Jeff Levin, "Revisiting the Alexander UFO Religious Crisis Survey: Is There Really a Crisis?" *Journal of Scientific Exploration* 26, no. 2 (2011): 273-284; 275.

in part on their religious background and environment.<sup>28</sup> Scientists have since weighed in, predicting that such contact would be devastating to Earthly religions.<sup>29</sup> Several studies have examined this assumption by surveying opinions regarding the impact of the discovery of ETI on religious belief.

In 1992, Michael Ashkenazi conducted 21 interviews with theologians and practicing officiants of the three Abrahamic religions (Judaism, Christianity, and Islam). While noting that his sample size was small, Ashkenazi reported that none of the interviewees felt that contact with ETI would affect their own or their congregation's belief or practice. Ashkenazi went on to flip the argument from the Brookings Report by hypothesizing that religious impact on Earth would depend largely on whether ETI had religion and, if so, what its nature would be.<sup>30</sup>

The Alexander UFO Religious Crisis Survey (AUFORCS) was a mail survey of clergy conducted in 1994 that gathered 230 responses from Catholic, Protestant, and Jewish congregations in the U.S. Alexander reported that minister and rabbi respondents did not feel that their faith or that of their congregation would be threatened by the existence of ETI. This was in contrast to the 'conventional wisdom' that religion would face an insurmountable crisis.<sup>31</sup> In revisiting AUFORCS, Jeff Levin concluded that "such a crisis may

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<sup>28</sup> Donald N Michael, *Proposed studies on the implications of peaceful space activities for human affairs* (Washington D.C.: Brookings Institution, 1960).

<sup>29</sup> Jill Cornell Tarter, "SETI and the religions of the universe," *Many Worlds: The New Universe, Extraterrestrial Life and the Theological Implications*, ed. Steven K. Dick (Philadelphia, PA: Templeton Foundation Press, 2000): 143-149; Paul Davies, *Are we alone?: philosophical implications of the discovery of extraterrestrial life* (Harmondsworth: Penguin, 1995).

<sup>30</sup> Ashkenazi, "Not the Sons of Adam," 1992.

<sup>31</sup> Victoria Alexander, *The Alexander UFO Religious Crisis Survey* (Las Vegas, NV: The Bigelow Foundation, 1994).

be primarily in the minds of those less familiar with or engaged in religion.”<sup>32</sup>

Another important, though less directly relevant, survey was conducted by Douglas Vakoch and Yuh-shiow Lee in 2000. Vakoch and Lee constructed a psychometric instrument to assess six different beliefs in American and Chinese undergraduates: 1) the existence of ETI, 2) ETI would be benevolent, 3) ETI would be malevolent, 4) contact with ETI would have religious significance, 5) discovery of ETI would be unsettling, and 6) experts should design replies to ETI messages. Vakoch and Lee found that Chinese and American students who were more religious were less likely to believe in the existence of ETI, whereas more religious Americans were also more likely to believe ETI would have hostile intentions.<sup>33</sup> Because strength of religious conviction appears relevant, we included this factor in our examination of the anticipated impact of ETI on personal belief, personal tradition, and religion as a whole.

In 2002, the Sci Fi Channel commissioned a Roper Poll to conduct phone interviews with 1,021 random Americans regarding their beliefs about extraterrestrials. Though the poll asked questions ranging from UFO sightings to the amount of information the government shares with the public, it also found that 88% of respondents said that the discovery of ETI would have no impact on their religious beliefs. This response was shown to correlate directly with age; the older the respondents, the less likely ETI was reported to impact their beliefs.<sup>34</sup>

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<sup>32</sup> Jeff Levin, “Revisiting the Alexander UFO Religious Crisis Survey: Is There Really a Crisis?” 282.

<sup>33</sup> Douglas Vakoch and Yuh-shiow Lee, “Reactions to Receipt of a Message from Extraterrestrial Intelligence: A Cross-Cultural Empirical Study,” *Acta Aeronotica* 46, no. 10-12 (2000): 737-744.

<sup>34</sup> Roper, *UFOs & Extraterrestrial Life: Americans' Beliefs and Personal Experiences* (2002) Retrieved from <http://web.archive.org/web/20090524145857/http://www.scifi.com/ufo/roper/>.

