

## Article

# Religion, Science, and Space Exploration from a Non-Western Perspective

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**Abstract:** Religion and science are often set up as polar opposites in Western philosophical and religious discourse and seen as representing different epistemological perspectives that juxtapose rationality with faith. Space exploration is largely viewed as a scientific and engineering problem and, thus, has tended to set aside the issue of religion as it relates to human movement off-planet. However, as we have moved increasingly toward the idea of colonization of the Moon and Mars, social scientists and philosophers have increasingly come to recognize that human movement into space also needs to be understood as a social phenomenon. As a social phenomenon, there is an inherent necessity to consider how religion may play a role in or influence the process of human exploration and settlement of space. However, what do we mean when we say “religion?” One of the fundamental problems of thinking about the relationship between religion, science, and space exploration is that the meaning of the word *religion* is rarely well-defined. Do we mean faith-based religions such as Christianity or Islam? Or do we mean practice-based religions such as Shinto and some forms of Buddhism? This paper will explore the question of religion and science from the perspective of Japanese religions as a way of problematizing the manner in which we think about and define religion as it relates to the practice of space exploration.

**Keywords:** Japanese Buddhism; non-western religions; space exploration; science

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*The uncertainty that is necessary in order to appreciate nature is not easily correlated with the feeling of certainty of faith which is usually associated with deep religious belief.* Richard P. Feynman (Feynman 2015)

*Of course, secularists are desperate to find life in outer space, as they believe that would provide evidence that life can evolve in different locations and given the supposed right conditions! The search for extraterrestrial life is really driven by man's rebellion against God in a desperate attempt to supposedly prove evolution!* Ken Ham (Ham 2014)

The tone of incompatibility between science and religion lurking in the above quotations may seem unsurprising in the context of public discourse related to religion and science in societies such as the U.S. or U.K., where there has been a long tradition of suspicion and even animosity between those who identify with religious ways of thinking and those who adhere to the scientific worldview. For most of the past century, at least, and certainly in part stemming from the challenge to Abrahamic concepts of creation inherent in evolutionary theory, a basic assumption has been that the relationship between science and religion is inevitably difficult, at best. There have been some attempts among philosophers and theologians not only to identify the differences but to look for common ground between the epistemological frames of science and religion, perhaps most notable being religious studies scholar Ian Barbour's seminal work *Issues in the Study of Science and Religion*, which explores ways in which science and religion both diverge and intersect and which, in his later somewhat speculative work, moves from exploring the relationship to creating a typology in which religion and science move through phases of

conflict, independence, dialogue, and integration (Barbour 1968, 2013). Natural scientists, too, have explored the idea of how religion and science might be fundamentally opposed (Dawkins 2008) as well as how religion and science might intersect (Margenau 1984; Polkinghorne 1998) and scientists such as Stephen J. Gould, Carl Sagan, and Albert Einstein have engaged in variously themed commentary on religion that ranges from positive to negative viewpoints, while often still pointing out fundamental differences (Gould 2002; Sagan 1997; Hammer 2002). Physicist Neils Bohr in a conversation with fellow physicist Werner Heisenberg commented that although religion and science use different languages, with the language of religion being more akin to that of poetry, it is not necessary to split religion and science into opposing realities (Heisenberg 1971).

My aim in this article is not to enter into a discussion of the intellectual discourse related to religion and science among Western academics. Rather, I wish to argue that said discourse has relied on ethnocentric conceptualizations religion built on Western, and largely Christian, theological ideologies. An excellent example of this is found in Dawkins's book *The God Delusion*, which despite briefly mentioning that his ideas may not apply to Buddhism, constructs "religion" entirely as an Abrahamic enterprise (Dawkins 2008). A key point of my argument here is that there is a significant need among scholars interested in the relationship between space exploration and religion to interrogate the meaning of the word "religion" and to note that lack of a clear concept of what is meant by religion generates problems in understanding the nature of the relationship between religion and science as it relates to the study of space exploration.

