

GOD AND THE MULTIVERSE: SCIENTIFIC, PHILOSOPHICAL, AND THEOLOGICAL PERSPECTIVES

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INTRODUCTION

“Since one of the most wondrous and noble questions about nature is whether there is one world or many, a question the human mind desires to understand *per se*, it seems desirable for us to inquire about it.”

- Albertus Magnus (as quoted in Dick 1982, 23).

“Thus is the excellence of God magnified and the greatness of his kingdom made manifest; he is glorified not in one, but in countless suns; not in a single earth, a single world, but in a thousand thousand, I say in an infinity of worlds.”

- Giordano Bruno (as quoted in Singer 1950, 246).

On March 17, 2014, Stanford University released a remarkable two-minute video.¹ It shows Chao-Lin Kuo, a faculty member in the Department of Physics, arriving unannounced at the suburban home shared by two of his colleagues, Andrei Linde and Renata Kallosh. As Linde and Kallosh open the door, Kuo, without salutation or preamble, announces: “So, I have a surprise for you. It’s five sigma at point two.” Kallosh, visibly shocked, manages to blurt out one word: “Discovered?” “Yes,” Kuo replies. Kallosh immediately embraces Kuo, while Linde, astonished, twice asks him to repeat himself. He can hardly believe what he is hearing. Moments later, the three physicists can be seen raising a champagne toast. As the video concludes, Linde turns to Kuo and, in voice trembling with emotion, says “Thank-you so much for doing this.”

Kuo was reporting the latest results from a research project that has been using increasingly sophisticated radio telescopes at the South Pole to examine Cosmic Microwave Background radiation emitted during the infancy of the universe. In particular, the project aims to detect a certain swirly pattern in polarized light known as “B-mode polarization”.² It is widely thought that evidence of this phenomenon would provide the strongest support yet for the theory of cosmic inflation. Linde is one of the pioneers of this theory, which posits that just 10^{-35} seconds after the Big Bang, the universe expanded by one hundred trillion trillion times in less than the blink of an eye.³ Many believe that this theory strongly suggests the existence of other universes beyond our own. Linde himself puts it simply and directly: “If inflation is there, the multiverse is there.”⁴ The results have yet to be published, and they may, of course, be disconfirmed. But if they stand up to scrutiny, this may well count as one of the most important discoveries in the history of cosmology. Several prominent scientists are already on record suggesting that the work of Kuo and his colleagues, if confirmed, will merit a Nobel Prize.⁵

The dramatic moment captured in this video represents one of the most recent episodes in a history of scientific, philosophical, and theological inquiry stretching back at least twenty-five hundred years in the Western world.⁶ In the fifth century BCE, the Greek atomists Leucippus and Democritus posited the existence of innumerable realms beyond our own, each with an earth at its centre, surrounded by planets and stars. In the third century BCE, Epicurus held the same view, and it was popularized by Lucretius in the first century BCE. In contrast, Plato (c.428-347 BCE) and Aristotle (384-322 BCE) rejected the idea of a plurality of worlds, and some early Christian thinkers such as Hippolytus, and Philastrius, in the third and fourth century CE, respectively, deemed it to be heretical. Augustine (354-430) and Aquinas (1224-1274) rejected it as well.

Three years after Aquinas' death, however, a momentous event occurred. In 1277, the Bishop of Paris condemned two hundred and nineteen propositions as heretical. The thirty-fourth of these asserted that God could not make several worlds. The condemnation of this claim allowed late medieval Christian thinkers to more openly consider the notion of multiple worlds, although they nevertheless generally rejected it.

When the Copernican revolution replaced the geocentric view with the heliocentric view, this paradigm shift and its many attendant astronomical discoveries ushered in an era even more hospitable to the consideration and development of many-worlds theories. Giordano Bruno (1548-1600) vigorously defended the plurality of worlds, as did Christiaan Huygens (1629-1695) and Bernard le Bovier de Fontenelle (1657-1757), both of whom claimed that stars were encircled by other planets, and indeed that these were inhabited. Together with the discoveries of Galileo Galilei (1564-1642) that diminished the overall significance of Earth's sun, the heliocentric view was eventually supplanted by what Carr (2007) calls the *galactocentric* view, according to which reality consists in the entire Milky Way.

The eighteenth and nineteenth centuries saw enormous debate among the leading intellects about the existence, nature, and scope of other worlds, whether they might be inhabited, and whether and to what extent they might conflict with Christian doctrine. Immanuel Kant (1724-1804) was one of the first to speculate that the Milky Way might not exhaust all of reality. These speculations were confirmed by Edwin Hubble (1889-1953) in 1924, thus ushering a shift to what Carr (2007) calls the *cosmocentric* view.

In the middle of the twentieth century, Milton Munitz wrote that "the essential problems confronting cosmology at the present time do not include active debate as to whether there is more than one universe" (1951, 254). Since then, however, multiple universe theories have proliferated, and they have increasingly gained scientific respectability. Today, there are many theories of multiple universes under serious consideration by physicists. As a result, Carr (2007) deems the cosmocentric view to have been replaced with the *multiverse* view. Some of the more prominent theories include (a) Everett's (1957) *many worlds* interpretation of quantum mechanics, which is defended by Deutsch (1997), Wallace (2012) and others; (b) Linde's (1986) *eternal inflation* view, which may have been confirmed by the results that Kuo related to Linde and Kallosh on their doorstep; (c) Smolin's (1997) *fecund universe theory*; which proposes that universes are generated through black holes; (d) the *cyclic model*, recently defended using string/M theory by Steinhardt and Turok (2007), which holds that distinct universes are formed in a never-ending sequence of Big Bangs and Big Crunches; and (e) Tegmark's (2007) "Level IV" multiverse, which posits many universes governed by distinct mathematical and scientific laws. The details, implications, and overall scientific standing of these are theories are widely contested at present.⁷