The Peters ETI Religious Crisis Survey is, to our knowledge, the most extensive and focused survey to date. Peters and Froehlig received 1,325 total responses from persons belonging to ten different religious groups as well as from those identifying as non-religious. The survey specifically addressed the impact ETI would have on religious belief as well as the participants' tacit and overt beliefs about the nature of ETI. While the Peters Survey corroborated the previous assessments that people did not imagine that their own beliefs, nor those of their congregation or tradition, would face a crisis, Peters and Froehlig reported that nearly 70% of respondents who identified as 'non-religious' agreed that "... contact with extraterrestrials would so undercut traditional beliefs, that the world's religions would face a crisis."<sup>35</sup>

Whereas the Peters Survey covered a wider range of religious affiliation than Ashkenazi or the AUFORCS, the Roper Poll did not include religion as a factor. We attempted to cover as wide of a religious range as Peters and also added a factor of self-identified strength of belief that was missing from most previous surveys. While these instruments used the language of 'problem' or 'crisis' to describe potential impact on belief, we kept the language neutral to see if, and how, this would affect responses. Our instrument also looked for connections between denominational belief, strength of belief, and a judgment of ETI as helpful and/or hostile. Lastly, while demographic factors of age, sex, education, race, and geographic location were incorporated into the Roper Poll, these factors were either not included or remained unanalyzed in the other surveys. We included these factors, excepting geographic location. We also used a statistical approach that simultaneously controlled for the variety

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<sup>35</sup> Ted Peters and Julie Froehlig, *Peters ETI religious crisis survey* (2008): 12. Retrieved from <http://www.counterbalance.org/etsurv/PetersETISurveyRep.pdf>.

of background factors, so as to obtain a clearer view on the effects of religion.

### **Data and Methods**

Our survey was created on, and distributed through, Google Forms. Due to limited time and funding, we collected a convenience sample using the snowball technique, with the goal of maximizing the number of participants and statistical power. Over a three-week period in early 2018, we emailed friends and colleagues around the U.S., asking them to participate and to forward the survey to others. Through the use of social media, the survey was distributed beyond our social and professional networks. While about 60 personal emails were sent out, we received 762 total responses, which we culled to 747 by eliminating duplicates and blanks. Because of our method of collection, it is important to note that our sample is not representative of any particular social population or geographic location. Nonetheless, convenience samples are typically used at the inception of a new research field (such as the study of the relationship between religion and ETI) because they are able to generate hypotheses that can be followed up in larger, and more expensive, representative studies. In addition, whereas the sample distribution of characteristics may be indeed be atypical, our multivariate statistical analysis focuses not on distributions, but on higher-order correlations for which bias is at least less likely.

We asked 14 questions, eight of which inquired about the respondents' opinions on ETI; two, about the independent variables of interest, religion and strength of belief; and four, about the control variables of age, gender, race, and education. The opinion questions as well as the 'strength of belief' question were answered on anchored 6-point scales. We chose neutral wordings for the questions about how one's personal religious beliefs, one's religious tradition, and religion in general might be affected by the discovery

of ETI (taking into account the potential perception of positive effects).

We initially divided religious affiliation into 11 groups: Agnostic, Atheist, Buddhist, Catholic, Hindu, Jewish, Muslim, Orthodox Christian, Protestant: Evangelical, Protestant: Mainline, and Other. Owing to low response numbers, we excluded the few responses we received from self-identified Hindus and Muslims, as well as 37 respondents who left the religion question blank. To increase statistical power, we combined the four Christian denominations under a larger category of ‘Christian’ and added 26 respondents who had identified as Christians using the category of Other. The Other category included 24 respondents who self-identified as ‘Spiritual,’ as well as deists, Unitarians, Taoists, wiccans, 14 self-identified pagans, and more. Table 1 shows the number of respondents for each category after this initial sorting process.

**Table 1: Sample composition by belief group**

<b>Belief Group</b>	<b>Respondents</b>
Agnostic	154
Atheist	119
Buddhist	26
Christian	241
Jewish	37
Other	128

The participants’ ages spanned seven decades, from 13 to 86, with a mean age of 43. Age was treated as a linear continuous variable. Females accounted for 58.8% of respondents; males, 40.1%; and 1.1% self-identified as other (who were dropped from the analysis, owing to low numbers). 88.7% of participants identified as White or Caucasian; hence, in our statistical analysis, we collapsed the

categories into a dummy variable of White versus non-White. The mean response for strength of religious belief was 4.1 (within the 1 to 6 scoring range). In terms of education, 7.0% of respondents had not received a high school diploma; 10.4% had a high school diploma or GED; 31.0% attended some college or received an Associate degree; 26.1% had a bachelor's; and 25.5%, a graduate degree. The educational levels were coded from zero to four and treated as a linear continuous variable.