I approach this issue as an anthropologist and ethnographer, not as a theologian nor as an historian of religions. As a result, I am primarily interested not in scriptural renderings of Buddhism, but in how Buddhism is practiced and talked about among the Japanese with whom I have worked as an ethnographer. The conceptualization of science and its relationship with Buddhism is, like Christianity, complex and would require considerably more space than possible here to explore in detail (Wallace 2003). Thus, the aim of the paper is not to go into a detailed exploration of Buddhist perspectives on science or space exploration, but to use the example of Japanese Buddhism as a way to show the problems of an emphasis on the Abrahamic concept of religion for the study of space exploration as it relates to religious beliefs and practices.

It should be noted that there are a few examples of works by scientists, particularly physicists, that attempt to explore intersections between non-Western religious traditions and science (Bohm 2005; Capra 2000; Traphagan 1994); however, there has not been significant writing among Western scholars, at least, on how non-Western religious traditions might respond to the idea of space exploration. The tacit influence of Western theological discourse and concepts about the nature of religion has significantly shaped the ways in which both natural scientists and other scholars have developed ideas related to the relationship between religion and science, which influences the discourse on the relationship between religion and space exploration (Traphagan and Traphagan 2015). As McAdamis notes in relation to astrobiology, "most research engaging astrobiology's relationship with religion has tended to disproportionately focus on Christian theology" (McAdamis 2011). This is unfortunate given that only about 1/3 of the population on Earth identifies with Christianity, which itself is a complex set of culturally and historically varied traditions and sects.

## 1. Space Exploration and Religion

Interestingly, several astronauts have flown on American spacecraft who did not identify with Abrahamic traditions: Ellison Onizuka (Buddhism) and Kalpana Chawla (Hinduism) are examples of two, but there have been others, including individuals who identify as atheist (McGraw and Formicola 2005). And, obviously, with the growing number of astronauts from non-Western societies traveling to low earth orbit (China, Japan, India) people are bringing non-Western religious perspectives with them into space, despite the tendency of dominant discourse in writing about religion, science, and space exploration usually defaulting to the Christo-centric worldview. The extent to which these perspectives may inform both ideas about space travel and interpretations of

the experience of being in space, has not been well-developed from a scholarly perspective. This may be a result of the fact that space exploration is largely viewed within organizations such as NASA or JAXA (the Japanese Aerospace Exploration Agency) as a scientific/engineering or systems problem within which the bodies of astronauts are integrated components to be understood and managed (Olson 2018). Hence, those involved with the execution of space exploration-related activities have tended to set aside the issue of religion as it relates to human movement off-planet, although some natural scientists such as Carl Sagan have noted the tendency of space exploration to raise religious questions (Sagan 1997). However, as the idea of colonization of the Moon and Mars has become more realistic, social scientists, theologians, and philosophers have increasingly come to recognize that human expansion into space also needs to be understood as a social phenomenon. And as a social phenomenon, there is an inherent necessity to consider the question of how religion may play a role in or influence the process of human exploration and settlement of space.

To consider this question of how religion and space exploration may intersect necessarily raises a more fundamental question: What do we mean when we use the term *religion*? One of the central problems of thinking about the relationship between religion, science, and space exploration is that the meaning of the word *religion* is rarely well-defined. Do we mean faith-leaning religions such as Christianity or Islam? Or do we mean ritual-leaning religions such as Shinto and many forms of Japanese Buddhism? Although a sharp distinction between faith-oriented and practice or ritual-oriented religions can obfuscate the fact that belief and ritual are both part of religious behavior, the balance between these varies in different cultural contexts. Most Japanese, for example, place relatively little emphasis on the element of faith in their religious lives, while placing strong emphasis on ritual—one need not believe in nor have faith in the existence and powers of deities in order to sincerely pray at a Shinto shrine. For the most part, Japanese religions do not demand expression of belief in, nor internal commitment, to the power and existence of a deity (Reader 1991; Reader and Tanabe 1998). This is unlike much of Christianity, in which it would be strange (although certainly not impossible) to claim, say, adherence to the Presbyterian faith while not believing in the existence of a god. Of course, when it comes to practice, it is difficult to sharply differentiate faith-centered from ritual-centered orientations to religious behavior, given that individuals within any tradition engage ideas of faith and practice differentially.

