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## Heartbreak at Hilbert’s Hotel

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**Abstract:** William Lane Craig’s defence of the *kalam* cosmological argument rests heavily on two philosophical arguments against a past-eternal universe. In this article I take issue with one of these arguments, what I call the ‘Hilbert’s Hotel Argument’ – namely, that the metaphysical absurdity of an actually infinite number of things existing precludes the possibility of a beginningless past. After explaining this argument, I proceed to raise some initial doubts. After setting those aside, I show that the argument is ineffective against proponents of presentism. The remainder of the article considers and rejects possible replies on Craig’s behalf.

For more than three decades, William Lane Craig has been the leading proponent of the *kalam* cosmological argument for the existence of God. The argument is formulated as follows<sup>1</sup> (Craig (2008a), 111):

- (1) Whatever begins to exist has a cause.
- (2) The universe began to exist.
- (3) Therefore, the universe has a cause.

After attempting to justify the premises of this argument, Craig sets out to analyse what the cause must be like, given certain characteristics it must have. For example, he says the cause must be uncaused, timeless, spaceless, and immaterial (*ibid.*, 152). Allegedly, the only kind of cause that could plausibly fit this description would be a powerful, immaterial mind – just as God is supposed to be.<sup>2</sup> In this article I examine Craig’s case for premise (2). In particular, I focus on just one of the philosophical arguments he uses to establish that the universe began to exist – namely, that the metaphysical absurdity of an actually infinite number of things existing precludes the possibility of a beginningless past. Let’s call this supporting argument *Hilbert’s Hotel Argument* (HHA, for short). I begin by reviewing HHA, and follow by raising some initial doubts about the controversial first premise, which states that ‘an actually infinite number

of things cannot exist' (*ibid.*, 116). After ultimately granting this premise for the sake of argument, I show that the second premise presupposes the falsity of a plausible metaphysical theory about time: presentism. Furthermore, Craig himself accepts presentism. It follows that, by his own lights, HHA should be rejected. Moreover, I show that elsewhere in Craig's defence of the *kalam* cosmological argument he presupposes the truth of presentism, which means that his defence of *kalam* is inconsistent. The remainder of the article critically evaluates possible responses on Craig's behalf. I conclude that Craig needs to abandon HHA.

Before we turn our attention to HHA, I should make one preliminary comment about the importance of HHA for Craig's defence of the *kalam* cosmological argument. In defending the claim that the universe began to exist, Craig appeals both to empirical evidence as well as to two general philosophical arguments, one of which is HHA. As I said, in this article I want to set aside the empirical evidence and consider the merits of HHA. It might seem that only empirical evidence from the fields of physics and cosmology could hope to show that the universe began to exist, and that armchair philosophizing is of no use in this project. So, by setting this evidence aside and just focusing on a purely philosophical argument, one might get the impression that I am attacking the weakest part of Craig's case. However, I think this is a mistake. In the first place, Craig takes the philosophical arguments to be more important for his case than the actual empirical evidence.<sup>3</sup> Moreover, he is interested in showing that time itself – and, therefore, any physical world whatsoever – had an absolute beginning.<sup>4</sup> Yet it seems to me that this hypothesis is beyond the purview of the empirical sciences.<sup>5</sup> The important point for now is that, if I'm right, then Craig's case really rests heavily on his philosophical arguments for premise (2).

### **Initial worries for HHA**

Let's now turn our focus to HHA. Craig states the argument as follows (*ibid.*):

- (A1) An actually infinite number of things cannot exist.
- (A2) A beginningless series of events in time entails an actually infinite number of things.
- (A3) Therefore, a beginningless series of events in time cannot exist.

There's supposed to be a close connection between (A3) and premise (2) of the *kalam* cosmological argument. By establishing (A3), Craig thinks that he is thereby supporting (2).

Before we move on to evaluate Craig's reasons for accepting (A1) and (A2), it's worth noting that the wording of this argument sometimes varies.

For example, elsewhere, Craig spells out the argument as follows (Craig (2001b), 221):

- (A1\*) An actual infinite cannot exist.
- (A2\*) A beginningless series of equal past intervals of time is an actual infinite.
- (A3\*) Therefore, a beginningless series of equal past intervals of time cannot exist.