We carried out a multivariate analysis of variance for each ETI opinion item, predicting it from religion, strength of belief, and the controls. In addition to estimating main effects models, we checked for potential interaction effects between religion and the other independent variables. In all cases, we followed the stricter  $p < 0.01$  standard for significance (instead of the conventional  $p < 0.05$  standard) to guard against false positives. Occasionally, a control variable was statistically significant. We report all significant findings; however, to streamline the results section, we forgo results tables and show the main effects of religion in the form of bar graphs. Tukey post-hoc tests were used to determine statistically significant differences between religions. To graph significant interaction effects, we used a prototypical respondent (a 43-year-old white woman who was about halfway between 'some college' and a Bachelor's degree) in order to calculate regression lines for two religions displaying great difference for a given item. In all cases, error bars in main effects models indicate one standard error, while bands surrounding regression lines of interaction models indicate 95% confidence intervals.

## **Results**

In four of the eight ETI opinion questions, a main effect of religion was detected. Moreover, four interactions of religion with other independent variables (mostly strength of belief) were found

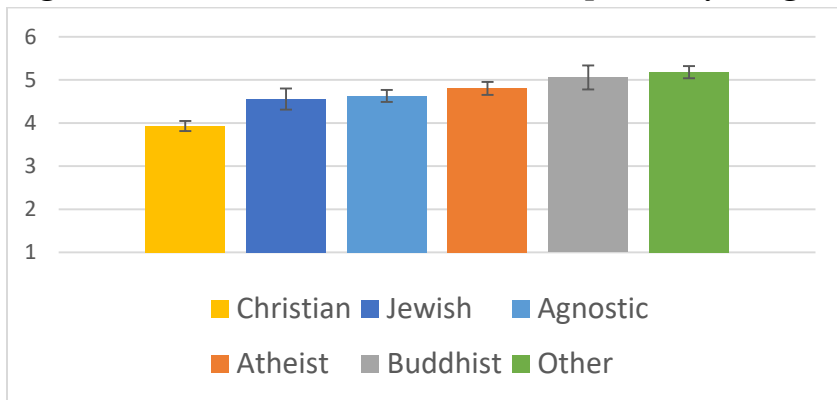


in three of the remaining four questions. In the following, the results of our main effects and interaction models are presented for each of the questions.

**Question 1: In your opinion, what is the likelihood that extraterrestrial intelligent life exists?**

On the rating scale used, 1 represented ‘There is no chance that extraterrestrial intelligent life exists,’ and 6 represented ‘Extraterrestrial intelligent life definitely exists.’ We found religion ( $p < 0.0001$ ) and race ( $p = 0.0034$ ) to be significant main effects, with the estimated effect of Whiteness being 0.52. There were no significant interaction effects. In Figure 2, three distinct tiers of religious beliefs are differentiated, with Christians being least likely to believe in the existence of ETI and Others being the most likely. Jews, Agnostics, and Atheists constituted a third, statistically inseparable, bloc in between.

**Figure 2: Question 1 Estimated Mean Responses by Religion**

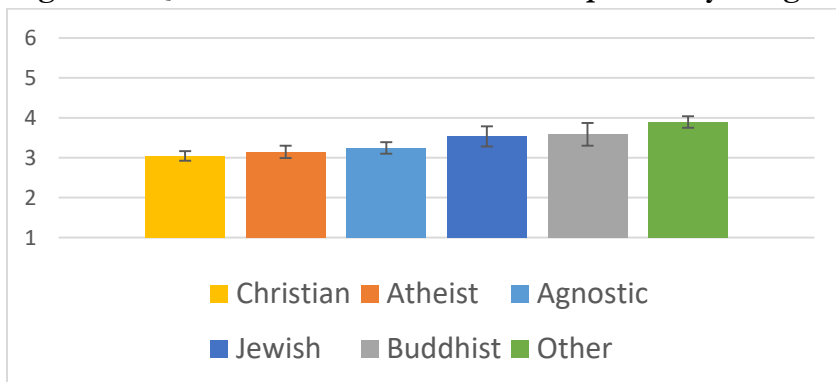


(N = 653)

**Question 2: How likely is it that, within the next 50 years, human beings will learn of one or more extraterrestrial civilizations?**

The rating scale went from 1 ‘There is no chance that we will learn of extraterrestrial civilizations within the next 50 years’ to 6 ‘We will definitely learn of extraterrestrial civilizations within the next 50 years.’ We found statistically significant main effects to be religion ( $p < 0.0001$ ), age ( $p = 0.0001$ ), and education ( $p = 0.0032$ ), with no significant interaction effects. The effect of age (0.013) indicates that the older one gets, the more likely one is to think that humans will learn of extraterrestrial civilizations in the next 50 years. This result differs from that of the earlier Roper Poll. Education had a negative effect (-0.144); the more educated the respondents, the less likely they were to believe in ETI discovery within the next 50 years. Figure 3 shows that Christians have the lowest mean on this item; Others, the highest. Christians are statistically distinct from Jews, Buddhists, and Others; Christians and Atheists are distinct from Buddhists and Others; and Christians, Atheists, and Agnostics are distinct from Others.