My aim here is to explore the question of religion and science largely from the perspective of Japanese Buddhism as a way of problematizing the manner in which we think about and define religion as it relates to the practice of space exploration. It is important to recognize that I limit my discussion only to Japanese Buddhism, which is itself different from other forms of Buddhism in that it is part of an integrated worldview in Japan that includes Buddhist, Shinto, and Confucian themes that often overlap and intertwine in the minds of Japanese individuals (LaFleur 2002; Roberts et al. 1986). Like other world religions, Buddhism is a complex web of concepts and ideologies and discussion of science takes various forms and perspectives within that web.

Two points are central to my argument: (1) the Abrahamic concept of religion is by no means an adequate framework for defining religion from a cross-cultural perspective, and (2) the idea that there is necessarily a tension or conflict between epistemological frames associated with science and religion is itself a product of Western academic practices that have tended to construct the relationship between religion and science in terms of a “warfare narrative” over the methods and authority by which truth claims are established and is by no means a necessary conclusion (Evans and Evans 2008). As Evans and Evans note, from a historical perspective, the notion of science and religion inevitably being in conflict is not an accurate representation of the discourse until fairly recently, but the narrative of religion and science in conflict over truth claims is so deeply entwined with contemporary Western intellectual discourse that it is difficult to identify perspectives outside of this viewpoint from which we can consider how religion and science are, or are not, in conflict (Evans and Evans 2008).

## 2. Religion and Faith

A comprehensive exploration of definitions of religion developed by Western scholars would be far too ambitious for a paper of this length, and others have explored this issue in detail (Fitzgerald 2003; Platvoet and Molendijk 1999; Tweed 2009). For my purposes here writing as an anthropologist, I am less interested in defining religion than exploring how the Abrahamic conceptualization of religion has shaped the discourse on the relationship between religion and science at least in American academic circles, where as Ecklund points out, the assumption of a necessary conflict has been institutionalized in elite universities for well over a century (Ecklund 2010) despite the fact that other ways of thinking about religion obtain in many parts of the world. However, it is worth noting that I follow Geertz's perspective that religion is best understood as a cultural system, where culture is understood as a set of historically transmitted meanings expressed in symbolic form and through which humans communicate their ideas about life, the universe, and everything (Geertz 1973). Religion and science both can be understood as cultural phenomena following this definition, albeit with, in the West, different starting points for how they tend to identify valid symbolic forms and meanings and determine the basis on which to make truth claims. As Fitzgerald notes, from an academic perspective, religion is best not thought of as an objective feature of particular societies; instead, it represents an ideological category that has been shaped by Western ideologies strongly associated with the nineteenth-century European colonization and often employed in ways that simplify and essentialize the behaviors of people living in non-Western contexts (Fitzgerald 2003).

Anthropologists have often chosen to focus on ritual rather than religion, *per se*, in part because the Western concept of religion as involving belief in deities and faith or commitment to those deities often fails to translate well into non-Western contexts. This is certainly the case for Japan, where belief and faith are not typically considered prerequisites for participation in religious activities; nor is there a sense that one need be committed to a particular "faith" that excludes beliefs and ritual participation associated with different religious traditions (Traphagan 2004). Most Japanese describe themselves as engaged in both Shinto and Buddhist practices, and it is quite common for Japanese to marry in a Christian ceremony, despite having no commitment to Christian ideologies (Edwards 1990).

