

Expanding Theistic Multiverses

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ABSTRACT: This paper argues that multiverses that expand in a divine meta-time are plausible candidates for unsurpassable worlds. Proponents of the exhaustive theistic multiverse claim that the best possible world is a world in which god creates all and only the universes that are worth being created. The cardinality objection, one of the most pressing objections against this conception of an unsurpassable world, is based on the assumptions that for every cardinal number \aleph , there can be more than \aleph creation-worthy universes and that necessarily, there are not proper class many universes. This paper introduces expanding theistic multiverses as novel candidates for unsurpassable worlds. In an expanding theistic multiverse, creation takes place in a divine meta-time. This allows us to hold that at no point in meta-time are there proper class many universes, but every cardinal number \aleph is such that at some point in meta-time there will be more than \aleph universes. These features of expanding theistic multiverses will be shown to defuse the cardinality objection if it is assumed that the expanding multiverses have an expansionist metaphysics of meta-time according to which the domain of universes increases when meta-time passes.

According to the hypothesis of the *exhaustive theistic multiverse*, god creates all and only the universes that are worth being created (see, e.g., Hudson 2005; Kraay 2010). God thereby creates a maximally good world, a world that cannot be surpassed. There can be no better world than a multiverse that comprises all and only the creation-worthy universes, or so the defender of the exhaustive theistic multiverse thinks. One of the most pressing objections against this hypothesis is the *cardinality objection*, which is based on the following three premises:

- (1) Necessarily, for every cardinal number \aleph , it is possible for there to be more than \aleph creation-worthy universes.
- (2) Necessarily, there is a cardinal number \aleph such that there are fewer than \aleph creation-worthy universes.
- (3) Necessarily, if there is a cardinal number \aleph such that the world includes fewer than \aleph creation-worthy universes and it is possible for there to be more than \aleph creation-worthy universes, then the world is surpassable.

From (1) and (2) it follows that necessarily, there are fewer creation-worthy universes than there could possibly be. Together with (3), this yields the result that necessarily, the multiverse is surpassable; no possible multiverse qualifies as a best possible world (see, e.g., Monton 2010; Rubio 2020 for variants of this objection).

In this paper, I argue that a variant of the hypothesis of the exhaustive theistic multiverse can escape the cardinality objection. This variant is based on the idea that the creation of universes proceeds in a divine meta-time. In this meta-time, god continuously creates new

universes such that for every cardinal number κ , god will at some point have created more than κ -many universes. This allows us to accept that necessarily, at every point in meta-time there are fewer than proper class many universes although there is no cardinal number of universes that will not be exceeded at some point in meta-time.¹

I will describe a class of possible worlds and argue that every world in this class is unsurpassable. According to the result I will argue for, there is more than one possible and unsurpassable world. I will not argue for there being a uniquely best possible world. Hence, my proposal burdens god with the task of choosing one of the many unsurpassable worlds. I assume that god is able to perform this task, but I will not defend this assumption in this paper.

In the first section, I will give a brief exposition of the cardinality objection and the motivations for accepting premises (1)–(3). The second section will develop the hypothesis of the expanding multiverse. Finally, in the third section the cardinality objection will be revisited and I will argue that expanding multiverses can escape it. For this it will be crucial to argue that there is no vantage point (not even for god) from which one can quantify over everything that meta-will exist. Like the growing block theorist holds that there are no future people (although there will be people in the future), the defender of this proposal holds that, for some κ , there are no more than κ -many universes, although there will be more than κ -many universes.

1. The Cardinality Objection

I begin by showing that the argument presented in the introduction is valid. To do so, I will provide a formalisation of the argument that will also prove useful for clarifying how my response to the argument works. Afterwards I will comment on each of the premises and briefly point to the ways in which they are defended in the literature.

To formalise the argument, I use ' κ ' as a variable to quantify over cardinal numbers. To refer to the number of creation-worthy universes that exist at a given modal context, I introduce ' v ' as a definite description that denotes the number of creation-worthy universes. This description is not rigidified, it changes its value in accordance with the modal context. Accordingly, ' $\forall \kappa \Diamond (v > \kappa)$ ' stands for the claim that for every cardinal number, possibly there are v -many creation-worthy universes with $v > \kappa$. Furthermore, '*Surp*' is used as a sentential constant such that necessarily, '*Surp*' is true iff the world is surpassable.

