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**Cosmology and Creation:
How Do They Relate To One Another?**

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The idea that the world was created is one of the most widely encountered and basic religious ideas, and finds expression in the various religions of the world. Religions of the ancient near east often take the form of a conflict between a creator deity and the forces of chaos. The dominant form of the doctrine of creation is that associated with Judaism, Christianity and Islam. In what follows, I shall set out the basic features of this doctrine from a Christian perspective, and explore how these might play out in relation to some of the big questions of our time, focusing especially on the curious phenomenon that is often called “fine-tuning”. I will begin by looking at the idea of creation, and draw out a few themes, and then lay the groundwork for looking at this idea of “fine-tuning” in more detail.

One of my favourite stories from the classical age concerns the Greek philosopher Aristippus (c. 435 – c. 356 BC), who found himself shipwrecked on the Aegean island of Rhodes. He had no idea where he was. Was this strange place uninhabited? Would he be able to find anyone to help him? As he walked along the shoreline, he found some patterns traced in the sand. Like Robinson Crusoe after seeing a footprint on the beach of his deserted island, he had noticed something that allowed him to see the island in a new way. He realized that he was not on his own. Someone else was there as well.

Since the beginning of recorded history, people have looked at the world around them, and wondered about their deeper meaning. We see rivers and pastures around us, stunning mountain ranges in the distance, and the starry skies above us. What are they all about? Where did they come from? Do they point to a bigger story, of which we are part? Is this our true homeland? Or do we really belong somewhere else? Are there tracings in the fabric of the world which tell us we are not alone? Many answers have been given, and debated endlessly. One of the best known expressions of this intuition is found in Christianity, and is set out in its doctrine of creation. We could summarise it in a phrase that we find in the writings of the influential Christian theologian Augustine of Hippo in the early fifth century: “You have made us for ourselves, and our heart is restless until it finds its rest in you.”

One of the deepest human intuitions is that this world is not really our home. We are sojourners, passing through the world on our way somewhere else. In the period of late classical antiquity, the movement known as “Gnosticism” developed this idea in a highly influential way. We trapped in this world, and don’t belong here. Matter is evil; we are spiritual creatures, who want to break free from being trapped in the material cages that we call our bodies. We are “gold in the mud”, to use a favourite Gnostic phase: souls trapped in bodies, who long to be liberated and find our way back to our true destination. Some forms of Gnosticism developed complicated systems of passwords to allow their followers to get past cosmic sentries who might otherwise bar their path to their spiritual homelands. The Greek word “gnosis”, from which this movement takes its name, means knowledge – in this case, a highly esoteric knowledge, which is only known to the initiated.

From the outset, Christianity proclaimed that the world around us was not itself divine, but was nevertheless of divine origin. God brought the universe into existence, and in doing so, established an order which reflected God’s character, without itself being God. Some peoples in the Ancient Near East believed in national gods, whose sphere of influence was limited to a geographical region – such as Egypt or Babylon. For ancient Israel, recognizing God as creator meant that the “LORD God of hosts” was the lord of *all* the world. “I am the LORD, who made all things, who alone stretched out the heavens, who by myself spread out the earth” (Isaiah 44:24). This idea seems to have become especially important during the period of exile in Babylon, when the people of Israel were remote from their own land. Yet they did not need to live in Israel to know, trust and be guided by the God of Israel.

A Christian theology of creation has three core elements. In the first place, it is about *origination*. The world has not always existed. It came into being – not by accident, but by an act of will. To speak of creation is to speak of divine causation of both the universe and ourselves as its inhabitants.

This leads into the second core theme – that of *intentionality*. In plain English, the universe came into being, not as an accident but as something which was caused and intended. The universe was intentionally caused, rather than being a product of happenstance. The universe did not simply happen; it was *made* to happen, and it was *meant* to happen.

The third aspect of the language of creation is that of *signification*. The universe is a signpost to its creator. It echoes or expresses the character of God in a scaled-down yet recognizable manner. “God was a creator, as an artist is a creator” (G. K. Chesterton). The universe bears the imprint of God, revealing something of the divine glory and wisdom. “The heavens are telling the glory of God; and the firmament proclaims his handiwork” (Psalm 19:1).