In general, Japanese engage religious contexts through the practice of *omairi*—visiting or "prayer", which is performed at a variety of public and private spaces such as temples and shrines, family graves, or Shinto and Buddhist altars found in the home. Unlike Abrahamic religions, which normally require some type of commitment to belief in a deity based on faith in the existence of that deity that may be mandated by institutional powers, Japanese religions for the most part have little such expectation (Traphagan 2005). The focus of religious behavior is located in the performance and aesthetics of rituals and the ways in which Japanese normally engage ritual performance raises questions about the extent to which it is intellectually reasonable to think of religion in Japan as comparable to Western religions (Daneley 2015; Traphagan 2004). Indeed, it has been noted by some scholars that the concept of *religion* is a modern invention of Western scholars and theologians and rests upon a distorted understanding of human society in which the religious and secular are understood as necessarily distinct realms of human activity (Fitzgerald 2003; W.C. Smith 1983). In the case of Japan (and other non-Western societies), the fields of religious studies and comparative religions in Western academic circles have historically attempted to characterize forms of Japanese Buddhism in terms of faith without recognizing the sociopolitical and philosophical contexts in which practices associated with those forms have typically evolved. This has led to a tendency to misrepresent Pure Land Buddhism, in particular, as being faith-oriented in a way that parallels Christianity, despite the fact that most Pure Land Buddhists in Japan engage in religious practice in much the same ways that other Buddhists in Japan do—they focus on rituals associated with ancestor memorialization and downplay the importance of belief in spirit beings or the Buddhist Pure Land (heaven) (Amstutz 1997; R.J. Smith 1974).

Indeed, the idea of *religion* in the Western sense of the word was sufficiently foreign to Japanese in the 19th Century that the term for religion in Japan—*shūkyō* 宗教—was developed by Japanese scholars to describe Western religions such as Christianity and only came to be applied to practices of Buddhism

and Shinto after contact with Western individuals such as missionaries (Reader 1991). For the most part, Japanese historically have not drawn a sharp distinction between the religious and secular realms. One can find Shinto and Buddhist altars in homes and small shrines are commonly seen nestled among buildings on city streets or sitting alone in the middle of rice paddies. It is not unusual in some parts of Japan to find a bowl of carefully piled salt outside of a restaurant, which is intended to purify those who enter and is a practice associated with Shinto. But this type of practice is not done to show that one is a Shintoist, along the lines that a Christian might wear a cross; it is simply a customary behavior found in some parts of Japan and having connections with Shinto rituals and ideas—particularly the idea that salt is a purification agent (one can also find this in sumo matches). In short, for Japanese there is no *necessary* separation between the religious and the secular and, important for our purposes here, the need or desire to identify a sharp distinction between the realms of religion and science is not an indigenous concept. The Japanese case underscores the importance of not assuming that Western categories such as faith or religion are universal or even universally linked together and also points to the fact that the concept of *religion* is not necessarily an indigenous structure to be found in all societies in some common way, but is better thought of as a product of Western cultural and epistemological frameworks that have shaped how scholars (both Western and non-Western) and others have thought about the nature of religion and, thus, the relationship between religion and science.

### 3. Religion, Science and Japanese Buddhism

Perhaps because the idea of a conflict between religion and science is not assumed in Japanese discourses on the world, there is only limited writing on the topic among Japanese scholars. However, there is some discussion in Japanese scholarly literature on questions related to religion and science, largely constructed in terms of Western categories or that discuss the conflict as it has been expressed within Western academic literature. One locus of thought can be found in the writings of Ikeda Daisaku, who was president of the Japanese new religion known as Sōka Gakkai, which represents itself as a form of Nichiren Buddhism in the Mayahana tradition.<sup>1</sup> I want to be careful in discussing this particular representation, because Sōka Gakkai has at times been viewed negatively by other Japanese religious organizations, as well as in the public eye, following its rapid growth in the 1950s and 1960s and subsequent entrance into electoral politics (McLaughlin 2012). Hence, the perspective I discuss here should not be taken as representative. Indeed, Ikeda's discussion of science and religion was developed in conversation with the British historian Arnold Toynbee, which underscores the notion of the idea of a conflict existing between science and religion as being a Western frame of reference (Toynbee and Ikeda 1976). Furthermore, despite the fact that the idea of compatibility between science and Buddhism is a fairly common trope in the modern Japanese worldview, it is easy to find aspects of religious ideas in Japan that focus on features such as supranormal deities, the sacred qualities of mountains, and the potential (magical) power of rituals to influence the world that may be seen at odds with scientific perspective within Japan (Blacker 2004; Kawano 2005; Williams 2007).