This volume is not about the historical antecedents of these views, nor is it about the contemporary scientific debate concerning them. Instead, it is primarily about the role played by multiverse theories in certain current debates in philosophy of religion. Before introducing these, I will briefly mention – in order to then set aside – one philosophical context in which multiverses feature prominently. In contemporary analytic philosophy of religion, multiverse

theories are frequently discussed in connection with *fine-tuning* arguments for the existence of God. There are many such arguments, but they all have the following basic structure. They begin by noting that if certain features of our universe had been slightly different, it would not have been capable of generating and sustaining life. They then claim that this apparent fine-tuning is best explained by the hypothesis of an intelligent designer who intentionally framed the universe to be biophilic. These arguments are, of course, hugely controversial. The most important criticism holds that they are undermined by multiverse theories. The basic idea is that if there are vastly many universes which vary (perhaps randomly) with respect to the relevant parameters, then it should not come as a surprise that at least one universe is life-permitting. So, in this context, multiverse theories are typically proffered as naturalistic *rivals* to theism.⁸

In recent years, however, several philosophers of religion have independently suggested that, far from being hostile to theism, multiple universes are what just what we should expect to find if God exists. This volume collects together twelve new papers that address this issue. The first two are by physicists, and the remaining ten are by philosophers. Before situating these papers with respect to the contemporary literature, and summarizing their arguments, I first set out some important aspects of the philosophical framework within which this discussion takes place. This will serve to set the stage.

THEISM, POSSIBLE WORLDS, ACTUALIZATION, AND CREATION

Much of contemporary analytic philosophy of religion addresses questions concerning the existence, nature, and activity of God. There are, of course, many models of God. Among philosophers, one of the most influential holds that God is a necessarily existing being who cannot be surpassed in power, knowledge, and goodness, and who is the creator and sustainer of all that is.⁹ Hereafter, I take *theism* to be to the claim that such a being exists.¹⁰ In the remainder of this section, I introduce a way of thinking about the idea of God as the creator and sustainer.¹¹ This will provide a basis for the subsequent section's discussion of axiology.

Philosophers of religion often employ the language of *worlds* to illuminate the idea that God is the creator and sustainer of all that is. In this parlance, one can say (very roughly) that the *actual world* is everything that really exists, whereas each *possible world* is a unique way that things might have been. There are many accounts of what possible worlds are. Some philosophers think they are concrete objects (e.g. Lewis 1986), while others say they are abstract objects (e.g. Plantinga 1974), and still others deem them to be convenient fictions (e.g. Rosen 1990). The details and implications of these and other views about possible worlds are controversial, and there is no consensus about which one is correct.¹² On any of these views, however, one can say that if theism is true, God surveys the landscape of possible worlds, and then selects ours to be the actual world.¹³ This process is called *actualizing* a world.

When considering the idea that God actualizes a world, it can be tempting to imagine (a) that God stands outside this landscape of possible worlds; that (b) God always *creates* something; and that (c) God determines each and every feature of the ensuing world (d) all at once; and that (e) God can choose any logically possible world for actualization. The first of these claims is false, and the rest are often denied by philosophers of religion.¹⁴

As noted, theism includes the claim that God is a necessary being: one who could not possibly fail to exist, or, equivalently, one who exists *in* all possible worlds. On this view, no sense can be made of the idea that God stands *outside* of the ensemble of worlds in order to select one for actualization. Since the possible worlds there are exhaust the way that things could be, there simply is no vantage point, divine or otherwise, entirely outside this ensemble.¹⁵

Second, while it is tempting to conflate world-actualization and *creation*, it is important to keep them distinct. Creation occurs, let's say, when God causes some spatiotemporal entity to be actual, but it's not the case that every instance of world-actualization involves this. Suppose

that God exists, but creates nothing at all. If so, there still is an actual world. We might call it the *bare world*, since it is empty – except for whatever uncreated entities (such as God, and perhaps numbers) it contains. God, of course, is still responsible for the bare world's being actual, and so it makes sense to say that God has *actualized* it, without *creating* anything.

Third, God's actualizing a world need not mean that he determines each and every feature of the resulting world. Consider, for example, random processes. If a world includes such processes, then God causes it to be the case that they occur, but he does not (by definition) determine their outcome. Next, consider libertarian freedom.¹⁶ Many theists maintain that human beings possess this kind of freedom, and that their free choices affect how the world unfolds. On this view, any world containing such creatures is *jointly* actualized by them and God. God is responsible, *inter alia*, for such a world's being the way it is prior to the introduction of creatures, and God is also responsible for the introduction of such creatures. But when they are introduced and begin to act freely, they too help make it the case that one world rather than another is actual. The resulting world, then, is partly the product of God's actions, and partly the product of creatures' actions.¹⁷

Fourth, there is no need to suppose that God's causal activity in actualizing a world is limited to one act at the (temporal or logical) beginning of that world. Some theists hold that God *intervenes* from time to time, and on this view, God performs many world-actualizing actions throughout the history of the world being actualized. In addition, as we have seen, theism holds that God's world-actualizing activity includes *sustaining* whatever is actual. This also suggests that this activity does not occur all at once at the outset of a world.