Here there are three noticeable differences from the previous formulation of the argument. First, instead of claiming that an actually infinite number of *things* cannot exist, (A1\*) just says that ‘an actual infinite cannot exist’. Second, whereas Craig talks about ‘events’ in (A2), he instead talks about ‘intervals of time’ in (A2\*). And third, (A2) says that a ‘beginningless series... entails an actually infinite number of things’, but (A2\*) says that a ‘beginningless series... is an actual infinite’. Despite these differences, I’ll speak loosely about HHA, allowing that to name both of these arguments. I’ll consider (A1)–(A3) the first formulation of HHA, and (A1\*)–(A3\*) the second formulation.<sup>6</sup> Our primary focus will be on the first formulation, but the second formulation will arise later in the discussion.

The justification for (A1) is based on certain thought-experiments which purport to show the absurdity of an actually infinite number of things existing. By ‘actually infinite’ Craig means to be talking about ‘a collection of definite and discrete members whose number is greater than any natural number 0, 1, 2, 3...’ (Craig (2008a), 116). This is contrasted with a ‘potential infinite’, which is ‘a collection that is increasing toward infinity as a limit but never gets there’ (*ibid.*).<sup>7</sup> So, according to Craig, if an actually infinite number of things existed, that would have some absurd implications for the kind of world we live in. For example, consider Craig’s favourite thought-experiment on this topic: Hilbert’s Hotel – a hotel with an actually infinite number of rooms. Now we’re to suppose that a new customer comes to the hotel asking for a place to stay when every room is already occupied. In such a hotel, we merely need to shift everybody down a room (so the person in room 1 moves to room 2, and the person in room 2 moves to room 3, etc.). Now room 1 is available for the new customer. This means that, even though every room in the hotel is full, new guests can always be accommodated. Moreover, if an *actually infinite* number of new customers all request a room, the hotel can accommodate all of them. Each person who already has a room just needs to move to the room that’s twice the number of his or her current room. So the person in room 1 moves to room 2, and the person in room 2 moves to room 4, etc. This empties out all of the odd-numbered rooms, and the infinity of new guests can be accommodated. This could be repeated without end. In a world with Hilbert’s Hotel and an unlimited supply of new guests (and an unlimited supply of patience!), an infinite number of people can check into the already full hotel every thirty minutes.<sup>8</sup> This, Craig says, is absurd. Moreover, he claims that

the thought-experiment can be made even more counterintuitive. Suppose somebody checks out of the hotel. Now we have an empty room, yet the hotel is still housing the same number of guests (because infinity minus one is infinity). In fact, suppose everybody in an odd-numbered room checks out. In this case, an infinite number of people have checked out, yet the same number of people remain in the hotel as before (i.e. infinity). And if we don't like having an infinite number of empty rooms in our hotel, we can simply shift the remaining guests around until all of the rooms are again occupied (*ibid.*, 116–119).

Let's grant Craig (at least part of) what he wants us to take away from this thought-experiment: Hilbert's Hotel really is absurd, and it therefore cannot exist. Let's suppose for the sake of argument that such a place is not a real metaphysical possibility. Given that we've granted the absurdity of Hilbert's Hotel, does it follow that (A1) is true? It certainly follows that it's impossible for there to be a hotel with an actually infinite number of rooms. It might even generalize to the conclusion that it's impossible for there to be any building with an actually infinite number of rooms, or even more generally, that it's impossible for there to be any concrete object with an actually infinite number of equal spatial parts. Moreover, since Craig has elsewhere run the same kind of argument to show that there cannot be an actually infinite number of marbles, baseball cards, books, etc., let's suppose that the argument shows that there can't be an actually infinite number of physical objects. Better yet, let's grant that there cannot be an actually infinite number of concrete objects, physical or not.

Nevertheless, it is certainly not clear that (A1), 'an actually infinite number of things cannot exist', follows from the absurdity of Hilbert's Hotel, at least if abstract objects count as 'things'. Consider numbers, for example. If a number is a thing, and if there are an actually infinite number of them, then (A1) is false. Of course, some philosophers have held that numbers are things, and that there are an actually infinite number of them. Let's call such a view about numbers 'Platonism'. In response to this worry, Craig reassures us that there are other views which hold that, for example, numbers don't really exist, or that there aren't an actually infinite number of them (*ibid.*, 117). But surely this response misses the thrust of the worry. The obvious point to make is that *if* Platonism is correct, then it follows that the Hilbert's Hotel thought-experiment doesn't prove (A1). So it's Craig's burden to show that Platonism must be false. Rather than merely point out that we need not be Platonists, Craig needs to give an argument *against* Platonism. He may think that Hilbert's Hotel will suffice here, but I'm not at all inclined to agree. Should we conclude that just because it would be absurd for an actually infinite number of hotel rooms, marbles, baseball cards, or books to exist, that it would be equally absurd for an actually infinite number of *numbers* to exist? Or should we think that a suitably reformulated version of the thought-experiment – say, 'Hilbert's Platonic Heaven'<sup>9</sup> – would lead us to deny Platonism? If we're relying on intuitions alone here, it's unclear whether the intuitions will