**Figure 3: Question 2 Estimated Mean Responses by Religion**



(N = 652)

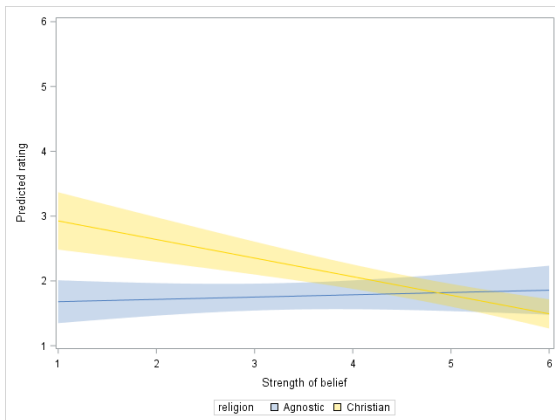
**Question 3: To what extent would the discovery of a civilization of intelligent beings living on another planet affect your personal beliefs about religion?**

The responses ranged from 1 ‘My beliefs would not be affected at all’ to 6 ‘My beliefs would be dramatically affected.’ While strength of belief had a significant negative coefficient ( $-0.10$ ) in the main effects model ( $p = 0.0009$ ), there were significant interaction effects between religion and strength of belief ( $p = 0.0016$ ) and between religion and education ( $p = 0.0031$ ).

Figure 4 shows that, as strength of belief increases, Agnostic respondents are slightly more likely to think that their personal beliefs would be affected. By contrast, Christian respondents are less likely to think that their personal beliefs about religion would be affected as strength of belief increases.

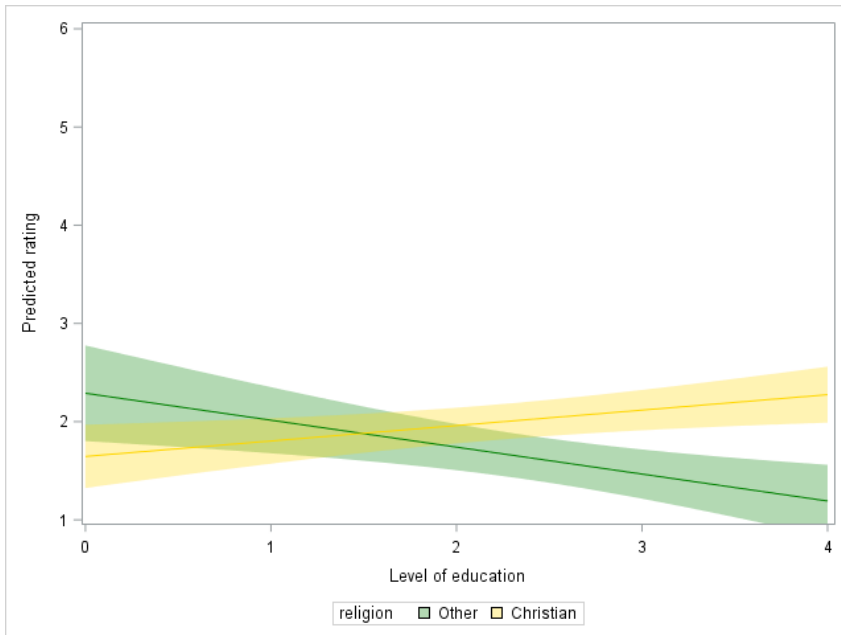
Looking at Figure 5, we see that the more educated the Christian respondents, the more likely they think that their personal beliefs about religion would be affected. The category of Other showed an opposite trend; the more educated the respondents, the weaker their opinion, on average, that their personal beliefs would be affected.

**Figure 4: Question 3 Interaction between Religion and Strength of Belief**



(Graph constructed using a prototypical respondent. Y-axis shows predicted answers to Question 3 based on the interaction effect between religion and strength of belief.)

**Figure 5: Question 3 Interaction between Religion and Level of Education**



(Graph constructed using a prototypical respondent. Y-axis shows predicted answers to Question 3 based on the interaction effect between religion and level of education.)