With this notation in place, the argument can be formalised as follows:

$$(1) \quad \Box \forall \kappa \Diamond (v > \kappa)$$

$$(2) \quad \Box \exists \kappa (\kappa > v)$$

$$(3) \quad \Box (\exists \kappa ((\kappa > v) \wedge \Diamond (v > \kappa)) \rightarrow \textit{Surp})$$

$$(1) \text{ and } (2) \text{ yield: } (1+2) \quad \Box \exists \kappa ((\kappa > v) \wedge \Diamond (v > \kappa))$$

¹ After this paper had been accepted, I learned that Nevin Climenhaga briefly sketches a structurally similar proposal concerning the creation of people in Climenhaga (2025, 221ff).

Together with (3) this yields $\Box\text{Surp}$ (i.e., the result that every possible world is surpassable), given the modal axiom K .

In what follows, I will briefly present the respective motivations for upholding (1)–(3). In doing so I will roughly follow the presentation of Daniel Rubio (2020).

Rubio motivates (1) by arguing that the proponent of a best world should assume that there can be arbitrarily many duplicates of every universe worth creating. If there can be \aleph duplicates of some universe (with \aleph being an arbitrary cardinal number), then, so Rubio argues, there is no reason to deny that there can be 2^\aleph -many duplicates of this universe. Accordingly, for every \aleph , one should accept that there is a possible world inhabiting more than \aleph -many duplicates of this universe.²

A related line of thought does not concern duplicates of universes, but rather that there is no upper bound on the number of angels (or other entities) in a universe. Gabriel Uzquiano and John Hawthorne argue that “no aleph manages to set an appropriate upper bound on the possible cardinalities of angels dancing on the point of a needle” (Hawthorne and Uzquiano 2011, 58). It seems plausible that for every number, there is a creation-worthy universe containing this number of angels.

To defend premise (2) it has to be shown that there is a cardinality of universes or, differently put, that there are not proper class many universes. This directly follows from the more general assumption that there are not proper class many entities that are not sets. This more general assumption follows from the Urelement Set Axiom. Call an entity an urelement if it is not a set. The Urelement Set Axiom says that there is a set of all urelements. Every set has a cardinality. Consequently, if there is a set of all urelements, then there are not proper class many non-sets. For defences of the Urelement Set Axiom being a necessary truth, I direct the reader to Hawthorne and Uzquiano (2011, §6.2) (see also §6.1 and §6.3 of said paper for further strategies that can be used to motivate premise (2)).

Premise (3) is motivated by the simple idea that more creation-worthy universes are always better. Rubio summarizes this idea as follows: “If a multiverse omits a universe that the exhaustive multiverse] TM contains, it omits a universe worth creating. This gives it strictly fewer good things than TM . That sounds worse” (Rubio 2020, 812). Simple as this idea seems, it has a lot of argumentative force.

I do not claim that there cannot be reasonable disagreement about the motivation of the individual premises. However, I contend that the cardinality objection is strong enough to make it reasonable to investigate whether the argument can be escaped without objecting to the way in which the given premises are motivated.

2. The Expanding Multiverse

The basic idea standing in the background of the expanding multiverse hypothesis is that the creation of universes takes place in a time and that there is a temporal order in which universes are created. The time in which the divine creation takes place is not our ordinary time, but a divine meta-time, a temporal dimension that is distinct from ordinary time and

² Rubio also proposes the following variant of his reasoning that does not presuppose that there can be qualitative duplicates of universes: Take universes that only differ with respect to the favourite cardinal number of a skilled mathematician. Rubio holds that “since it is plausible that Gödel, Cantor, or von Neumann was free to select any of the cardinal numbers as his favourite, it is plausible that there are trivial variants of this universe in one-to-one correspondence with the cardinals” (Rubio 2020, 813).

that is not experienced by us humans.³ The expanding multiverse hypothesis will be argued to escape the cardinality objection. It will be argued that a multiverse can be both unsurpassable and such that at every point in meta-time, there will be a cardinal number κ that is the number of universes that exist in the multiverse. In this section, the expanding multiverse hypothesis will be presented. How it allows us to rebut the cardinality objection will be discussed in the next section.

In this paper I will assume the following four theses about divine meta-time:

(A) Every set of points in meta-time is totally ordered by the meta-before-relation (expressed by ' \prec ').

(B) The meta-time is expansionist.

(C) For every cardinal number κ there will be a point in meta-time mt such that there will be more than κ points of meta-time in the past of mt .