Finally, while it is tempting to suppose that God, given his omnipotence, can actualize any logically possible world, reasons have been offered for thinking otherwise. Consider, first, that there seem to be very bad logically possible worlds. One might think that while an omnipotent being would have the power to actualize such a world, a perfectly good being simply could not do so. On this view, such worlds, while logically possible, cannot be actualized by God.¹⁸ Another influential reason for thinking that God cannot actualize every logically possible world is offered by Plantinga (1972). Plantinga claims that there are true propositions about how libertarian-free creatures will behave if placed in certain circumstances.¹⁹ Although it is logically possible for these creatures to be in the relevant circumstances and to behave otherwise, Plantinga argues, not even God could actualize a world in which those find themselves in those circumstances, but freely act in ways other than those specified by these propositions. Given considerations like these, discussions of God's choice of a world often restrict their attention to those worlds that are *actualizable by God*.²⁰ In what follows, I presume this restriction.

WORLDS AND AXIOLOGICAL STATUS

So, philosophers of religion express the idea that God is the creator and sustainer by saying that God surveys the logical space of worlds within his power to actualize, and then selects exactly one world for actualization. But on what basis does God choose? Many philosophers have held that God chooses on the basis of the *objective value* of the worlds at issue. This section introduces a way of thinking and talking about the overall axiological status of worlds.

Consider such judgments as “it would have been far better had the Holocaust not happened”, or “things would be far worse if slavery had not been abolished”. These axiological evaluations aim to compare history as it really unfolded with one (or perhaps more) *counterfactual* histories: series of events that might have happened, but did not. At their broadest, such claims can be construed as comparative axiological judgments about worlds. Taken this way, to assert the former claim is to say that at least one possible world is better than the actual world, and to assert the latter is to say that at least one possible world is worse than the actual world. It is widely assumed in the relevant literature that worlds can coherently be

supposed to have both absolute and relative axiological status.²¹ If so, one can sensibly say that one world is good while another is bad, or that one world is better than or worse than another.

One way to spell out such claims is to say that a world, if actual, can bear, or fail to bear, *world-good-making* properties (hereafter WGMPs). These are properties that, *ceteris paribus*, tend to make worlds good.²² Equally, one might say that a world, if actual, can bear, or fail to bear, *world-bad-making* properties (hereafter WBMPs).²³ If this is correct, then the overall axiological status of a world can be understood to depend upon which WGMPs and WBMPs are instantiated in the world, and, for degreed properties, the degree to which they are exemplified.²⁴

This, of course, is just a framework for grounding absolute and comparative judgments of world-value. I have said nothing about which properties really are WGMPs or WBMPs, or about how they function, individually or jointly, or about what kinds of worlds really are good or bad. There are many different philosophical accounts of value, and these will have their own views about which properties are *world-good-making* or *world-bad-making* (and to what degree), and about whether and to what extent these properties can be jointly instantiated in a world, and about how they individually or jointly contribute to the overall axiological status of a world. A complete account would, presumably, settle these disputes. Moreover, such an account would also clarify the modal status of these properties, and would also reveal whether all worlds can really be compared, or whether, as some have held, there are genuine failures of comparability between worlds.²⁵ Of course, even if each world has an overall axiological status, and many or all pairs of worlds can be compared, this does not entail that finite creatures such as ourselves are always (or ever) capable of making the relevant judgments. But it is often taken for granted that God – an essentially omnipotent and omniscient being – would be able to make these judgments infallibly.²⁶ In the next section, I turn to some issues surrounding God’s choice of a world.

GOD’S CHOICE OF A WORLD

So far, then, the overall picture looks like this. Theists say that God is the creator and sustainer of all that is. Analytic philosophers of religion express this idea by saying that God selects one world for actualization, and that he does so on the basis of its axiological properties. Suppose, for the moment, that all worlds can sensibly be compared with respect to value; i.e., that there are no incomparable worlds. On this view, there are three distinct models of the hierarchy of possible worlds: either there is exactly one best of all possible worlds (as Leibniz famously thought), or else there are multiple unsurpassable worlds, or else there are no unsurpassable worlds, but instead an infinite hierarchy of increasingly better worlds. There are many thorny issues surrounding God’s choice of a world on each of these hierarchies, and I briefly survey these now.²⁷

Consider the first view, according to which there is one unique best of all possible worlds. It is natural to think that an omnipotent, perfectly good being will choose that world for actualization.²⁸ But if, given his attributes, God cannot fail to choose the best world, then one might wonder whether God’s choice counts as free.²⁹ If it doesn’t, one might wonder whether God’s world-actualizing action really is worthy of thanks and praise, as theists typically suppose it to be. Moreover, if God cannot fail to choose the best world, one might wonder whether there really are any other possible worlds. Let’s call these *the problem of divine freedom*, *the problem of thanks and praise*, and *the problem of modal collapse*, respectively. These can be thought of as in-house problems for theists. They can also be formulated as arguments for atheism.³⁰

Next, consider the second view, according to which there are multiple – and perhaps even infinitely many – unsurpassable worlds. Variants of the three problems just noted seem to arise here as well: if, as seems natural to suppose, God cannot fail to choose an unsurpassable

world, one might wonder whether God's choice counts as free, whether God's action is worthy of thanks and praise, and one might also wonder whether there really are any surpassable worlds at all. In addition, there are further questions to consider, on this view: assuming that God will choose an unsurpassable world, which one will he choose, and how, and can his choice be deemed rational?³¹ Again, these questions can be deemed to be in-house problems for theists, but they can also motivate arguments for atheism.