Each of these aspects of the doctrine of creation merits further exploration, beginning with the theme of “origination”. The Christian view that the universe came into being was widely criticised by secular writers during the period of the early church. Most classic Greek philosophers – such as Aristotle – believed in the eternity of the world. Christians found themselves facing ridicule for suggesting that the universe had an origin. How could anyone take Christianity seriously in the sophisticated Greek cultural world, when it contradicted one of the core teachings of the great philosopher Aristotle?

Similar ideas were deeply embedded in the scientific community in the not so distant past. By the first decade of the twentieth century, most scientists had come to the view that the universe has always existed, so that any talk of “creation” was meaningless. The great Swedish physicist Svante August Arrhenius (1859-1927), who won the Nobel Prize for chemistry in 1903, wrote a bestselling work entitled *Worlds in the Making* (1906). In this, he argued for an infinite, self-perpetuating universe, without beginning or end, based partly on the recently-discovered principle of the “indestructibility of energy”. Arrhenius made clear his fundamental “conviction that the Universe in its essence has always been what it is now. Matter, energy, and life have only varied as to shape and position in space.”[[1]](#footnote-1) Matter and energy might move around the universe; there was, however, no overall change within the system as a whole. To talk about the universe having an “origin” was thus to be seen as outdated religious nonsense, which science had consigned to history. Maybe the universe had changed over time. But the scientific wisdom of that age was that it was nonsense to suggest that universe had a beginning. Or that it would have an end.

Yet all that has now changed. From about 1920, evidence began to accumulate suggesting that the universe originated in what we now call the “Big Bang” – a cosmic fireball, which expanded to form the universe that we now know. It was not until after the Second World War that the scientific community decisively accepted this new way of thinking. One of the reasons for this reluctance was the belief that this seemed a very “religious” way of thinking. Atheist astronomers such as Fred Hoyle (1915-2001) were alarmed that this new scientific understanding of the origins of the universe seemed uncomfortably close to traditional Christian belief. In the end, however, these concerns were overcome. The idea that the universe came into being is now mainstream science.

Yet agreement that the universe had an origin does not necessarily that there is a God, or that the Christian doctrine of creation is right. It certainly *suggests* so; but it does not *prove* so. This scientific way of thinking easily fits into the Christian “big picture”. Yet while Christians argue that God brought the universe into existence, atheist scientists would argue that the universe just happened. Maybe it came into existence by a process that we do not understand. Maybe it even caused its own existence. Christians reply that these seem to be rather clumsy ways of trying to avoid the most obvious explanation – namely, that what we know about the origins of the universe fit neatly into the Christian way of thinking.

In the second place, the Christian doctrine of creation affirms that God meant to create the world – and us. This world is not an accident. Nor are we. We can speak of life having a purpose, and the universe having a meaning. These are not ideas that we can read off the world, as if there were like colour, temperature, or height. These are deeper notions, lying beneath the surface of things. The book of Job, one of the finest examples of the wisdom literature of the Ancient Near East, speaks of wisdom as something that is hidden deep within the world, its true meaning hidden from a casual and superficial glance. Meaning and purpose are things that need to be discovered. But they are there, waiting for us to find them.

The doctrine of creation gives us a lens for looking at the worlds around us and within us. We might look at the silent pinpoints of light in the night sky, and conclude that the stars are reminders of human transience. Yet there is another way of looking at them. When I was young, I often lay awake at night, looking out of my school dormitory windows, tracing the patterns of the stars. Yet I found this a deeply melancholy experience. I had rejected any belief in God, and believed that I was alone in a vast, meaningless universe. The stars became symbols of the brevity of my own life, and the meaninglessness of life. After discovering Christianity, I looked at those same stars, but now through a different lens. What I had once seen as symbols of transience and pointlessness took on a new meaning. They became signs of God’s love and presence.