One of the key points in Ikeda's comments on Buddhism and science is that they are fundamentally compatible because, according to him, Buddhism has been oriented around a scientific perspective from its beginnings. Ikeda argues that Buddhism is essentially scientific because it is built on the assumption that our world can be understood in terms of causal relationships (Solomon 1980). Ikeda argues that in Buddhism life is conceptualized as being based on the law of causality and that although different in focus from natural sciences, it is "no different from other fields of science, in that it is also an approach to discover the universal law of cause and effect . . ." (Ikeda 1968). Ikeda moves into more

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<sup>1</sup> Buddhism is generally divided into two distinct traditions, Mahayana, which is associated with East Asian cultures and Theravada, which is associated with South Asian cultures. There are important differences in these two traditions and for the purposes of this paper I am only focusing on the Mahayana approach as it has developed in Japan. Like other religions that have moved across a wide range of cultural contexts, it is difficult to generalize about "Buddhism" as a faith, philosophy, or ideology.



polemical arguments in which Nichiren Buddhism is presented as being superior to science on the grounds that it perceives of the world through the eyes of the Buddha (Solomon 1980). Nonetheless, the basic point that Buddhism is built on a concept of causality does capture a fundamental insight into the world that is held in common between a scientific and at least one Buddhist representation of nature.

Although Ikeda is certainly correct that cause and effect are key concepts in Buddhist doctrine, one should be careful in interpreting this in terms of its similarities to science, because the Law of Causality in Buddhism is a moral concept in which doing good or evil have (causal) consequences for one's rebirth (Yokoi 1976). However, awareness of the actions of cause and effect historically evident within Buddhism led to conclusions about the universe that also share insights with modern scientific discourse. One of these is the notion that everything is interconnected. For the Japanese monk Dōgen—one of the most important philosophers in Japanese history and founder of the Sōtō Zen school—this interconnectedness is expressed in a radical de-establishment of the notion of self and other as distinct. For Dōgen, the true self is found in the realization that self and other are interpenetrating and absolute reality is the whole of the universe as a single thing (Cook 1985). Along with this idea, Dōgen emphasizes the basic insight of Buddhism that our universe is characterized by change—things are never stable and constant. The true nature of the universe is impermanence (Cook 1985). As things interact, they continually influence other things. Human existence, such as the existence of all living things, involves an endless trip through the cycle of births and rebirths. Although there are different realms, such as the realm of hungry ghosts or the realms of heaven and hell, these are not other, final, places to which we go after death, but are simply frames of existence in this universe that we enter based on accumulated karma and can include rebirth as other life forms on Earth. Importantly, it is the failure of humans to recognize this basic insight into the continuously changing nature of reality that leads to suffering in the Buddhist worldview.

I do not have space to enter into a detailed discussion of the karmic cycle here. Rather, I want to make a simple point. Humans, in the Japanese Buddhist worldview, *are not particularly special in the sense that they are in the Abrahamic traditions*. They are not chosen. They are not created in the image of a deity. And for many Buddhists they are no better (nor worse) than any other being in terms of moral status or value. Humans are, however, different, because they happen to be born into a condition that allows awareness of the way the universe really is and, thus, allows one to attain enlightenment. But this is not a superior state along the lines found in Abrahamic religions like Christianity, that is a product of humans having been created in the image of their deity. For example, in Dōgen's philosophy there is a radical leveling of the universe evident in the idea that all beings, whether sentient or non-sentient, have Buddha nature or, more precisely, *are Buddha*. This concept is tied to the Mahayana doctrine of sunyata or sameness (Cook 1985), an idea that has much in common with the recognition sometimes verbalized by scientists that everything is basically just star dust, including living beings.

Put another way, there is little concern within Buddhist doctrine, as represented in the writings of monks like Dōgen, about humans being created in the image of a deity and thus being special or superior to other forms of life (and Dōgen is by no means unusual in this approach). This, when combined with a basic assumption of the intercausal nature of the universe, mitigates against the idea of a natural conflict between science and religion. More specifically, when it comes to particular scientific theories such as evolution, Japanese Buddhism has no *necessary* problem because it already assumes evolution in its basic doctrine that everything is always changing through causal interactions, an observation that includes humans and everything else in the universe. Another way to think about this is that the universe—rather than being like a path leading somewhere, which in Christianity is the end of history in the return of Jesus—is like a kaleidoscope that just rearranges the basic components inside as it turns. There is not really directionality in this worldview; it is merely change in a way very similar to the notion that evolution is simply ongoing change as a product of natural selection.