carry over. It may well be that our intuitions are better suited to tell us about concrete objects anyway.<sup>10</sup>

As it turns out, the general conclusion that Craig draws on the basis of the Hilbert's Hotel thought-experiment, (A1), rules out a number of other philosophical theories as well. In addition to Platonism about *numbers*, one might believe in an infinite number of other abstract objects – e.g. propositions, properties, sets, possible worlds, etc. Alvin Plantinga, for example, believes that possible worlds are abstract objects, and that there are an actually infinite number of them (Plantinga (1976), 144).<sup>11</sup> Likewise, (A1) entails that David Lewis's modal realism view of possible worlds is badly mistaken, since he believed in the existence of an infinite number of concrete worlds.<sup>12</sup> Moreover, some people have believed that space is continuous, made up of an infinite number of points, but (A1) seems to rule this out as well. Craig considers this possibility, but he imagines that his opponent must be trying to use this as a clear counterexample to (A1). His response is to point out that the notion that space is continuous is unproven (Craig & Sinclair (2009), 112). Seemingly, Craig thinks that it's up to his opponent to prove it. But again, Craig's premise seems to entail that space is not like this, which is also an unproven claim. True, if one could prove that continuous space is possible, then we'd have a counterexample to (A1). But since Craig is claiming that it's *not* possible, it's reasonable to expect him to prove it.

We're beginning to see that in order for HHA to go through, it has to settle a number of controversial metaphysical debates. And we're expected to think that these debates can be resolved by the Hilbert's Hotel thought-experiment, or parallel thought-experiments. It seems that there is plenty of room here to doubt that the absurdity of Hilbert's Hotel proves (A1).<sup>13</sup> Perhaps what it actually proves is something quite a bit more modest. Craig will undoubtedly point out that there are independent reasons to reject Platonism about abstract objects, David Lewis's modal realism, and the rest. But notice that there are really two distinct problems here. First, we can see that *if* any of these views are true, then Craig's premise is false. So Craig seems to have his work cut out for him in showing that all of these various views are false. But secondly, and perhaps more importantly, I want to claim that whatever else can be said against these metaphysical views, we should probably not think that the Hilbert's Hotel thought-experiment disproves all of them. So even if Craig does have good reasons to reject these views, this would not show us that Hilbert's Hotel provides us with a good reason to reject these views, and therefore to affirm (A1). At the very least, we should probably be hesitant to accept (A1) on the basis of Hilbert's Hotel, given that it rules out a number of plausible metaphysical views that have been held by some very intelligent people.

At this point I'm not quite sure what the full import of Hilbert's Hotel actually is. But having registered some of my worries, let's suppose Craig is right to think that the thought-experiment actually shows that (A1) is true. I'm certainly dubious about whether we can really make such a determination on the basis of the

intuitions we get about the hotel, but I want to be as charitable to Craig here as I reasonably can be in order to see where the argument goes from there.

When it comes to defending (A2), Craig usually doesn't have as much to say. In addition to claiming that it's 'obvious', he writes: 'If the universe never began to exist, then prior to the present event there have existed an actually infinite number of previous events. Thus, a beginningless series of events in time entails an actually infinite number of things, namely, events' (Craig (2008a), 120).

Craig doesn't go into great detail explaining exactly what he means by an 'event', but it's apparently supposed to be an existing *thing*. It's notable, however, that in another context Craig seems to acknowledge a chasm between events, on the one hand, and things, on the other:

Normally, we speak of something's becoming this or that; but temporal becoming is conceived to be absolute. 'In the pure becoming of an event,' demands Smart, 'what does the event become?' . . . Smart's question is strangely misconceived, however, for he himself has repeatedly emphasized Broad's point that it is *things*, not *events*, that come to be; an event is just the coming to be of some thing or things. (Craig (2001b), 156)

If being a *thing* and being an *event* are different in this way, it's unclear how HHA is supposed to get off the ground in the first place. (A1) tells us that there can't be an actually infinite number of things, and (A2) tells us that a beginningless past would entail an actually infinite number of events (read: *events*, not *things*). Craig would need some additional premise to make the argument go through. For example, he would need:

(IE) An actually infinite number of events cannot exist.