In the third place, Christianity insists that something of the creator is echoed in the creation. Like an artist, God’s character is expressed in God’s creation. When understood correctly, the world around us echoes and reflects something of God. Nature on its own is very ambiguous. We may take delight in beautiful sunsets and rich landscapes. But what about the bloodshed of the food chain? What of the pain animals inflict on each other in their quest for fresh meat? We need a map to make sense of the complex moral landscape of nature, and a lens so that we can bring things into focus. We need to know how to interpret something that is ambivalent, so that we can see it in the right way. Otherwise, the moral ambiguity of nature might lead us to think that God is both good and evil – or perhaps that there are two Gods, one good and one evil.

G. K. Chesterton made this point forcefully. The natural world needs to be interpreted. But nature itself did not provide the key to unlocking its true meaning. “One must somehow find a way of loving the world without trusting it.” For Chesterton, that “way of loving the world” was provided by Christian doctrine, which gave him a way of looking at nature that allowed him to value it as a pointer to God, where it might otherwise be seen simply as a witness to the cosmic lack of meaning, purpose, and justice.

The beauty of the creation thus echoes the greater beauty of God. We sometimes hear something of the melodies of the New Jerusalem in this world, wafted by a passing breeze. This world may only be a scaled-down version of something greater, seen through a smoky mirror. But it is enough to allow us to realize that something of immense beauty lies beyond us, and makes us long to enter there. Perhaps nothing can fully prepare us for heaven, when we finally enter it – except the thought that it is like the best of this world, only better.

The theme of “God as creator” is of major importance within the Old Testament. Perhaps one of the most significant affirmations which the Old Testament makes is that *nature is not divine*. The Genesis creation account stresses that God created the moon, sun and stars. The significance of this point is too easily overlooked. Each of these celestial entities was worshipped as divine in the ancient world. By asserting that they were created by God, the Old Testament is insisting that they are subordinate to God, and have no intrinsic divine nature.

Attention has often focussed on the creation narratives found in the first two chapters of the book of Genesis, with which the Old Testament canon opens. However, it must be appreciated that the idea of creation is also deeply embedded in the wisdom and prophetic literature in the Old Testament. For example, Job 38:1 – 42:6 sets out what is unquestionably the most comprehensive understanding of God as creator to be found in the Old Testament, stressing the role of God as creator and sustainer of the world. It is possible to discern two distinct, though related, contexts in which the notion of “God as creator” is encountered: first, in contexts which reflect the praise of God within Israel’s worship, both individual and corporate; and secondly, in contexts which stress that the God who created the world is also the God who liberated Israel from bondage, and continues to sustain her in the present.

Of particular interest for our purposes is the Old Testament theme of “creation as ordering”, and the manner in which the critically important theme of order is established on and justified with reference to cosmological foundations. It has often been pointed out how the Old Testament portrays creation in terms of an engagement with and victory over forces of chaos. This divine establishment of order is generally represented in two different ways:

1. Creation is an imposition of order on a formless chaos. This model is especially associated with the image of a potter working clay into a recognizably ordered structure (e.g., Genesis 2:7).

2. Creation concerns conflict with a series of chaotic forces, often depicted as a dragon or another monster (variously named Behemoth, Leviathan, Nahar, Rahab, Tannim, or Yam) who must be subdued (e.g., Isaiah 27:1; 41:9—10).

It is clear that there are parallels between the Old Testament account of God engaging with the forces of chaos and Ugaritic and Canaanite mythology. Nevertheless, there are significant differences at points of importance, not least in the Old Testament’s insistence that the forces of chaos are not to be seen as divine. Creation is not be to understood in terms of different gods warring against each other for mastery of a (future) universe, but in terms of God’s mastery or conquering of the forces of chaos, and establishing the ordering of the world. Here is a text in which this idea is expressed, taken from the prophet Isaiah:

Awake, awake, put on strength,

O arm of the LORD!

Awake, as in days of old,

the generations of long ago!

Was it not you who cut Rahab in pieces,

who pierced the dragon?