Finally, there is also a lack of the type of creation mythology in Buddhism that might generate a sense of conflict between the aims and intentions of a deity and the behavior of its created beings.

The cycle of births and rebirths is ongoing and if one chooses, the way out of that endless cycle is through practices that lead to *satori* (nirvana, enlightenment), which involves a reorienting of the mind such that one ceases to distinguish between subject and object which, in turn, leads to an insight in which everything in the universe is experienced as a manifestation of enlightenment (Yokoi 1976). This idea is quite different from the worldview of Abrahamic religions such as Christianity or Islam in that not only is time not linear—it is cyclical—there is no starting point and no endpoint at which those with a right view are saved. Seeking enlightenment is a personal choice not conceptualized as mandated by a deity nor understood as a requirement for salvation, because salvation is not relevant from this perspective (salvation and enlightenment are quite different, despite at times being conflated in western writings on Buddhism).

Despite the limited interest in the idea of philosophical conflict between Buddhism and science in Japan, it is important to point out that this does not necessarily translate into a lack of political disagreement and conflict. Ambrose notes that there have been protests by Buddhist monks against scientific laboratories that practice animal vivisection (Ambrose 2012), but this should not be interpreted as meaning there is necessary conflict between religion and science at a level fundamental differences in worldview; instead, such conflicts tend to revolve around differences in attitudes about specific moral issues such as vivisection. In fact, Ambrose notes, I think quite importantly, that “[c]ontemporary Japanese, including Buddhist clerics, are well aware of modern scientific taxonomies and perceive a clear hierarchy among humans and animals that places humans at the pinnacle of existence. And yet from an ontological perspective humans and other animals—even bacteria—are considered akin in that they are all living beings ... In contrast to similar Western discourses [on animal rights], which prioritize the *quality* of animal life, Japanese discourse seems to prioritize the *protection* of life” (Ambrose 2012 emphasis added). Ambrose goes on to note that this perspective may be reflected in the reluctance of contemporary Japanese to euthanize pets who are experiencing serious and painful illness.

In other words, Buddhist-oriented concepts related to the value of all life in Japan, at least, have something of a leveling influence on how people think about the relationship of humans to the rest of the living world—even while recognizing a hierarchy of life forms as expressed through (western) science, there is also a tendency to see all life as valuable simply on the grounds that it is life. Humans do not particularly stand out in that way of thinking. As in Abrahamic religions in western societies, the ways in which Japanese think about and employ concepts associated with Buddhism is complex and varies among groups and individuals. What is most important for my purposes here is that Japanese Buddhism works from assumptions distinct from Abrahamic religions when it comes to question such as how religion and science may or may not be in conflict and how the nature and import of human and other life is understood.

#### 4. Implications for Space Exploration

Perhaps the most important implication consideration of the practice of Japanese Buddhism raises is that there is no inherent conflict between “religion” and science, largely because there is no overt philosophical nor theological tension between the religious and scientific worldviews. Concern over the validity of ideas such as evolutionary theory for many Japanese, which has so powerfully characterized the relationship between science and religion in American society, does not necessarily arise as a significant problem, because Buddhism already works from a similar basic premise as evolutionary theory—that everything is always changing as different things in the world interact through natural processes of cause and effect. Indeed, in my own experience as an anthropologist conducting ethnographic research in Japan, I have often had conversations with my interlocutors in which I am asked why Americans question the validity of evolutionary theory. These questions are usually accompanied by bewildered looks and I suspect much of this has to do with the fact that for many Japanese there is no basis for seeing the religious as inherently in conflict with the scientific. Doctrine tends not to be terribly important to most Japanese, as noted above, because people tend

to focus primarily on the ritual aspects of Buddhist (and Shinto) religious activity with only limited interest or concern for doctrinal or philosophical points.