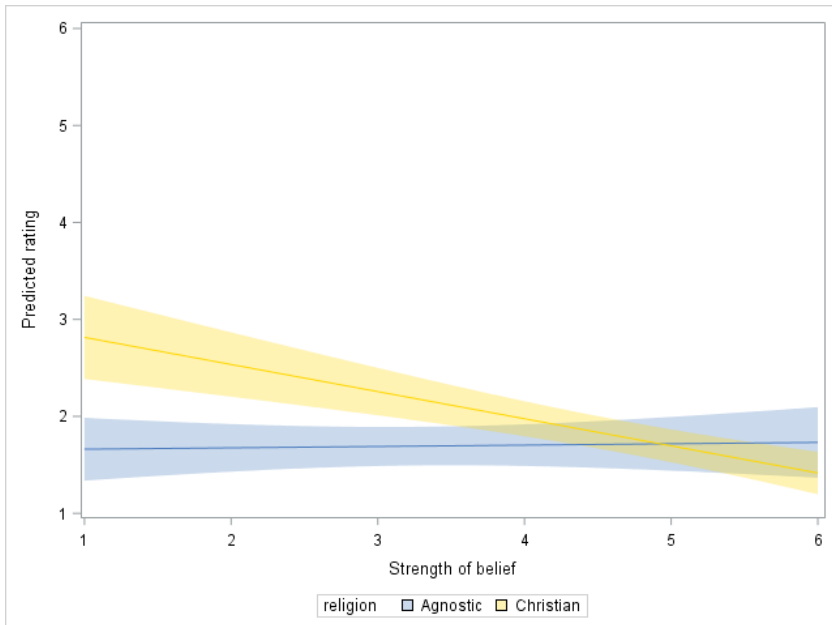
**Question 4: To what extent would the discovery of a civilization of intelligent beings living on another planet affect your particular religious (or non-religious) tradition as a whole?**

Respondents were asked to choose an answer from 1 to 6, with 1 representing ‘My tradition would not be affected at all’ and 6 representing ‘My tradition would be dramatically affected.’ Significant main effects were age ( $p = 0.0002$ ), strength of belief ( $p = 0.0049$ ), and education ( $p = 0.006$ ). Age and strength of belief had small negative coefficients ( $-0.01$  and  $-0.08$  respectively), while education had a positive one ( $0.11$ ). As with Question 3, the

interaction effect between religion and strength of belief was significant ( $p = 0.0017$ ).

In Figure 6, we see the different estimated effect that strength of belief has on Agnostic and Christian respondents. As strength of belief increases, Agnostics are slightly more likely to think their tradition would be affected, whereas Christians are less likely to think their tradition would be affected. This interaction is similar to that of Question 3 (Figure 4).

**Figure 6: Question 4 Interaction between Religion and Strength of Belief**



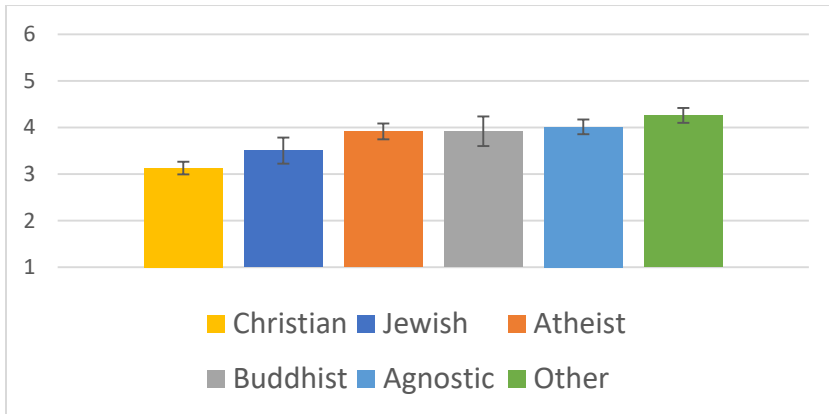
(Graph constructed using a prototypical respondent. Y-axis shows predicted answers to Question 4 based on the interaction effect between religion and strength of belief.)

**Question 5: To what extent would the discovery of a civilization of intelligent beings living on another planet affect religion in general?**

Here, the participants used a rating scale where 1 represented 'Religion in general would not be affected at all' and 6 stood for 'Religion in general would be dramatically affected.' Significant main effects were religion ( $p < 0.0001$ ), age ( $p = 0.0002$ ), and education ( $p = 0.0031$ ). Age had a small negative coefficient (-0.015), and education, a positive coefficient (0.16).