(D) At every point in meta-time, the points of meta-time in the past of mt form a set.

My defence of the expanding theistic multiverse against the cardinality objection works if (A)–(D) are accepted, or so I will argue. In the remainder of this section I will briefly comment on (A)–(D) with respect to their relevance for the present purpose.

Thesis (A) is taken to be a necessary condition for something to count as a time with a single temporal dimension. It assures that for every two points in meta-time, there is a fact of the matter which of them is meta-temporally prior.

Thesis (B) says that the meta-time is expansionist. I take this to be the claim that (i) if something exists at a point in meta-time, it meta-will⁴ never go out of existence and that (ii) not always everything always exists. Over meta-time, the ontology expands. The most prominent expansionist position in the metaphysics of ordinary time is the growing block view. According to this view, a spacetime point stays in existence once it came into existence and the spacetime-block grows over time. One of the claimed advantages of the growing-block theory is that it allows us to account for the asymmetry between past and future, whereas past events (still) exist, future events do not exist, yet (see, e.g., Rosenkranz and Correia 2018 for a defence of the growing-block view).

Expansionism entails the failure of permanentism, understood as the claim that always everything always exists. Most *B*-theories of time are permanentist, and so is the moving spotlight theory, according to which future and past existents are equally real and there is a privileged present (see Emery, Markosian, and Sullivan 2020 for an introduction to the distinction between *A*-theories and *B*-theories of time and Cameron 2015 for a defence of the moving spotlight theory).

Following the literature (see, e.g., Sullivan 2012; Correia and Rosenkranz 2020), I will take temporaryism to be the negation of permanentism. For the present purpose, it is

³ Such a further temporal dimension is also sometimes called hypertime (see, e.g., Hudson 2014). I choose to talk of meta-time, because the application for the further temporal dimension in this paper is different from both the applications discussed by Hudson and the applications the concept finds in DC Comics (see, e.g., Wallace 2008). Furthermore, some of the assumptions I will make concerning meta-time (specifically the assumption (C) given below) are standardly not made for hypertime.

⁴ In what follows I will standardly suppress the 'meta-' prefix if it is clear from the context that I am talking about the meta-time.

important that temporaryism holds for meta-time. The reason is as follows: Call a world *bound* iff there is a cardinal number \aleph_{max} such that there never will be more than \aleph_{max} universes and call it *unbound* just in case it is not bound. Call a world *orderly* if at every point in meta-time there is a cardinal number \aleph_{\square} (a supremum) such that there are not more than \aleph_{\square} universes. I will argue that unsurpassable possible worlds are both unbound and orderly. Permanentism would yield that there never will exist a universe that does not already exist now, a result that is incompatible with the world being both unbound and orderly.

If premise (1) holds, then no bound world is such that it exhausts all creation-worthy possible universes. Orderliness will be relevant, because if it failed in a world, there would be a point in meta-time at which there exist proper class many universes at this world. This is impossible according to premise (2).

Another hypothesis in the metaphysics of time that is compatible with the failure of permanentism is presentism. Presentism allows that there were things that do not exist any more. For the purpose of this paper, it will simplify matters if it is assumed that whatever is created by god at some point in meta-time stays in existence from then on. This allows us to hold that once universes have been created (in meta-time), they from then on will be part of what there is. For this reason, an expansionist ontology will be assumed.

Thesis (C) says that there is no upper bound to the points in the future. For every cardinal number \aleph , at some point there will have been more than \aleph points in meta-time. I assume that universes continue to exist in meta-time once they are created. Accordingly, the number of universes never decreases. For every two points in meta-time mt_1 and mt_2 , if $mt_1 < mt_2$, then every universe that exists at mt_1 also exists at mt_2 . For every universe, we can say when in divine meta-time it came into existence. Given that the world is orderly, for every point in meta-time mt , there is a cardinal number \aleph that is the cardinality of the universes that exist at mt . These are the universes that get created at mt or at a point in meta-time that is in the meta-past of mt .

If world w is unbound and orderly, then there is no upper bound to the points in the meta-future of any point in meta time mt . There is no upper bound cardinal number \aleph_{t-max} such that there will never have been more than \aleph_{t-max} points in meta-time. This can be shown as follows: Assume that there is an upper bound cardinal number \aleph_{t-max} for world w . Then, by the world being orderly, there would be a set of \aleph_{t-max} cardinalities, the set of cardinalities such that at some point in meta-time there exist (or will exist) exactly so many universes in w . Every set of cardinalities has a supremum, a cardinality such that no cardinality in the set is larger than it. This cardinality would be an upper bound on the number of universes that will ever exist at w and hence w would be bound.