Finally, consider the third view, according to which there is an infinite hierarchy of increasingly better possible worlds. Several authors have argued, in various ways, that this view precludes theism. The basic idea is this: theism maintains that God is essentially unsurpassable, but no matter which world from the hierarchy God chooses, God could have selected a better one, in which case God is surpassable in either rationality, or goodness, or both. And this, of course, is inconsistent with the idea that God is essentially unsurpassable in these respects. *A priori* arguments for atheism along these lines in this vein can be grouped under the heading *the problem of no best world*.³²

Until now, we have supposed that all worlds can sensibly be compared with respect to value. If, however, this is false, further puzzles arise for the idea that God chooses one possible world to actualize. On what basis can God choose between incomparable alternatives? Various answers have been proposed, but it is sometimes argued that no choice between incomparable alternatives can be rational, and that this counts against theism if indeed there are genuine failures of comparability between worlds.³³

There is one further issue concerning God's choice of a world that must be mentioned here. Whether there is one unsurpassable world, or multiple unsurpassable worlds, or no unsurpassable worlds, critics of theism can argue (and have argued) that the actual world is surpassable. When such arguments invoke *a posteriori* premises about the existence, nature, scope, duration, or distribution of some type or token of evil, they belong to a family of arguments for atheism collectively known as the *problem of evil*. An enormous literature in contemporary analytic philosophy of religion concerns such arguments,³⁴ perhaps because the problem of evil is thought to be the strongest objection to theism.³⁵ As we will see, theistic multiverse theories are typically deployed in responses to arguments from evil.

WORLDS AND UNIVERSES

It is important to distinguish *worlds* from *universes*. It can be useful to speak of smaller domains within a world, and to deem some of these to be *universes*.³⁶ To say that a multiverse is possible, then, is just to say that at least one possible world features two or more universes. Whether the *actual* world really includes multiple universes is, of course, a complex and vexed question. Different scientific theories offer different accounts of what constitutes a universe, and, as noted, there is considerable controversy within the scientific community about whether there really are multiple universes. Most philosophers who have proffered or discussed theistic multiverse theories take universes to be spatiotemporally interrelated objects that do not interact with each other (e.g. Turner 2003; O'Connor 2008; Kraay 2010b). Some, however, appear to assume that universes are related to each other, either temporally (Stewart 1993), or by being embedded in a higher spatial dimension (Hudson 2006). Others are officially neutral on this issue (Forrest 1996; Draper 2004).

As we earlier restricted our attention to possible worlds *actualizable* by God, let's now restrict our attention to universes *creatable* by God.³⁷ Proponents of theistic multiverse theories typically believe that, like worlds, universes can sensibly be thought to have objective axiological status. Adapting the account given earlier, we might elaborate this idea with reference to a set of *universe-good-making* properties (UGMPs), and a set of *universe-bad-making* properties (UBMPs), such that the axiological status of universes depends upon which of these are

instantiated, and, for degreeed properties, to what degree.³⁸ Most theistic multiverse theories appear to assume that all universes can be compared with respect to value.³⁹ Some philosophers think it obvious that there are unsurpassable universes (e.g. McHarry 1978), while others hold that there are no unsurpassable universes (e.g. O'Connor 2008).

CONTEMPORARY THEISTIC MULTIVERSE THEORIES

The contemporary literature in analytic philosophy of religion on theistic multiverses begins with McHarry (1978), Forrest (1981), Parfit (1991, 1992) and Stewart (1993), all of whom briefly suggest that, in response to arguments for atheism that appeal to evil, theists could speculate that God has actualized a multiverse comprised of universes above some objective axiological threshold. The basic intuition these authors share is that God might reasonably be expected to create many such universes (assuming this is possible), and that it is more difficult to establish the surpassability of the multiverse as a whole than of one universe in particular. More recent and more developed proposals can be found in Forrest (1996); Turner (2003); Hudson (2006, 2013); Collins (2007), O'Connor (2008); Kraay (2010b, 2011b, 2012, 2013); Megill (2011); and Gellman (2012).⁴⁰

Theistic multiverse proposals are controversial. McHarry (1978) is criticized by Perkins (1980) and Monton (2010). Forrest (1996) is criticized by Monton (2010). Turner (2003) is criticized by Almeida (2008, 2010), Monton (2010), Kraay (2012), and Pruss (forthcoming). Hudson (2006) is criticized by Almeida (2008), Rea (2008), and Monton (2010). O'Connor (2008) is criticized by Oppy (2008); Mawson (2009); Almeida (2010);⁴¹ Craig (2010); Monton (2010); and Johnson (forthcoming). Kraay (2010b) is criticized by Monton (2010); Ijjas, Grössl, and Jaskolla (2013); Johnson (forthcoming); and Pruss (forthcoming). And Megill (2011) is criticized by Kraay (2013). Space does not permit a detailed discussion of every move and countermove in this complex debate.⁴² Instead, in the remainder of this section, I will set out some of the key features of the theistic multiverses that have been proposed, and the uses to which they have been put, along with some of the most important objections they face.

Defenders of theistic multiverses all maintain that an essentially omnipotent, omniscient, and perfectly good God will create only those universes that surpass some objective axiological threshold. Most maintain that God will create *every* universe above this threshold.⁴³ O'Connor, in contrast, denies this (2008, 119),⁴⁴ and others are silent or neutral on this issue (Stewart 1993; Forrest 1981, 1996).⁴⁵ Some defenders of theistic multiverses maintain that universes come in different *kinds* or *types*, and that God will choose at least one of each (Stewart 1993; O'Connor 2008; Forrest 1981, 1996). Some authors claim that there can be *duplicate* universes within a multiverse (Parfit 1992; Monton 2010), but others deny this, citing the Principle of Identity of Indiscernibles (McHarry 1978; Turner 2003). Still others are silent or neutral on this issue (Stewart 1993; Forrest 1981, 1996; Hudson 2006; O'Connor 2008; Kraay 2010a).