Figure 7 shows that Christian respondents as a group were statistically distinct from all other groups, excepting Jews, in thinking that religion in general would be affected less dramatically. On the opposite end, the category of Other was distinct from Christians, Jews, and Atheists in their belief that religion in general would be more dramatically affected by the discovery of an ETI civilization.

**Figure 7: Question 5 Estimated Mean Responses by Religion**

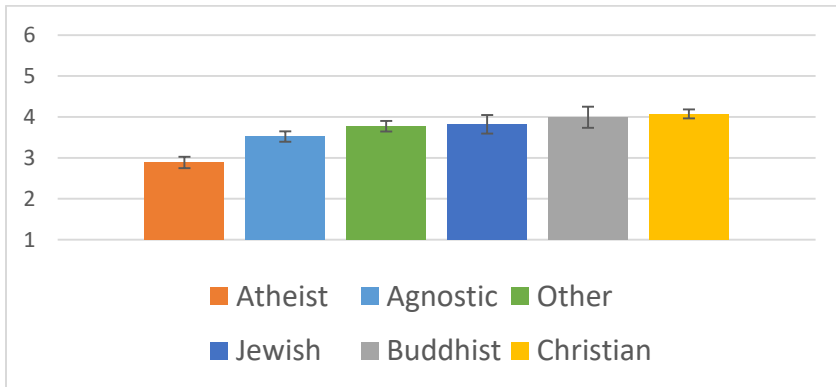


(N=651)

**Question 6: If an extraterrestrial intelligent civilization were discovered, what is the likelihood that its members would have religious beliefs?**

On this question, the ratings ranged from 1 meaning ‘There is no chance they would have religious beliefs’ to 6 representing ‘They would definitely have religious beliefs.’ Significant main effects were religion ( $p < 0.0001$ ) and strength of belief ( $p = 0.007$ ), though the coefficient for strength of belief was small (0.085). Figure 8 depicts a significant difference between Atheist respondents, who had the lowest average ratings on this question, and all other religious categories, as well as a distinction between Christian respondents and the categories of Other, Agnostic, and Atheist.

**Figure 8: Question 6 Estimated Mean Responses by Religion**



(N = 653)

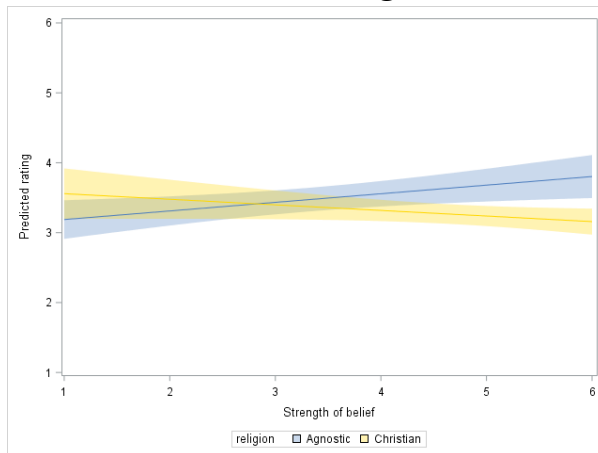
**Question 7: If an extraterrestrial intelligent civilization were discovered, what is the likelihood that its members would help human beings?**

The scale ranged from 1 standing for ‘There is no chance that they would help humans’ and 6 representing ‘They would definitely help humans.’ Age was the only significant effect found ( $p = 0.0014$ ), with a very small effect size (the coefficient was 0.009).

**Question 8: If an extraterrestrial intelligent civilization were discovered, what is the likelihood that its members would be hostile toward human beings?**

On the final ETI opinion item, the participants gave ratings on a scale from 1 representing ‘There is no chance they would be hostile to humans’ to 6 meaning ‘They would definitely be hostile to humans.’ Similar to Question 7, age was a significant main effect ( $p = 0.0026$ ), though, as one might expect, a slight negative one ( $-0.0072$ ). We also found an interaction effect between religion and strength of belief. Figure 9 displays this interaction by contrasting Christian and Agnostic respondents. The stronger the personal belief, the less likely Christian respondents were to think that ETI would be hostile toward humans, but the more likely Agnostic respondents were to believe this would be the case.

**Figure 9: Question 8 Interaction between Religion and Strength of Belief**



(Graph constructed using a prototypical respondent. Y-axis shows predicted answers to Question 8 based on the interaction effect between religion and strength of belief.)