Was it not you who dried up the sea,

the waters of the great deep;

who made the depths of the sea a way

for the redeemed to cross over?

So the ransomed of the LORD shall return,

and come to Zion with singing;

everlasting joy shall be upon their heads;

they shall obtain joy and gladness,

and sorrow and sighing shall flee away (Isaiah 59:9-11).

So how is the idea of creation to be visualized? Three main ways of conceiving the creative action of God have been influential within Christian circles. We shall note them briefly, and identify their relevance to our theme.

1. *Emanation.* This term was widely used by early Christian writers to clarify the relation between God and the world. It is not an idea that is easily grasped today, as it has philosophical roots in the Platonic tradition. Creation, it is argued, is analogous to light or heat being radiated from the sun, or from a human source such as a fire. This image of creation (hinted at in the Nicene Creed’s phrase “light from light”) suggests that the creation of the world can be regarded as an overflowing of the creative energy of God. Just as light derives from the sun and reflects its nature, so the created order derives from God, and expresses the divine nature. There is, on the basis of this model, a *natural* or *organic* connection between God and the creation.

However, the model has weaknesses, of which two may be noted. First, the image of a sun radiating light, or a fire radiating heat, implies an involuntary emanation, rather than a conscious decision to create. The Christian tradition has consistently emphasised that the act of creation rests upon a prior decision on the part of God to create, which this model cannot adequately express. This is related to the second weakness – the impersonal nature of the model in question. The idea of a personal God, expressing a personality both in the very act of creation and the subsequent creation itself, is difficult to convey by this image. Nevertheless, the model clearly articulates a close connection between creator and creation, leading us to expect that something of the identity and nature of the creator is to be found in the creation. Thus the beauty of God would be expected to be reflected in the nature of the creation.

2. *Construction.* Many biblical passages portray God as a master builder, deliberately constructing the world (for example, Psalm 127:1). The imagery is powerful, conveying the ideas of purpose, planning and a deliberate intention to create. The image is important, in that it draws attention to both the creator and the creation. In addition to bringing out the skill of the creator, it also allows the beauty and ordering of the resulting creation to be appreciated, both for what it is in itself, and for its testimony to the creativity and care of its creator.

However, the image has a deficiency, which relates to a point we noted made in connection with Plato’s dialogue *Timaeus*. This portrays creation as involving pre-existent matter. Here, creation is understood as giving shape and form to something which is already there – an idea which, we have seen, causes at least a degree of tension with the doctrine of creation *ex nihilo*. The image of God as a builder would seem to imply the assembly of the world from material which is already to hand, which is clearly deficient. Nevertheless, despite this slight difficulty, it can be seen that the model expresses the insight that the character of the creator is, in some manner, expressed in the natural world, just as that of an artist is communicated or embodied in her work. In particular, the notion of ordering – that is, the imparting or imposing of a coherence or structure to the material in question – is clearly affirmed by this model. Whatever else the complex notion of creation may mean within a Christian context, it certainly includes the fundamental theme of ordering – a notion which is especially significant in the creation narratives of the Old Testament.

3. *Artistic expression*. Many Christian writers, from various periods in the history of the church, speak of creation as the “handiwork of God”, comparing it to a work of art which is both beautiful in itself, as well as expressing the personality of its creator. This model of creation as the “artistic expression” of God as creator is particularly well expressed in the writings of the eighteenth-century North American theologian Jonathan Edwards.

The image is helpful, in that it supplements a deficiency of both the two models noted above – namely, their impersonal character. The image of God as artist conveys the idea of personal expression in the creation of something beautiful. Once more, the potential weaknesses need to be noted: for example, the model could easily lead to the idea of creation from pre-existent matter, as in the case of a sculptor with a statue carved from an already existing block of stone. However, the model offers us at least the possibility of thinking about creation from nothing, as with the author who writes a novel, or the composer who creates a melody and harmony. It also encourages us to seek for the self-expression of God in the creation, and gives added theological credibility to a natural theology.