Taking the motivation that supports premise (3) of the cardinality objection seriously gives us the result that every orderly and bound world is surpassable. The purpose of this paper is to show that there can be an orderly unsurpassable expanding multiverse. For this reason, the conception of meta-time has to allow for orderly and unbound worlds. The above consideration shows that if the world is an unbound and orderly expanding multiverse, then (C) is true.

At the same time, *thesis (D)* gives us that at every point in meta-time there will have been fewer than proper class many points in meta-time. Even if points in meta-time count as entities, this allows us to maintain that there are always fewer than proper class many entities. This assumption is important for the expanding multiverse to escape the cardinality objection and to do justice to the motivation of premise (2).

One might wonder whether a meta-time of which (C) and (D) are true qualifies as a time. Ordinary time is very often assumed to be a continuum, although this thesis is disputed (for critical discussion see Dummett 2000). The salient alternative to continuous time is assumed to be discrete time (see, e.g., Forrest 1995). On both views of time, (C) fails. I acknowledge that the kind of meta-time defended in this paper is very different from what ordinary time is on most (if not all) reasonable hypotheses. Nevertheless, I do not see any reason to suppose that god should be unable to let the creation of universes successively take place in a quasi-temporal structure for which (C) and (D) hold.⁵ I suggest to use ‘meta-time’ to refer to this structure, but it should be clear that there are important differences to ordinary time.

To make the creation of universes formally tractable, it is worth pointing out that it can be modelled analogously to the potential creation of abstract objects as it is modelled in debates concerning the potential (rather than actual) infinite and in modal set theory (see, e.g., Linnebo 2013; Linnebo and Shapiro 2019). We can take a set of points \mathcal{S} that represent creation-worthy universes and give a model of which universes god can create at which point in meta-time. The possible world-states concerning these universes are given by $P(\mathcal{S})$, the power-set of the universes. A binary accessibility-relation R on $P(\mathcal{S})$ can be defined such that for all $\mathcal{S}', \mathcal{S}'' \in P(\mathcal{S})$, $R(\mathcal{S}', \mathcal{S}'')$ iff $\mathcal{S}' \subseteq \mathcal{S}''$. If at a point in meta-time $\mathcal{S}' \in P(\mathcal{S})$ are all and only the universes of \mathcal{S} that are created, it is possible for god at this point in meta-time to bring it about that $\mathcal{S}'' \in P(\mathcal{S})$ are all and only the universes among \mathcal{S} that exist at a later point in meta-time iff $R(\mathcal{S}', \mathcal{S}'')$. This encodes the assumption that every universe that exists meta-continues to exist. God can always add universes, but they cannot destroy them. The accessibility-relation we receive is non-symmetric, but it is guaranteed to be reflexive, transitive, and convergent.⁶ The modal logic of possible divine creation in meta-time is accordingly $S4.2$.⁷ If one holds that a world is unbound, then these models will obviously only be partial models, for every set has a cardinality. Still, the partial model shows how the idea of successive creation can be understood and it allows us to draw parallels to further debates.

One might wonder whether the defended view is compatible with classical theism.⁸ It is central to the defended view that from no metaphysical perspective are there all the universes that at any point in meta-time get created. If there were such a perspective, then from this perspective there would be proper class many universes. We would have an immediate violation of the Urelement Set Axiom I briefly discuss in §1. Given that there is no atemporal viewpoint from which everything that ever gets created exists, it is part of the view that god cannot exist outside of meta-time.

It is debatable whether this is compatible with classical theism. My view forces its defender to accept that there is a sense in which god cannot be absolutely atemporal, for they are temporal with respect to meta-time. One might still hold that god’s existing in meta-time makes them atemporal with respect to ordinary time. My view is furthermore compatible with god being everlasting, in the sense of always existing, and immutable with respect to meta-time. There is no need to assume that god learns something while they see the world (meta-)temporally unfold (as some versions of open theism have it), nor that god dynamically interacts with the development of the world in time and/or meta-time.

⁵ An exemplary structure that obeys (C) and (D) is the transfinite sequence of the ordinal numbers.