## Discussion

When considering the responses to the eight ETI opinion questions together, we find that religion is an important variable



affecting participants' views on ETI. In half of the questions, religion was a significant main effect explaining the greatest variation in response. In three of the remaining four questions, religion interacted with strength of belief three times and, additionally, once with education. None of the control variables came close to that showing. Age, which, among the control variables, was most frequently found significant, had small effect sizes. The largest age coefficient,  $|-0.015|$ , amounts to only 0.9% of the standard deviation of the dependent variable; and a standard deviation change in age corresponds to 15.2% of the standard deviation of the dependent variable. Other predictors showed up only infrequently as significant main effects. Religion thus proved to be a much more relevant predictor of ETI beliefs than did the control variables.

The question of how religion affects views on ETI has a less clear answer and allows for a number of interpretations. Looking at the results for religion in the four main effects models where religion was significant (Questions 1, 2, 5, 6), we see that Christian respondents always occupy an extreme position; they are either the least likely or most likely to believe. In three cases, Other respondents are at the high extreme of the line-up of our religious groupings, with Christians at the low end. On Question 6, where Christians are at the high end, the bottom end is occupied by Atheists.

From an astrosociological perspective, we are particularly interested in what beliefs and/or dispositions are represented by the categories of Atheist and Other. It may be useful to view the distinction between Christians, Atheists, and Others, as it appeared in this sample, through the lens of 'conflict,' 'independence,' and 'integration' derived from Bertka's theory.

Bertka notes that ‘independence’ is the common approach in mainstream Christian communities.<sup>36</sup> Such a mentality could explain the statistically distinct Christian mean response to the effect of ETI discovery on religion in general (Question 5), because, from an ‘independence’ perspective, religion and science ask different questions, and, therefore, scientific discovery does not threaten religion in general. From such a perspective, even if ETI stands in for scientific or technological advancement, contact with ETI would have little or no bearing on religion.

The group of Other appears to be on the engagement side of Bertka's scheme, and, more specifically, in the ‘integration’ sub-category. While a few of the self-identified Other respondents cited organized religions, such as Unitarian Universalism and Taoism, the majority avoided denominational categorization and chose descriptors like ‘Complicated,’ ‘Humanist,’ ‘Mystical,’ ‘Open,’ and ‘Spiritual.’ It may be possible to view this rejection of the offered categories, in the context of a survey about ETI and religion, as a rejection of a perceived binary between religion and science (as represented by ETI). This could be interpreted as an ‘integration’ stance, in which science and ETI are both accepted as integral to one's belief structures. Eight self-categorized Other respondents cited knowledge of, or interactions with, ETI, more than all other categories combined. An interpretation of ‘integration’ could explain Other respondents’ statistically distinct and highest mean regarding the existence of ETI, their discovery within the next 50 years, and even the effect of ETI on religion in general.

Atheist results can also be viewed through the lens of ‘engagement,’ though more on the ‘conflict’ than on the ‘integration’ side. If we understand atheism to mean a disbelief or lack of belief in a higher power or deity, and we understand religion to involve this

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<sup>36</sup> Bertka 2013, 334.

type of belief, then the Atheists' mean score in Question 6 (which asks about the possibility for ETI to have religion) takes on potential significance. If we view the response as a projection of personal beliefs, then the Atheist respondents' statistically distinct position makes sense: They do not have a belief in a higher power, do not have a religion as defined by such, and, therefore, they may be prone to conclude, neither would ETI. In the Atheists' minds, religion may be characteristic of humanity's immature developmental stage, and a more advanced ETI might have left that stage long behind, if they had ever gone through it. This idea can be glimpsed in some Atheists' open-ended responses at the end of our survey: "Most likely an alien intelligence would be many thousands of years beyond us," and "... everything would depend on ... what their beliefs are and if they have scientific proofs as backbones to their belief systems." In this view, Atheists' low belief in ETI having religion may reflect an assumption of 'conflict' between science and religion.

In comparison with Peters's survey, our sample size was smaller, and we were therefore unable to represent the nuance of a larger group of different denominations. Replicating a finding in Peters's study, our sample showed a distinction, across all belief groups, between the predicted effects the discovery of ETI would have on the participants' personal beliefs and traditions and the predicted effects on religion in general. However, by looking at mean responses about the effects on religion in general in multivariate models that control for various background characteristics (instead of percentages of agree/disagree/neither-agree-nor-disagree responses in Peters's survey), we found Atheist and Agnostic mean responses on this question to be statistically indistinguishable from Buddhist, Jewish, and Other respondents. While the Christian estimated mean response was indeed statistically separate and lower, all group means, with the exception of Other, fell between 3 and 4 and surrounded the center of our response range. This seems to

complicate Peters's finding that "non-religious persons are much more likely to deem religion fragile and crisis prone than [sic] those who hold religious beliefs."<sup>37</sup>