A Christian understanding of the concept of creation is thus closely linked with the concept of ordering. As Stephen Hawking, among many others, has pointed out, the existence of God is easily and naturally correlated with the regularity and ordering of the world. “It would be completely consistent with all we know to say that there was a Being who is responsible for the laws of physics”. The noted theoretical chemist Charles A. Coulson pointed out the importance of religious convictions in explaining the “unprovable assumption that there is an order and constancy in Nature”. In what follows, we shall explore the idea of the “laws of nature”, a highly significant way of depicting (and interpreting) the order found within the world.

The theme of cosmic order is of major importance within the writings of Isaac Newton, who argued that the regularity and predictability of the world were a direct consequence of its created origins. Alexander Pope’s celebrated epitaph for Newton captures aspects of this point well:

Nature and Nature’s Law lay hid in Night

God said, let Newton be, and all was Light.

The universe is not random, but behaves in a regular manner which is capable of observation and explanation. This led to the widespread belief that systems which satisfied Newton’s laws of motion behaved in manners which were predetermined, and which could therefore be predicted with considerable accuracy – a view which is often represented at a popular level in terms of the image of a “clockwork universe”.

It is widely held within the scientific community that regularity (including statistical regularity) is an intrinsic feature of the world, uncovered (not imposed) by human investigation. For example, consider the comments of Paul Davies, which would be widely endorsed by natural scientists:

I believe any suggestion that the laws of nature are similar projections of the human mind is absurd. The existence of regularities in nature is an objective mathematical fact. . . . In conducting science we are uncovering real regularities and linkages out of nature, not writing them into nature.

It will be clear that a religious (and especially a Christian) approach to the debate will focus on the idea of the ordering of the world as something which exists in that world, independent of whether the human mind recognizes it or not, and that this ordering can be understood to be related to the doctrine of creation.

*The “Big Bang”*

The question of the origin of the universe is without doubt one of the most fascinating areas of modern scientific analysis and debate. That there are religious dimensions to this debate will be clear. Sir Bernard Lovell (born 1913), the distinguished British pioneer of radio astronomy, is one of many to note that discussion of the origins of the universe inevitably raises fundamentally religious questions. More recently, the physicist Paul Davies has drawn attention to the implications of the “new physics” for thinking about God, especially in his widely-read book *God and the New Physics.*

The origins of the “big bang” theory may be argued to lie in the general theory of relativity proposed by Albert Einstein (1879-1955). Einstein’s theory was proposed at a time when the scientific consensus favoured the notion of a static universe. The equations which Einstein derived to describe the effects of relativity were interpreted by him in terms of a gravitational and levitational equilibrium. However, the Russian meteorologist Alexander Friedman (1888-1925) noticed that the solutions to the equations which he himself derived pointed to a rather different model. If the university was perfectly homogenous and expanding, then the universe must have expanded from a singular initial state at some point in the past characterized by zero radius, and infinite density, temperature and curvature. Other solutions to the equations suggested a cycle of expansion and contraction. The analysis was disregarded, probably because it did not conform to the consensus viewpoint within the scientific community. All that began to change with the astronomical observations of Edwin Hubble (1889-1953), which led him to interpret the red shifts of galactic spectra in terms of an expanding universe.

A further major development took place (largely by accident, it has to be said) in 1964. Arno Penzias and Robert Wilson were working on an experimental microwave antenna at the Bell Laboratories in New Jersey. They were experiencing some difficulties: irrespective of the direction in which they pointed the antenna, they found that they picked up a background hissing noise which could not be eliminated. Their initial explanation of this phenomenon was that the pigeons roosting on the antenna were interfering with it. Yet even after the enforced removal of the offending birds, the hiss remained.

It was only a matter of time before the full significance of this irritating background his was appreciated. It could be understood as the afterglow of a primal explosion – a “big bang” – which had been proposed in 1948 by George Gamow, Ralph Alpher and Robert Herman. This thermal radiation corresponded to photons moving about randomly in space, without discernible source, at a temperature of 2.7 K. Taken alongside other pieces of evidence, this background radiation served as significant evidence that the universe had a beginning (and caused severe difficulties for the rival “steady state” theory advocated by Thomas Gold and Hermann Bondi, with theoretical support from Fred Hoyle).