Some authors think that a theistic multiverse comprised of all and only those universes objectively worthy of being created and sustained by God is the unique best of all possible worlds (e.g. Turner 2003; Hudson 2006, 2013; and Kraay 2010b). If this is plausible, then the problem of no best world cannot arise, nor can the problem of how God is to choose between multiple unsurpassable worlds.

But arguments for the claim that such a multiverse is the unique best possible world face two major challenges. The first concerns the threshold of universe worthiness. Various construals of this threshold have been developed, and, predictably, these are controversial.⁴⁶ Moreover, it has been argued that if there are no unsurpassable universes, then it is incoherent to suppose that *any* threshold could be acceptable for an unsurpassable being to choose, since for any threshold one might specify, a higher one could be defended (Johnson, forthcoming).

The second major challenge holds that a multiverse of *all* worthy universes is logically impossible. Several philosophers appeal to considerations about personal identity in support of this claim.⁴⁷ Others argue that for any number of universes God could create, God could create even more – and that, accordingly, no multiverse can house them all (Monton 2010, Johnson forthcoming). It has also been argued that there are pairs of worthy universes such that only one can be included.⁴⁸ Finally, it has been argued that the idea of such a multiverse conflicts with the divine omniscience (Pruss, forthcoming), thus generating a contradiction for theistic multiverses.⁴⁹

Most defenders of theistic multiverses believe that their model will help theists respond to arguments from evil. As noted above, this is the primary application of these theories. They differ, though, in their estimation of how significant this assistance will be. Some think that multiverses can make a modest contribution to theistic responses (e.g. O'Connor 2008). Others think it has the resources to significantly enhance existing theistic strategies (e.g. Hudson 2013).⁵⁰ The limit case is Megill (2011), who believes that the bare epistemic possibility of multiple universes completely defeats all arguments from evil, past and present. All these claims are controversial. Draper (2004), Almeida (2008), and Monton (2010) have argued, in various ways, that theistic multiverse theories cannot defeat arguments from evil, and I have argued likewise (2012, 2013).⁵¹

Before turning to the present volume, a final word is needed about theistic multiverses and puzzles for theism. Even if it can be shown that some model of a theistic multiverse is logically possible, and indeed that it is the best of all possible worlds, and even if it is reasonable to believe that the actual world is (or probably is) such a multiverse, so that the problem of evil is either mitigated or resolved entirely, some of the puzzles pertaining to God's choice of a world would still remain. Theists would still have to address three problems noted earlier: the *problem of divine freedom*, the *problem of thanks and praise*, and the *problem of modal collapse*.⁵²

CHAPTER SUMMARIES

This volume opens with two chapters by physicists. In “Puzzled by Particularity”, Robert Mann argues that multiverse hypotheses spell trouble for both science and theism. After setting out some surprising features of our universe, including its biophilic character, he distinguishes four ways of accounting for them: randomness, cosmic necessity, intelligent design, and, finally, the postulation that our universe is part of a much larger multiverse. Mann concedes that there is indirect scientific support for the final view, but he thinks its attractiveness is merely superficial. He argues that multiverse theories involve two features (rampant duplication and Boltzmann brains) that severely compromise scientific inquiry. He also claims that multiverse theories are difficult to square with theism, in part because they are committed to the actual existence of massive quantities of evil, all of which are repeated arbitrarily many times.

In contrast to Mann, Don Page takes a much brighter view of both the scientific and theological potential for at least one multiverse model: the multiple ‘worlds’ postulated by the Everett interpretation of quantum theory. Page begins “The Everett Multiverse and God” by setting out some simplicity-based considerations that, he thinks, favour this interpretation. Page then entertains what he takes to be an even simpler explanation of why the world is as it is: the hypothesis that the actual world is the best possible world. Page supposes that the best possible world would be one that maximizes the intrinsic value of conscious experience, and he speculates that such a world would have to include an omnipotent, omniscient, omnibenevolent creator who has enormous appreciation for the mathematical elegance of the universe.⁵³ Page then argues that it is plausible to suppose that such a being would bring about an Everett multiverse.

The remaining contributions to this volume are all by philosophers. The papers in the next section explore various details and applications of theistic multiverses. Peter Forrest's chapter is entitled "The Multiverse: Separate Worlds, Branching, or Hyperspace? And What Implications Are There for Theism?" Forrest thinks that multiverse views can offer good accounts of agency, freedom, time, and probability. After distinguishing several distinct multiverse theories, Forrest says that theists should prefer a view called *hyperspace*, on which universes are four-dimensional subspaces of a larger overall structure containing more – and perhaps many more – dimensions. He closes by expressing tentative support for a version of pantheism, according to which God just is the actual universe. (Later chapters by Nagasawa and Leslie consider different forms of pantheism.)

Jason Megill's chapter, "An Argument for Modal Realism", defends the claim that there are at least two worlds containing literally concrete entities. This view is inconsistent with the view that all possible worlds are abstract objects, but is consistent with (although considerably more modest than) the modal realism of Lewis (1986), which holds that there are infinitely many concrete worlds. Megill's argument contains only two premises. The first is "if an entity *e* is possibly literally concrete in the actual world, then there is a possible world *w* in which it is literally concrete", and the second is "there (i) is an entity *e* that is possibly literally concrete in the actual world but (ii) *e* is not literally concrete in the actual world." Megill offers three arguments in favour of each premise, and then considers what bearing his view has for theism. He argues that theists should favour a restricted modal realism according to which (1) God ensures that there are no universes unworthy of divine creation, and (2) there are not so many universes that fine-tuning arguments for theism are undermined.