Then, of course, we would like to know what kind of justification there could be for (IE). Hilbert's Hotel wouldn't work here, because it says nothing at all about events.

It's also worth pointing out that some philosophers have denied that events exist. Terence Horgan, for example, argues that 'it is a mistake to posit events at all' on the grounds that, 'despite the initial appearances, there is no real theoretical need to posit events. So, since their elimination yields an important simplification of ontology, we should banish them from existence' (Horgan (1978), 28). Similarly, Peter van Inwagen writes: 'There are, I would say, no events. That is to say, all statements that appear to involve quantification over events can be paraphrased as statements that involve quantification over objects, properties, and times – and the paraphrase leaves nothing out' (van Inwagen (2011), 220). Craig himself agrees that such a position is plausible, though it's not clear to me whether he is willing to endorse it. In (Craig (2011b), 220), immediately after claiming that events are among 'the sorts of thing that many metaphysicians plausibly deny exist', Craig states: 'These things are real in the sense that they are not illusory, but they are not, properly speaking, existents.' As it happens, this concession causes problems for HHA, as will soon become apparent.

Elsewhere, as already noted, Craig substitutes 'intervals of time' into the argument in place of 'events'. It's certainly questionable whether an interval of time is a 'thing' in the required sense. Things, at least of the non-eternal sort, ordinarily come into and pass out of existence; intervals of time merely pass.<sup>14</sup> On the face of it, at least, it seems we're talking about different categories altogether when we use examples about hotel rooms and other physical objects and then apply that reasoning to intervals of time. So I'm inclined to think that someone who accepts the premise that an actually infinite number of *things* cannot exist has some leeway in which he or she might deny that an event or interval of time is the kind of 'thing' to which the argument applies.

Craig has claimed that 'event' just means 'any change' (Craig & Sinclair (2009), 106). And presumably, a change involves a *thing* losing or gaining one or more properties. Here again some of the same worries as before begin to crop up. Is a *change* supposed to be a *thing* in the way that a physical object is a thing? If a change is just something that happens to a thing, and is not itself a thing, then for all I know there could be a possible world with a finite number of things (i.e. objects) which nevertheless change an infinite number of times. Perhaps there's a world that just consists of a sphere that has been changing colours – say, alternating between being red and being green – from eternity, and will continue to do so forever. How many things *exist* at that world? Maybe just three: the sphere, redness, and greenness.<sup>15</sup> Here's an alternative answer that, I suspect, most of us would find counterintuitive: an infinite number of things exist at that world, since in addition to the sphere and the properties of redness and greenness, you have to count the infinite number of colour changes as existing things. If HHA convinces Craig that there cannot be a world like the one envisioned, then it seems he would endorse this counterintuitive answer to our question. Otherwise, it's unclear why Hilbert's Hotel would allow us to conclude that there can't be an infinite number of changes.<sup>16</sup>

Let's nevertheless set that worry aside and assume that an event, whatever it is, is a thing which exists – the kind of thing that Hilbert's Hotel shows us to be limited in number. Craig seems to want to say that to deny (2) is to suppose that an actually infinite number of past events (or intervals of time, or changes) compose the past. But given that we have seen that an actually infinite number of things cannot exist, we must deny that there can be an actually infinite number of past events. And to deny that is just to affirm (2).