It is now widely agreed that the universe had a beginning. This immediately points to at least some level of affinity or consonance with the Christian idea that the universe was created. Yet the belief that the universe had a “beginning” does not necessarily imply that it was “created”. However, a number of writers, such as Stanley L. Jaki (1924-2009), have argued that this is the most obvious implication of the notion of origination. One of the factors which has been of particular importance in focussing this debate has been the “anthropic principle”, to which we now turn. The phenomenon is reasonably well understood. But as will become clear, it is open to many possible explanations!

*The Anthropic Principle*

The term “anthropic principle” is used in a variety of ways by different writers; nevertheless, the term is generally used to refer to the remarkable degree of “fine-tuning” observed within the natural order. Paul Davies argues that the remarkable convergence of certain fundamental constants is laden with religious significance. “The seemingly miraculous concurrence of numerical values that nature has assigned to her fundamental constants must remain the most compelling evidence for an element of cosmic design”.

The most accessible introduction to the principle is widely agreed to be the 1986 study of John D. Barrow and Frank J. Tipler, entitled *The Anthropic Cosmological Principle*. Barrow and Tipler point out that one of the most important results of twentieth-century physics has been the gradual realization that there exist invariant properties of the natural world and its elementary components which render the gross size and structure of virtually all its constituents quite inevitable. The size of stars and planets, and even people, are neither random nor the result of any Darwinian selection process from a myriad of possibilities. These, and other gross features of the Universe are the consequences of necessity; they are manifestations of the possible equilibrium states between competing forces of attraction and compulsion. The intrinsic strengths of these controlling forces of Nature are determined by a mysterious collection of pure numbers that are called the *constants of Nature*.

The importance of this point was brought out in an important review article published in 1979 in the journal *Nature* by B. J. Carr and M. J. Rees. Carr and Rees concluded that “the possibility of life as we know it evolving in the Universe depends on the values of a few physical constants – and is in some respects remarkably sensitive to their numerical values”. The constants which assumed a particularly significant role were the electromagnetic fine structure constant, the gravitational fine structure constant, and the electron-to-proton mass ratio.

Examples of the ‘fine tuning’ of fundamental cosmological constants include the following:

If the strong coupling constant was slightly smaller, hydrogen would be the only element in the universe. Since the evolution of life as we know it is fundamentally dependent on the chemical properties of carbon, that life could not have come into being without some hydrogen being converted to carbon by fusion. On the other hand, if the strong couplings constant were slightly larger (even by as much as 2%), the hydrogen would have been converted to helium, with the result that no long-lived stars would have been formed. In that such stars are regarded as essential to the emergence of life, such a conversion would have led to life as we know it failing to emerge.

If the weak fine constant was slightly smaller, no hydrogen would have formed during the early history of the universe. Consequently, no stars would have been formed. On the other hand, if it was slightly larger, supernovae would have been unable to eject the heavier elements necessary for life. In either case, life as we know it could not have emerged.

If the electromagnetic fine structure constant was slightly larger, the stars would not be hot enough to warm planets to a temperature sufficient to maintain life in the form in which we know it. If smaller, the stars would have burned out too quickly to allow life to evolve on these planets.

If the gravitational fine structure constant were slightly smaller, stars and planets would not have been able to form, on account of the gravitational constraints necessary for coalescence of their constituent material. If stronger, the stars thus formed would have burned out too quickly to allow the evolution of life (as with the electromagnetic fine structure constant).

This evidence of “fine-tuning” has been the subject of considerable discussion among scientists, philosophers and theologians. It will be clear that the considerations are actually quite anthropocentric, in that the observations derive their significance partly on account of their assumption that life is carbon-based.