The final paper in this section is by Donald Turner. In an important previous publication, Turner (2003) argued that the hypothesis of many universes can be deemed a partial solution to the problem of evil. In this chapter, "Revisiting the Many Universes Solution to the Problem of Evil", Turner responds to several objections to his view. Contra Monton (2010), Turner argues that an omnipotent, omniscient, perfectly good God would create every universe with a favourable balance of good over evil – and if duplicates are possible, God would create all possible duplicates of these as well. Turner next addresses a series of objections due to Almeida (2008), several of which claim that Turner's multiverse is logically impossible. He resists Almeida's claim that his multiverse is the only possible world, but concedes to Almeida that his view entails that God is not free to select any other world, and that no evil is genuinely gratuitous. Finally, Turner disagrees with my judgment (expressed in Kraay 2012) that his multiverse theory will not significantly help theists respond to the problem of evil.

The next section of the volume includes three papers that are (largely) critical of multiverse theories. In a previous publication, I argued that theists should expect the actual world to be a theistic multiverse (TM) comprised of all and only those universes that are worthy of being created and sustained by God (Kraay 2010b). I further claimed that this would be the unique best possible world. Accordingly, I urged, this view would evade two *a priori* arguments for atheism that depend upon there being no such thing. I have also argued that this view will simply reframe existing debates concerning *a posteriori* arguments for atheism, without advantaging either side (Kraay 2010b, 2012). Michael Schryinemakers' chapter, "Kraay's Theistic Multiverse", responds to these claims. He argues that no divinely furnished multiverse can possibly include *all* worthy universes, in which case there is no reason to suppose that TM is the unique best of all possible worlds, and, accordingly, no way for theists to appeal to TM to evade these *a priori* arguments for theism. Schryinemakers also argues, however, that a model like TM will make it more difficult to argue for atheism *a posteriori* by appealing to the surpassability of the actual world in general, or to the presence of evil in particular. In this respect his position is similar to that of Turner.

Michael Almeida agrees with Michael Schryinemakers that a multiverse comprised of all and only worthy universes is not logically possible, but he offers a different argument for this

conclusion. In his chapter, “Best Worlds and Multiverses”, Almeida assumes for reductio that necessarily God actualizes the best possible world – a world containing, inter alia, *all* universes in which all moral agents always observe all requirements of justice and beneficence and *no* universes in which all moral agents always violate all requirements of justice and beneficence. If, necessarily, God actualizes this world, then there are no alternate possibilities. In particular, it is not metaphysically possible for there to be universes in which all moral agents always violate all requirements of justice and beneficence. But, Almeida argues, such universes must be metaphysically possible in order for there to be universes in which all moral agents always observe all requirements of justice and beneficence. This is because observing all requirements of justice and beneficence requires significant moral freedom, and this sort of freedom, Almeida thinks, requires the existence of alternative metaphysical possibilities. Accordingly, he thinks, there can be no theistic multiverse comprised of all and only worthy universes.

Jeremy Gwiazda’s chapter, “On Multiverses and Infinite Numbers”, considers this question: “How many universes are there in the multiverse?” Gwiazda argues that a non-standard conception of infinite numbers, on which infinite numbers behave very much like finite numbers, is preferable to the Cantorian view of infinite natural numbers. He then argues that this conception lowers the prior probability of there being a multiverse comprised of infinitely many universes. This, of course, is a far more modest criticism of theistic multiverse theories than the ones levelled by Schryinemakers and Almeida.

The next section of the volume explores pantheistic views of ultimate reality. In “Multiverse Pantheism”, Yujin Nagasawa distinguishes traditional pantheism (the view that God is identical with our universe) from multiverse pantheism (the view that God is identical with the multiverse posited by Lewisian modal realism). He then sets out three objections to the former view: the universe cannot be God because (a) it is finite, while God is supposed to be infinite; (b) it contains evil, but God is supposed to be perfect; and (c) it is unworthy of worship, whereas God is supposed to be worship-worthy. Nagasawa then argues that multiverse pantheism fares better than does traditional pantheism against objections (a) and (c), but that it is vulnerable to a version of (b).

In his chapter, “God and Many Universes”, John Leslie defends a worldview that one might call pantheistic idealism.⁵⁴ Whereas the pantheism Nagasawa considers treats our universe as a concrete object, on Leslie’s view, what we call our universe just is a thought pattern contemplated by a divine mind. Moreover, there are infinitely many other universes, each of which just is a thought pattern contemplated by another divine mind. Leslie thinks that these minds exist because it is ethically or axiologically good for them to exist. Leslie is neutral between four ways of using the term “God” on this worldview: God might be (a) the entire multiverse of divine minds, taken together; (b) the mind whose thoughts comprise *our* universe; (c) the principle that the ethical/axiological need for existence is creatively powerful; or (d) an all-seeing, personality-imbued region of an infinite mind. After setting out some further details of his world-view, Leslie argues that it can be defended against the problem of evil.