It's important to pause here and consider exactly how HHA is supposed to work. We've already accepted (for the sake of argument, at least) that an actually infinite number of things cannot exist. Craig thinks that anybody who denies this will be forced to accept an undesirable view. In his words: 'It is indisputable that if an actually infinite number of things were to exist, then we should find ourselves landed in an Alice-in-Wonderland world populated with oddities like Hilbert's Hotel' (Craig (2008a), 119–120). So it looks like the argument is supposed to be



construed in basically the following way: we know that an actually infinite number of things cannot exist, so we should reject any view that entails that an actually infinite number of things exist. But, as it happens, somebody who believes that the universe is past-eternal is committed to saying that an actually infinite number of things (namely, events) exist. Since this conflicts with what we know to be the case (on the basis of Hilbert's Hotel), we should reject that view.<sup>17</sup> One way of formalizing the argument would go like this:

- (M) It's metaphysically impossible for an actually infinite number of things to exist.
- (B) The universe began to exist.
  - (B1) If  $\sim$ (B), then  $\sim$ (M)
  - (B2) (M)
  - (B3) Therefore, (B)

Note that (M) simply paraphrases premise (A1), and (B) is identical to premise (2) of the *kalam* cosmological argument. Now, when Craig defends HHA in order to prove premise (2), I think what he's after is something like (B1)–(B3). Since the conclusion of this argument is just (B), and since that's precisely the same as (2), this way of formulating the argument at least has the virtue of making it clear how it's supposed to support (2). Notice that on Craig's rendering of HHA, it's not immediately clear what the connection is between (A3) and (2). Finally, keep in mind that Craig's reason for accepting (B1) is that the falsity of (B) entails that an actually infinite number of past events exist.

### **Problems from the metaphysics of time**

It seems to me that, in making this argument, Craig is presupposing a certain view about the metaphysics of time. As such, it would be good here to distinguish briefly two competing theories in the current debate: the A-Theory and the B-Theory. On the A-Theory of time, which is often referred to as the *tensed* or *dynamic theory*, there is a real, objective difference between past, present, and future. Generally, according to this view, the present has a privileged ontological status. In fact, some philosophers have thought that the A-Theory is committed to a doctrine called 'presentism'. On that view, only the present is real. In Craig's own words, presentism is

the doctrine that the only temporal entities that exist are present entities. According to presentism, past and future entities do not exist. Thus, there really are no past or future events, except in the sense that there have been certain events and there will be certain others; the only real events are present events. (Craig (2001b), 148)

Craig also seems to believe that A-Theorists are committed to presentism. For example, in one place he apparently conflates the two views, writing: 'According to the A-Theory, things/events in time are not all equally real: the future does not yet exist and the past no longer exists; only things which are present are real' (Craig (2008a), 121).

Elsewhere, in a discussion of McTaggart's Paradox, he approvingly notes that other thinkers have concluded that the A-Theory is committed to presentism:

Sharp-sighted critics of McTaggart such as C. D. Broad and A. N. Prior have insisted almost from the beginning that a dynamic or tensed theory of time implies a commitment to presentism, the doctrine that the only temporal entities that exist are present entities.  
(Craig (2001b), 148)

Indeed, Craig believes that by accepting presentism, the proponent of the A-Theory can avoid McTaggart's Paradox, which would otherwise be a good argument against the A-Theory. Thus, regarding certain versions of the A-Theory which reject presentism, such as the so-called 'growing block theory' and the 'moving spotlight theory', Craig says that it's 'doubtful... whether these hybrid theories are coherent' (Craig (2008b), 597–598). In Craig's view, then, presentism is simply the only viable version of the A-Theory.

The B-Theory, by contrast, is often referred to as the *tenseless* or *static theory* of time. On this view, no point in time is ontologically privileged. As Craig puts it: 'all events in time are equally real' according to the B-Theory (Craig (2008a), 121). Therefore, the distinction between past, present, and future does not designate anything of ontological significance; past events are just as real as present events. Compared to Napoleon, William the Conqueror is in the *past*. But compared to Julius Caesar, William the Conqueror is in the *future*. There is no objective fact about whether something or somebody exists in the past, present, or future, because those characterizations are merely relative to times. B-Theorists usually talk about a different set of temporal relations: *earlier than*, *simultaneous with*, and *later than*.

Now, suppose I deny that the universe had a beginning. Craig would then say that I'm committed to the existence of an actually infinite number of things – namely, the infinite number of past events. If Craig is right, then I either have to give up my belief that the universe never began to exist, or else I have to give up my earlier concession that an actually infinite number of things cannot exist. But suppose I'm a presentist. As Craig himself characterized the view in the quoted passage above, a presentist doesn't believe that past events exist. So a presentist who denies that the universe began to exist is *not* thereby committed to the existence of an actually infinite number of past events. As a presentist, I would simply respond to Craig by reminding him that, in my view, past events don't exist at all – so there's no way I'm committed to an *infinite* number of them existing. Thus, the absurdity Craig was aiming for with his argument does not result if we accept presentism. Recall that the absurdity was supposed to result for anyone who believes, contrary to (A1), that *the number of things that exist* is actually infinite.<sup>18</sup>