This also means that there is little to discuss when it comes to expansion of human activity into space or to the possibility of the existence of extraterrestrial intelligence. The idea often raised by those interested in the conflict between Christianity and SETI, in which there is a sense among some that the discovery of ETI poses a fundamental problem for Christianity, with its emphasis on the belief in a deity who died to save the members of the “race of Adam”, simply has little relevance in the Japanese Buddhist (or Shinto) context (George 2005).<sup>2</sup> This does not mean there are no questions to be asked when it comes to Buddhism and space exploration—one concern that has been raised is whether or not aliens can become enlightened, given that in Buddhist doctrine only humans have that capacity. However, at least in the Japanese case, it seems reasonable to argue that extraterrestrials, whether intelligent or not, represent another form of life and Japanese Buddhist ideas would simply indicate that life should be treated like any other life found on Earth.

Indeed, it is possible that the locus where Buddhism may have a significant contribution that is distinct from religions such as Christianity is in the formation of an ethical framework for dealing with life on other worlds. Capper’s survey research on American Buddhists has shown that most American Buddhists affirm a no-harm approach to living beings, regardless of where those beings reside, as well as a no-harm ethic toward the ecosystems in which they live and support for a “scriptural ethical complex regarding the taking of resource lives [as] respectfully as possible” when it comes to scientific research on other worlds (Capper 2020). Buddhism, as Capper notes, is rather vague on the ethics of killing of lifeforms such as microbes and recognizes that it is impossible for humans to live without killing such organisms, and also that Buddhism in general tends to have high regard for human life (due to its ability to attain enlightenment) even while emphasizing the need to avoid killing other life forms as a way of respecting life in general. This presents something of a dilemma in Buddhism, because it is recognized that humans, like other life forms, kill simply to survive, even while it is best from an ethical perspective for humans to avoid killing. Capper notes the comment of one of his research participants who asks who humans think they are to assume our lives are more valuable than those of microbes, and I think this idea captures a perspective on life that is found in several manifestations of Buddhism in Japan (Capper 2020).

It is important to be careful in generalizing how we think about Buddhism, or any other religion; however, because there really are many Buddhisms and even in a relatively unified context such as Japan, there are considerable differences among Buddhist sects and also between approaches to how the religion is practiced among lay people—who largely focus on ancestor memorialization—and monks who tend (to some extent) to be more aware of and concerned by scripture and doctrine. Indeed, concern over the killing of non-human animals varies across different Buddhist-influenced contexts. And in Japan, for example, while most Japanese see themselves as following Buddhist traditions, most also eat meat—including several of my friends who are monks. What we can, perhaps, say in general is that Buddhist sects maintain an ethic of concern for life that is balanced with the recognition that at times it is necessary to take life (Capper 2020; Traphagan and Traphagan 2015).

A nuanced consideration of the relationship between science and religion as it relates to space exploration in non-Western (or western) societies needs to take into account the enormous variations that exist in how different religious traditions think about questions such as the nature of science, the nature of our universe, or the relative importance of different life forms. It also must recognize and address the fact that religion is very difficult to define and is manifested in relation to cultural variations expressed in different parts of the world. The common American notion that science and religion are necessarily at odds and that this conflict must be addressed as we expand into space is by

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<sup>2</sup> It is worth pointing out that while this conflict may be an issue for theologians and philosophers, it is not necessarily an issue seen as significant among the general public in the context of Western religious traditions, as noted by Ted Peters in his survey work on this topic (Peters 2018, pp. 183–207).



no means a necessary way of thinking about these two realms of human activity and, in fact, is largely a product of Western cultural traditions in which religion is based on faith and, hence, is often seen as naturally opposed to science as being based on reason (Kroesbergen 2018). In short, as we think about the ways in which religion and science can both intersect and diverge as humans move beyond low earth orbit and begin colonizing other worlds, it is important to understand that the narrative of religion and science as necessarily being in conflict over truth claims is a product of western intellectual discourse. When other religious and cultural traditions are taken into account, the narrative need not be centered on the idea of conflict between the religious and scientific realms of human thought and behavior.

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