The final two papers consider what bearing multiverses might have for the Christian doctrine of the Incarnation.⁵⁵ In his chapter, “Extraterrestrial Intelligences and the Incarnation”, Robin Collins first offers reasons for supposing that there are many other non-human ‘races’ of vulnerable, embodied conscious agents (VECAs). He then argues that Christians have good reason to believe that many of these have, like ourselves, fallen, and that it is extremely improbable that God would become incarnate only in our own race. Thus Christians should be motivated to develop a theologically satisfying model of multiple incarnations. He then considers several models of the Incarnation, and argues that all but one of them are entirely compatible with multiple incarnations, and that even this one can be made so, given certain assumptions concerning time. In their chapter, “The Incarnation and the Multiverse”, Timothy O’Connor and Philip Woodward suggest similar motivations for developing a model of multiple incarnations. They set out and defend a version of a compositional theory, according to which an

incarnate deity has two natures, each of which is a distinct component of its being. They then extend this model to permit multiple incarnations. Finally, they consider an objection to this model based on the theological idea that Christ's work is necessary for ushering in a united community of all divine-image-bearing creatures. In response, they speculate that no such all-encompassing community would be possible, given the vast differences between such creatures. Accordingly, they speculate that each incarnation could help to bring about a unified community of the relevant sort of divine-image-bearing creatures, and that each of these communities would, in its own way, participate in the common goal of union with God.

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NOTES

¹ The video can be found at: www.youtube.com/watch?v=ZlfIVEy_YOA. At the time of this anthology's publication, it had been viewed almost three million times.

² More information can be found on the project website: www.cfa.harvard.edu/CMB/bicep2/science.html. The as-yet-unpublished results were also released on March 17, 2014, and can be found at: <http://bicepkeck.org/>. Press coverage of these results can be found in Amos (2014), Clark (2014), Grossman (2014), and Overbye (2014).

³ For more, see Nasa's news release at: www.jpl.nasa.gov/news/news.php?release=2014-082.

⁴ As quoted in Grossman (2014).

⁵ Amos (2014), Clark (2014), and Grossman (2014) report that this sentiment has been expressed by Alan Guth (MIT), Andrew Jaffe (Imperial College) and Avi Loeb (Harvard), respectively.

⁶ What follows is a mere sketch of this history. More comprehensive presentations can be found in Lovejoy (1936); Munitz (1951); Dick (1982); and Crowe (1996, 2008). I should stress that, down through the ages, thinkers have meant very different things by terms like 'world', 'cosmos', and 'universe' (and by the words variously translated into these) and this, of course, significantly complicates the relevant intellectual history.

⁷ For opinionated introductions of these and other multiverse theories, see: Leslie (1989); Rees (2001); Kaku (2005); Susskind (2005); Vilenkin (2006); Carr (2007); Gribbin (2009); Greene (2011); Barrow (2012); and Wallace (2012).

⁸ Good introductions to these arguments, and to multiverse-based criticisms of them, can be found in Himma (2006), Collins (1999, 2006, 2007, and 2009), Manson (2003, 2009), and Ratzsch (2010).

⁹ There are, of course, many other models of God. Good introductions to the wide diversity of models of God currently discussed by analytic philosophers include Diller and Kasher (2013) and Nagasawa and Buckareff (forthcoming).

¹⁰ Most papers in this volume engage with this view of God, but those by Yujin Nagasawa and John Leslie (Chapters 9 and 10, respectively) instead consider a *pantheistic* conception of God.

¹¹ For more on this topic, see Kraay (2008) and Kraay, Chantler, and Lougheed (forthcoming).

¹² Good entry points into the vast literature on possible worlds are Divers (2002); Shalkowski (2011); Parent (2012); and Menzel (2013).

¹³ There is some controversy in the literature concerning whether theism is compatible with the modal realism of Lewis (1986). For a survey of this issue, see the section entitled "God and Modal Realism" in Kraay, Chantler, and Lougheed (forthcoming).

¹⁴ The next four paragraphs are adapted from Kraay 2008 and Kraay 2010b.

¹⁵ In Chapter Five in this volume, Donald Turner says that God is outside of all worlds, but he means something different by ‘world’: “... a single maximal spatiotemporal aggregate, a cosmos or universe.” [page number needed at proof stage.] On his view, there is a vantage point outside the set of all these.

¹⁶ A good entry point into the massive literature concerning free will is Kane (2011).

¹⁷ On this point, see Plantinga (1972, 169-190).

¹⁸ On this issue, see Guleserian (1983) and the other papers cited under the heading “God and Bad Worlds: The Modal Problem of Evil” in Kraay, Chantler, and Kougheed (forthcoming).

¹⁹ These have come to be called *counterfactuals of creaturely freedom*. For good introductions to the debate about such claims, see Flint (2009) and Zagzebski (2011). For some of the latest moves, see the papers collected in Perszyk (2011).

²⁰ An alternative move here (and one that I favour) is to claim that these putatively-possible-but-not-divinely-actualizable worlds are not, after all, genuine possibilities, given theism. Thomas Morris, for example, says that

God is a delimiter of possibilities. If there is a being who exists necessarily, and is necessarily omnipotent, omniscient, and good, then many states of affairs which otherwise would represent genuine possibilities, and which by all non-theistic tests of logic and semantics do represent possibilities, are strictly impossible in the strongest sense. In particular, worlds containing certain sorts of disvalue or evil are metaphysically ruled out by the nature of God, divinely precluded from the realm of real possibility (1987, 48).

²¹ One explicit discussion of this issue is Menssen (1996).

²² Candidate WGMPs pick out a property held to be good-making. Traditional examples include: the presence of free moral agents in the world, the favourable balance of moral actions over immoral ones, the variety of phenomena in the world, and the simplicity of a world’s governing laws.