Taken together, the results for Questions 3, 4, and 5 show that across religions, the effect of discovering ETI was estimated to be larger for religions in general than for one's own religious beliefs and religious tradition. This may be caused by a different mode of thinking when one's own religion is involved, as opposed to reasoning about religion in general. If religious belief is an integral part of a person's identity, it may be very robust vis-à-vis disturbances or new facts, such as the discovery of ETI. People may tend to keep their religious beliefs intact even in the face of possible contradictions and problems of doctrine, thereby avoiding potential cognitive dissonance<sup>38</sup> that could be generated by reasoning through the consequences of ETI discovery for their religion. By contrast, when personal identity is not at stake, as in considering the impact of discovering ETI on "religion in general," a more detached and rational stance toward doctrinal or societal repercussions appears easier to adopt. The second case revolves around reason, whereas the first case is more likely to be driven by self-preservation. The mentioned interactions on Questions 3 and 4 show that Christian respondents with great strength of belief are particularly apt to insulate their religious belief from potential effects of ETI discovery.

Vakoch and Lee found that the more religious Americans were less likely to believe in ETI and more likely to believe that ETI would be hostile.<sup>39</sup> In their survey, they used psychometrics to create a category of religiosity based on Genia's nine-item scale of Intrinsic

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<sup>37</sup> Peters 2008, 13.

<sup>38</sup> Leon Festinger, *A Theory of Cognitive Dissonance* (Stanford, CA: Stanford University Press, 1957).

<sup>39</sup> Vakoch & Lee, *Reactions to Receipt of a Message from Extraterrestrial Intelligence: A Cross-Cultural Empirical Study*, 2000.

Religiosity.<sup>40</sup> In contrast, our survey used self-reporting to measure what we call ‘strength of belief.’ It may be that these constructs measure different relations; however, it is worth noting that our survey did not find strength of belief to be a significant effect on respondents’ belief in ETI. Strength of belief did impact the belief that ETI would be hostile, but only in interaction with religion, as reported above.

Regarding the two questions about the helpful or hostile nature of ETI, the consistent result across all respondents was that of simply not knowing. In the main effects models, every religious group’s mean was right in the middle of the scale, between 3 and 4, and most individual responses were also bunched there (which also manifests itself in these two questions having the two smallest standard deviations of the eight ETI opinion questions). Considering this finding through the lens of popular narratives about ETI, we can interpret the results as indicating that, while stories run the gamut from destruction to salvation, there is no one accepted collective narrative. We can also view this finding as a rejection of the helpful/hostile dichotomy, as uncertainty due to a lack of information, and/or as requiring greater nuance and complexity in categorizing an entire civilization. If we understand these interpretations as projections of humanity onto ETI, we can consider that the jury is still out regarding our own intra-species intentions toward one another. If such an interpretation holds, a question arises about when and how a different and more homogeneous collective narrative might emerge. While this question is not in the scope of our survey, it again opens a possible application for research about ETI and its use for Earthly relations.

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<sup>40</sup> Vicky Genia, “A psychometric evaluation of the Allport-Ross I/E Scales in a religiously heterogeneous sample,” *Journal for the Scientific Study of Religion* 32 (1993): 284-290.

## **Conclusion**

Our study suggests that religion, and interaction between religion and strength of belief, are significant factors contributing to people's opinions about the existence and nature of ETI and about the effects of discovery upon belief systems. Other background factors—age, educational level, gender, and race—make much less of a difference. There were a number of limitations to this study, ranging from the reliance on social networks for sampling to the underrepresentation of certain religious denominations and non-White respondents. It is hoped that these findings and the interpretive lenses through which we viewed them stimulate further in-depth studies, analysis, and discussion with larger, more representative samples, more detailed questionnaires, or qualitative interviews.

The center of the current conversation around potential contact or discovery scenarios has shifted from a theological discussion to a primarily scientific one. When considering the effects of ETI on religion, theologians today are reacting to scientific discoveries from fields like astronomy and astrophysics. In this article, we hoped to show that it may be useful for theologians to integrate an additional scientific input into their discourse about ETI—an input from *social science*. This is because the scientific discoveries are also absorbed and metabolized into popular culture through narratives that open avenues for interpreting and understanding the beliefs held by people of various religious convictions. Here, social sciences can make a significant contribution by offering insight into social understandings and beliefs as they exist in the population. Thus, by combining the methodological arsenal of empirical social science research with historical and cultural interpretive lenses, astrosociology is poised to make a fruitful contribution to the debate about the relationship between ETI and religion.

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