⁶ Convergence is defined as follows: R is convergent iff $\forall x, y, z (R(x, y) \wedge R(x, z) \rightarrow \exists u [R(y, u) \wedge R(z, u)])$.

⁷ See, e.g., Linnebo and Shapiro (2019, §4). See also Chalki, Koutras, and Zikos (2018) for an overview of $S4.2$ and examples of further applications.

⁸ I wish to thank an anonymous referee for inviting me to discuss this question.

What makes an expanding multiverse unsurpassable? The thesis I defend can be summarized as follows:

BEST An expanding multiverse is unsurpassable just in case it is such that (i) every possible creation-worthy universe will be created at some point in meta-time and (ii) no universe that is not creation-worthy will be created at any time.⁹

The left to right direction of this biconditional should be unproblematic in the given dialectical situation. The cardinality objection is based on the assumption that every world in which a possible creation-worthy universe is never created is surpassable. It seems furthermore plausible that the creation of universes that are not creation-worthy makes a world surpassable. What is in need of defence is the direction from right to left. Is there a hierarchy of goodness among the expanding multiverses in which every creation-worthy universe will be created and no universe that is not creation-worthy will be created at any time? Are some of these worlds surpassable? I will use the rest of this section to argue for a negative answer to this question. The next section will make precise how the multiverses described in this section undermine the cardinality objection.

When we compare expanding multiverses that are unsurpassable according to BEST, they do not differ with respect to which universes will eventually be created. They only differ with respect to how speedy the creation takes place in meta-time. Is a world with speedier creation better? For reasons that will become clear in the last section, this would allow for a comeback of the cardinality objection. If speed matters, a world is better if more universes are created early in meta-time, because the amount of goodness a universe contributes to the value of a world decreases over meta-time if it is not created. But why should this be the case? One might think that universes that get created early on exist longer. Alternatively, one might think that there is some sort of cost to waiting for creation.¹⁰

None of these options seems plausible. When it comes to ordinary time, we are not inclined to say that those who lived thousand years ago are lucky because they got to live earlier. There are cases where it seems intuitive that it is preferable to get something earlier rather than later. People might prefer to get their yearly bonus earlier, but this is just because they have to spend less time waiting for it. The crucial difference is that no one is around before they are created and has to wait for it. Analogously, there does not seem to be a cost of the creation of a universe taking place later in meta-time.

It is unclear how to measure the length of a portion of meta-time. If length of meta-time is measured in terms of the cardinality of the points at which a universe exists, universes that get created earlier do not exist longer. Given that meta-time is unbound, for every n , every universe will have existed at more than n -many points of meta-time at some point in meta-time. One might think, however, that it is plausible to maintain that if the time at which

⁹ For ease of expression, (i) is formulated in a way that seems to quantify over merely possible universes. For the actual world it can be regimented without quantification over possibilities outside of modal contexts as follows: Necessarily, every creation-worthy universe actually meta-will exist at some point in meta-time. For non-actual worlds the thesis that has to hold at these worlds can be formulated semi-formally by means of Vlach-operators (see Vlach 1973) as follows: Necessarily, every creation-worthy universe meta-will exist at some point in meta-time.

¹⁰ In principle someone could also argue that a multiverse is better if creation happens slower. The arguments against this view are roughly analogous to those against the arguably more intuitive thesis that speedier creation is better.

universe v_1 exists properly includes the time at which universe v_2 exists, then v_1 exists longer than v_2 .¹¹

However, it seems implausible to maintain that existing longer in this sense is preferable. To see this, consider two persons that do not causally interact and live forever in ordinary time. One of them was born thousand years before the other. They do not themselves know whether they are the younger or the older person. It seems false to claim that each of them should hope to be the older one, because that would make them live longer. It seems hard to come up with assumptions about universes being created in meta-time that lead to a different verdict.

This clearly does not constitute an airtight defence of the right to left direction of BEST. However, it is enough to put the burden of proof on the shoulders of those who wish to defend the claim that every world is surpassable. I agree that this might be a potential case for controversy and proceed under the assumption that BEST holds. It should be noted that if its right to left direction is challenged, then this has to be done on grounds that are different from those that lead to the cardinality objection.