So what is the religious significance of this? There is no doubt that these coincidences are immensely interesting and thought-provoking, leading at least some natural scientists to posit a possible religious explanation for these observations. “As we look out into the Universe and identify the many accidents of physics and astronomy that have worked together to our benefit, it almost seems as it the Universe must in some sense have known that we were coming” (Freeman Dyson). It must be stressed, however, that this does not command general assent within the scientific community, despite its obvious attractions to a significant subset of that community which endorses the notion of a creator God.

The anthropic principle, whether stated in a weak or strong form, is strongly consistent with a theistic perspective. A theist (for example, a Christian) with a firm commitment to a doctrine of creation will find the “fine-tuning” of the universe to be an anticipated and pleasant confirmation of his religious beliefs. This would not constitute a proof of the existence of God, but would be a further element in a cumulative series of considerations which is at the very least consistent with the existence of a creator God. This does not mean that the factors noted above constitute irrefutable evidence for the existence or character of a creator God; few religious thinkers would suggest that this is the case. What would be affirmed, however, is that they are consistent with a theistic worldview; that they can be accommodated with the greatest of ease within such a worldview; that they reinforce the plausibility of such a worldview for those who are already committed to them; and that they offer apologetic possibilities for those who do not yet hold a theistic position.

But what of those who do not hold a religious viewpoint? What status might the “anthropic principle” have in relation to the long-standing debate about the existence and nature of God, or the divine design of the universe? God is a plausible explanation of anthropic phenomena. But is this the best explanation? Alternative perspectives certainly exist, even if they are generally of very recent origin. For example, some argue that apparent cosmic fine-tuning is nothing more an interesting happenstance. Peter Atkins, a physical chemist with strongly anti-religious views, notes that the “fine-tuning” of the world may appear to be miraculous; however, he argues that, on closer inspection, a purely naturalist explanation may also be offered. The fundamental constants in question had to have some value – so why not these ones? They need possess no further significance. To give an example: the population of the United States of America is about 300 million. There is only one president of the United States. The odds of any one American becoming president at any one time are thus one in three hundred million. It is highly improbable. But so what? Someone has to be president. It may be highly improbable that any given individual should be president, but it is a certainty that someone will be.

A related approach is taken by the Oxford philosopher Nick Bostrom, who argues that any special features of the universe which we might observe are ultimately illusory, and are the outcome of our restricted viewpoint. Since we could not exist in other situations (for example, those in which there is no resonance in 12C nucleus, enabling formation of elements heavier than helium), we will not observe these places, no matter how real and common they are. Bostrom thus argues that the central error of much anthropic thinking concerns a failure to appreciate that it represents nothing other than an *observational selection effect*.

And what of the notion of the “multiverse”? This debate continues, with no obvious sign of resolution. The crux of the debate is whether there exists a singular universe, or a multiplicity of universes. The possibility of multiple universes arises from the idea of an inflationary universe, first proposed by Alan Guth in 1981. One way of making theoretical sense of the observed properties of the universe is to suggest that it underwent massive inflation in the first instant – less than a trillionth of a second – of its existence. This involved the emergence of a multiplicity of universes.

On this approach, we happen to live in a universe with biologically-friendly properties. We do not inhabit or observe other universes, where these conditions do not pertain. Our insights are restricted by observation selection effects, which means that our location within a biophilic universe inclines us to propose that the entire cosmos possesses such properties, when in fact other universes will exist which are not conducive to the emergence of life. Indeed, some scientists argue that such biophobic universes are likely to be the norm. We happen to exist in an exceptional universe, and we have generalized from its properties. Our universe may possess anthropic properties. But others do not. The debate will continue, and its outcome is uncertain. But I think it’s interesting!

In this lecture, I have focussed on the notion of creation, and made some connections with some aspects of modern science. Of course, there is much more that needs to be said. The same is true for another scientific topic, which also opens up some important discussions and debates about a Christian doctrine of creation – Charles Darwin’s theory of evolution. In the next lecture in this series, we will look at this fascinating topic.

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1. Svante Arrhenius, *Worlds in the Making: The Evolution of the Universe*. New York: Harper, 1908, xiv. [↑](#footnote-ref-1)