Perhaps, then, the Hilbert's Hotel argument could be geared towards proponents of a B-Theory of time, since that view would maintain that past

events really exist. But at the very least, the A-Theorist should be off the hook here. If Craig is correct that the A-Theory entails a commitment to presentism, and if a presentist can easily reject HHA on the grounds that premise (A2) presupposes the falsity of presentism, it follows that the argument is ineffective against a proponent of the A-Theory. One might well conclude that Craig is presupposing the B-Theory in his defence of HHA.

This might not appear too problematic if Craig were to go on to defend the truth of the B-Theory. The problem, however, is that he is a committed A-Theorist and presentist (Craig (2001b), 115–216). This means that, by his own lights, the argument should not be accepted. Furthermore, aside from HHA, Craig uses a second, independent philosophical argument for premise (2) of the *kalam* cosmological argument, and he is explicitly clear in his writings that this other argument depends upon the truth of the A-Theory. Writing about one of the premises of this argument, he says: ‘As obvious as this premise may seem at first blush, it is, in fact, a matter of great controversy. It presupposes once again an A-Theory of time’ (Craig & Sinclair (2009), 124). Moreover, the *kalam* cosmological argument as a whole depends upon the truth of the A-Theory, according to Craig:

From start to finish, the *kalam* cosmological argument is predicated upon the A-Theory of time. On a B-Theory of time, the universe does not in fact come into being or become actual at the Big Bang; it just exists tenselessly as a four-dimensional space-time block that is finitely extended in the earlier than direction. If time is tenseless, then the universe never really comes into being, and, therefore, the quest for a cause of its coming into being is misconceived. (*ibid.*, 183–184)

In short, then, in defending these arguments Craig is presupposing inconsistent metaphysical views. When he defends the first philosophical argument in support of (2), HHA, he seems to presuppose the B-Theory, and when he defends the second philosophical argument in support of (2) he presupposes the A-Theory. And since the *kalam* argument as a whole requires the A-Theory, Craig’s defence of HHA falls flat.

### **Craig’s response**

My main contention in the previous section was that Craig’s use of Hilbert’s Hotel is ineffective against proponents of the A-Theory of time, as long as the only viable version of the A-Theory is presentism. This is because a presentist who claims that the universe is past-eternal is *not* committed to the existence of an actually infinite number of events. Past events, on that view, don’t exist at all.

In a recent defence of the *kalam* cosmological argument co-authored by Craig and James Sinclair, the authors responded to a related worry. According to them, both Aristotle and Thomas Aquinas accepted (i) the presentist view that past events don’t actually exist, and therefore (ii) the notion that ‘the series of past

events [is] a potential infinite' rather than an actual infinite (Craig & Sinclair (2009), 115). Note that these are two separate contentions. I have been arguing that (i), all by itself, is sufficient to cause major problems for HHA.

In responding to Aristotle and Aquinas, it seems to me that Craig and Sinclair unfortunately latch onto (ii) and utterly neglect (i). They write: 'The question, then, is whether events' temporal distribution over the past on a presentist ontology precludes our saying that the number of events in a beginningless series of events is actually infinite' (*ibid.*). Surely this is *a* question. But I'm not convinced it's *the* question. One could agree with Craig and Sinclair that, even on a presentist ontology, if the universe didn't begin to exist, then there have been an infinite number of events. But this does nothing to ease the worry raised by (i), which I take to be the more important problem here. Even though, in such a scenario, the number of events that *have occurred* is actually infinite, the fact remains that on a presentist ontology none of those events exist.<sup>19</sup> Recall that the entire argument was predicated on the notion that an actually infinite number of things cannot *exist*.