3. Revisiting the Cardinality Objection

In this concluding section I revisit the cardinality objection and show how an unbound and orderly expanding multiverse can escape it. The upshot is that if we live in an orderly expanding theistic multiverse, then there is an unproblematic answer to the question how many universes there are: For some \aleph , there are not more than \aleph -many universes. How is this compatible with the world being unbound? We are currently at a certain point in meta-time. There meta-now are \aleph -many universes, but there will be more. If you inhabit an orderly expanding theistic multiverse, there meta-always is a cardinality of the universes that exist. According to BEST, some such multiverses are unsurpassable if they are unbound and every creation-worthy universe meta-will exist at some point. Consequently, that there (meta-now) is a cardinality of universes is compatible with you living in an unsurpassable world. That our world is unsurpassable is not only consistent with the claim that for some \aleph , there are \aleph -many universes. It is also compatible with the stronger claim that necessarily meta-always, for some \aleph , there are \aleph -many universes. Given that necessarily, whatever is meta-always the case is the case, we get that our being in an expanding multiverse is compatible with its being necessary that for some \aleph , there are \aleph -many universes.

If we express modal facts about divine creation in meta-time, we need not only the familiar operator expressing metaphysical necessity, but also further meta-temporal operators. Taking this into account, the premises of the cardinality-objection can be reformulated as follows:

(1*) Necessarily, for every cardinal number \aleph , it is possible for there to *meta-always* be more than \aleph universes that are worth being created.

(2*) Necessarily, there is a cardinal number \aleph such that there *meta-sometimes* are fewer than \aleph universes.

¹¹ I thank an anonymous referee for pressing this point.

(3*) Necessarily, if there is a cardinal number κ such that there *meta-always* are fewer than κ universes and it is possible for god to create a multiverse that *meta-always* includes more than κ universes that are worth being created, then the world is surpassable.

The premises (1*), (2*), and (3*) are backed by the motivation underlying the cardinality objection. However, they do not form a valid argument. This can be seen by making use of the following formalisation, in which '[S]' and '[A]' are used as a meta-sometimes-operator and a meta-always-operator, respectively:

$$(1^*) \quad \Box \forall \kappa \Diamond [A](\nu > \kappa)$$

$$(2^*) \quad \Box (\exists \kappa [S](\kappa > \nu))$$

$$(3^*) \quad \Box (\exists \kappa [A](\kappa > \nu) \wedge \Diamond [A](\nu > \kappa)) \rightarrow \text{Surp}$$

This formalisation also points to two ways in which this collection of premises could be turned into a valid argument. The first way is to strengthen the second premise to

(2**) Necessarily, there is a cardinal number κ such that there *meta-always* are fewer than κ universes in the multiverse. (Formally: $\Box (\exists \kappa [A](\kappa > \nu))$)

Although this variant of the argument is valid, it is unsound because premise (2**) is false. I have argued for the possibility of an unbound expanding multiverse in the last section and (2**) is incompatible with this possibility.

Another way to go make the argument valid is to keep (2*) and to strengthen the third premise as follows:

(3**) Necessarily, if there is a cardinal number κ such that *meta-sometimes* the multiverse includes fewer than κ universes and it is possible for god to create a multiverse that *meta-always* includes more than κ universes that are worth being created, then the world is surpassable.

That this updated argument is valid can be seen by considering the following formalisation:

$$(1^*) \quad \Box \forall \kappa \Diamond [A](\nu > \kappa)$$

$$(2^*) \quad \Box (\exists \kappa [S](\kappa > \nu))$$

$$(3^{**}) \quad \Box (\exists \kappa [S](\kappa > \nu) \wedge \Diamond [A](\nu > \kappa)) \rightarrow \text{Surp}$$

This update of the argument fails if the right to left direction of BEST, which I defended towards the end of the last section, holds. If BEST holds, then (3**) is false. (3**) says that necessarily, if there is a κ such that sometimes there were fewer than κ universes and it is possible for the world to start out with more than κ universes, then the world is surpassable. However, BEST has it that it is irrelevant at which point in meta-time universes are created, as long as they get created eventually.

Note that it is crucial to my response to the cardinality objection that we can (meta-now) only quantify over what there (meta-now) exists. Given that the multiverse is expansionist (this was assumption (B) from the last section), the domain of quantification expands. We will be able to quantify over universes that we are now unable to quantify over.