²³ Candidate WBMPs typically appeal to the presence of unjustified evil or suffering in the world. On the Augustinian view, according to which evil is in fact the absence of good (*privatio boni*), every WBMP would presumably refer to the *absence* of a WGMP. There may be such WBMPs, and there may also be WBMPs that are the *contraries* of WGMPs, and there may be other, different, WBMPs.

²⁴ It may be that certain good-making properties cease to make worlds better past a certain point, or in certain combinations. The same goes, *mutatis mutandis*, for WBMPs. So, while the goodness of a world depends on its axiological properties, this dependency may not be simple.

²⁵ I discuss both issues in Kraay (2011a and 2012). For a survey of literature relevant to the latter issue, see Kraay, Chantler, and Lougheed (forthcoming).

²⁶ One important dissenting view is called *Open Theism*. For discussions that situate this view relative to alternatives, see Flint (2009) and Zagzebski (2009). For an influential defence of it, see Pinnock *et.al.* (1994).

²⁷ For discussions of the key literature on these three issues, see Kraay (2008) and Kraay, Chantler, and Lougheed (forthcoming).

²⁸ Adams (1972) denies this, but his argument has been widely criticized. One particularly clear critic is Rowe (2004).

²⁹ On divine freedom, see Rowe (2004) and Timpe (2014).

³⁰ Such arguments proceed by claiming, first, that theists cannot plausibly give up (some relevant conception of) divine freedom, or divine thankworthiness and praiseworthiness, or the claim that there really are sub-optimal possibilities. They then urge that one or more of these is incompatible with the idea that God cannot fail to choose the unique best world.

³¹ For further discussion, see Kraay (2008).

³² For further discussion, see Kraay (2010a).

³³ For further discussion, see Kraay (2011a).

³⁴ A good starting point is McBrayer and Howard-Snyder (2013).

³⁵ For results of a 2012 survey, see de Cruz (unpublished).

³⁶ Some contemporary authors, however, use ‘universe’ and ‘world’ in precisely the opposite way, and others use different terminology altogether. For consistency and simplicity, I will employ the dominant nomenclature.

³⁷ It is generally thought that possible worlds (unlike universes) can neither be created nor destroyed, which is why the term ‘actualize’ is used for God’s activity in making a world actual. For clarity, then, it is useful to reserve the term ‘create’ for universes.

³⁸ I suggested earlier that the dependency of the axiological status of a world on its WGMPs and WBMPs need not be simple. Similarly, the dependency of the axiological status of *universes* on the relevant properties need not be simple. One further point. Some WGMPs can equally be deemed *universe-good-making* properties. But not all: consider the property *comprising many good universes*. While this is a plausible *world-good-making* property, it cannot be a *universe-good-making* property.

³⁹ One exception is O’Connor (2008).

⁴⁰ One physicist, Don Page, has also expressed his sympathy for the idea of a theistic multiverse (Page 2010, and see also Chapter 2 in this volume).

⁴¹ O’Connor (2010) responds.

⁴² For an annotated guide to this literature, see Kraay, Chantler, and Lougheed (forthcoming). For an opinionated survey of it, see Kraay (2012).

⁴³ McHarry (1978); Turner (2003); Hudson (2006, 2013); Kraay (2010).

⁴⁴ O'Connor's denial that God will create every universe above the threshold has been criticized in various ways (Almeida 2010, Monton 2010).

⁴⁵ See also Draper 2004.

⁴⁶ I survey this discussion in Kraay (2012).

⁴⁷ As recorded by Turner (2003), Pruss advances this objection. As recorded by Kraay (2012), Peter van Inwagen and Tom Talbott also offered it. It is also advanced by Almeida (2008, Chapter 7 in this volume) and discussed in Lougheed (forthcoming).

⁴⁸ I discuss one such objection due to Pruss in Kraay (2012).

⁴⁹ The papers by Michael Schryinemakers and Michael Almeida (Chapters 6 and 7 in this volume) offer new arguments for the logical impossibility of a theistic multiverse comprising all and only universes worthy of being created and sustained.

⁵⁰ Michael Schryinemakers' paper (Chapter 6 in this volume) also argues for this claim.

⁵¹ To date, attempts to deploy theistic multiverse theories in response to arguments from evil have generally not engaged with the latest developments in the debate concerning the latter. Perhaps this is why Hudson deems this work "promising but underdeveloped" (2013, 246).

⁵² These arguments, of course, can be levelled against any view of what this best world is – they do not just target multiverse models.

⁵³ Page here inverts the traditional argument, made by Leibniz and others, which holds that since God exists, the actual world must be the best of all possible worlds. A similar appeal to multiverse-based aesthetic considerations can be found in Hudson (2006).

⁵⁴ Leslie is the leading contemporary proponent of this view, having defended it at length elsewhere, notably in Leslie (2001).

⁵⁵ This is not, I should stress, an entirely new question for Christian theology. Shortly after Copernicus published *De Revolutionibus Orbium Coelestium* in 1543, the Lutheran reformer Philipp Melanchthon challenged heliocentrism by warning that it might foster either the unorthodox idea that Christ's redemption would be unnecessary for denizens of other worlds, or else the absurd idea that Christ would manifest himself in such worlds. Many other thinkers have also grappled with this issue. (For more, see Dick 1982; Crowe 1996; and Crowe 2008). In the contemporary literature on multiverses in analytic philosophy of religion, however, only Hudson (2006, Chapter 8) considers how one multiverse view (his theory of hyperspace) bears on Christian doctrine.

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