Rubio provides the following consideration (in response to Climenhaga 2018) that seems to speak against this claim: “Even the most militant open-futurist admits that our history is an initial segment of many complete possible histories. And this remains true, whether or not there is a last moment. It is again helpful to think of the real numbers: the fact that there is no last real number does not mean that there is not a ‘completed’ real number line” (Rubio 2020, 821). One might think that, analogously, there is a completed collection of universes that get created at some point in meta-time. The underlying assumption seems to be that if a world is possible, then it is possible to always quantify over everything that has been or will be created in this world at some point. Given that the actual world is possible, the assumption has it that the domain of quantification cannot expand. Denying Rubio’s assumption seems to be crucial to the success of my argument and because it might be shared by many philosophers, I will argue in some detail that it is unfounded.

Rubio justifies his insistence on there being a completion by pointing to the fact that this “is precisely the assumption made by the Priorian semantic tradition in tense logic” (Rubio 2020, 821 fn. 6). We might understand his worry as follows: Possible worlds are complete descriptions of ways for a world to be. The complete description of an expansionist, orderly, unbound world would contain proper class many universes. However (for the reasons given in §1), there cannot be proper class many universes.¹²

Assume we aim at giving a model-theoretic description and we let the points in our models represent individual universes (as in the models briefly characterised above). The points do not have to be universes; they can be anything—for example, pure sets. A set of such points can be interpreted as the state of the multiverse at a particular point in meta-time. We can now describe a hierarchy of proper class many such sets (each representing a state of the multiverse) such that for every κ , there is a set with more than κ -many members.¹³ It is dubious what it means to say that the world, understood as such a description, contains more than κ -many universes. Descriptions do not, in the strict sense, contain universes.

Even if we, for the sake of argument, allow quantification over all the proper class many points that are members of some set in the described hierarchy (which is questionable; nominalists arguably can also use model theory without committing themselves to the sets they describe), the sets only contain points (that might themselves be sets) that represent universes, they do not contain the universes. We could only read off commitment to the points, not to the universes they represent. The focus on world semantics or model theory seems to not be helpful. The relevant question is hence not what the description contains, but rather: How many universes are there according to the metaphysical view described?

The metaphysical view described does not say that there are proper class many universes. The metaphysical view has it that we (always) are at a point in meta-time and that there (always) are only set-many universes. There meta-will be more and there meta-will be less. The metaphysical view also has it that whatever is the case simpliciter is the case at some

¹² Thanks to an anonymous referee for offering this reconstruction of Rubio’s worry.

¹³ It will be impossible to model complete meta-historical evolutions of the multiverse in set-sized models. Set-sized models will always be partial and can only model expanding multiverses of the kind described up to a point in meta-time.

point in meta-time. The unbounded expansionist world is (meta-)never completed and there is no reason why its proponent should be committed to proper class many universes.

Can an opponent just insist that there is a completion of the world (like there is a completion of the number-series)? This would simply beg the question against the view. To see this, a comparison to other views might help. Take modal set theory. The modal set theorist says that there necessarily are fewer than proper class many sets, but for any κ , there are possibly more than κ -many sets. Simply insisting on there being a completion of the set-theoretic hierarchy begs the question against modal set theory.

Take a different example from the philosophy of time. A presentist might hold that the world is a collection of presently obtaining facts that are not time indexed. The presentist might also hold that it changes which facts are contained in reality. Is it plausible to insist that the presentist is committed to a completed history of the presentist world that contains every fact that did obtain, obtains, or will obtain? If yes, we could argue against their position by complaining that they are committed to contradictory non-time indexed facts. How can the fact [Kim is sitting] and the fact [Kim is not sitting] both be part of reality, we might ask? This objection against the presentist begs the question, because it is central to the presentist view that always only the presently obtaining facts are part of reality. Committing the presentist to the completed timeline and everything there was or will be at any point in time is committing them to permanentism. This amounts to simply ignoring the central characteristic of their view.

If this is right, then my view is off the hook as well. My view shares with the presentist the assumption that permanentism fails and that one is only ontologically committed to what there is at a (meta-)present time. (The expansionist accepts that past entities remain in the ontology, but like the presentist they do not believe that there are future entities). My view shares with the modal set theorist the idea that there is a hierarchy that cannot be and never will be completed. As long as these are acceptable metaphysical views, so is the one defended in this paper.

These considerations suggest that there is no version of the cardinality objection that works against the hypothesis of an expanding theistic multiverse. If defenders of the theistic multiverse wish to accommodate the motivation standing in the background of the cardinality objection, they can do so by subscribing to the hypothesis that the world is an expanding theistic multiverse.¹⁴

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