Wes Morrision has made the point that the absurdity of Hilbert's Hotel results from the fact that every member of an infinite set exists at once, and is able to be moved about in relation to one another (Morrision (2003), 296). As we have seen, the doctrine of presentism presents a problem for Craig if he wants to use the thought-experiment to argue that the number of past events must be finite. But there's another problem lurking here as well. Morrision has pointed out that past events cannot be shuffled around in the way that hotel guests can, which vitiates Craig's attempted use of the thought-experiment (*ibid.*, 296–297). Craig's response to this point is worth considering. He insists that in order to see the absurdity you don't need to be able to manipulate the objects in that fashion. He says:

Let's suppose Hilbert's Hotel is a hotel where, say, all the rooms are locked, so that people can't move out of them. Or maybe there are no doors to the rooms, so that you have an infinite number of rooms, one person in each room, but there's no doors . . . You can still *imagine* what it would be like for [the] person in room one to be in room two, and for the person to room two – he could be in room four. And you'll generate the same absurdities. You don't have to actually go through the trouble of *moving* the people physically.  
(Craig (2009))

This response is surely strange, given what Craig has written elsewhere. Consider a separate worry for the Hilbert's Hotel argument that goes something like this: mathematicians know full well that you can't subtract infinities, yet the illustration supposes we 'subtract' an infinite number of guests as they check out from the hotel. On this point, Craig writes: 'In trans-finite arithmetic, inverse operations of subtraction and division are prohibited because they lead to contradictions; but in reality, one cannot stop people from checking out of the hotel if they so desire!' (Craig (2008a), 120). Yet, notice that this is precisely what Craig is now doing in response to Morrision's objection – namely, imagining the thought-experiment in

such a way that the people *are* prevented from being able to check out of the hotel. If the thought-experiment is described so that the guests are free to switch rooms and check out of the hotel, then it isn't analogous to past events, which can't be moved around in relation to one another. And if the thought-experiment is redescribed, in the way Craig imagines, to make it more analogous to past events, then it comes with a cost: Craig can no longer claim that the hotel guests are free to check out in response to the objection that you can't subtract infinities. Craig thereby sacrifices his response to one objection in his attempt to respond to another objection.

Let's set this problem aside and refocus our attention on the problem that presentism poses for Craig. One way for Craig to respond to this objection, suggested by his response to the previous objection, is to claim that it doesn't matter whether or not the past events exist, as long as they can be numbered. Indeed, he claims that since past events can be counted, we can simply run a Hilbert's Hotel-style thought-experiment using an infinite number of past events rather than an infinite number of hotel rooms. The way to carry out this sort of procedure is, first, to number the events mentally, starting with the present and working our way back. Then, we simply note the same sorts of absurdities that attended the original thought-experiment. In Craig's words, if the past is eternal,

then there have occurred as many odd-numbered events as events. If we mentally take away all the odd-numbered events, there are still an infinite number of events left over; but if we take away all of the events greater than three, there are only four events left, even though in both cases we took away the same number of events. (Craig & Sinclair (2009), 116)

But all of this is supposed to be metaphysically absurd, just like Hilbert's Hotel. And it's supposed to give us reason to reject the view that there are an actually infinite number of past events.

This response won't work for a couple of reasons. First, if we accept this line of argument it looks like we'll have to accept a parallel argument that shows that the universe cannot be future-eternal.<sup>20</sup> We can mentally number future events and do the same operations to *them*. So if Craig's argument shows that time must have a beginning, then a parallel argument shows that time must come to an end. But this is unacceptable. Surely the argument doesn't *really* prove such a thing as that! Craig might want to claim that we can't count events that haven't yet occurred, whereas we can count events that have occurred. This is false. If we construe events as 'equal intervals of time', then we can surely mentally number and count future events just as easily as we can past events. Or consider Morrision's proposal that God decrees that two angels take turns praising him for a minute at a time for eternity (Morrision (2010), 443). I suggest it would not be too difficult to number these events mentally and then mentally shuffle things around in the way Craig is doing for past events.

Craig's preferred response here is to argue that although time will never come to an end, the series of future events is nevertheless only potentially infinite, not actually infinite (Craig (2010b)). Thus, our Hilbert's Hotel-style reasoning would not apply to the future. This is a mistake. If the angels will be taking turns praising God forever, then the number of future praises must be the same as the number of past praises given the assumption that they *have been* taking turns praising God for an eternity. Craig insists that the number in the latter case is actually infinite. But if that's right, then he cannot deny that the number in the former case is actually infinite as well, since the past praises and the future praises can be put in a one-to-one correspondence. Craig's insistence that the future praises are not *real* is irrelevant, since past events aren't real either on the presentist view. Nevertheless, as Craig himself points out, we can still mentally number them and generate (alleged) absurdities. But since nobody thinks this argument seriously shows that time must come to an end, we shouldn't think it shows that time must have had a beginning, either.

The second reason this line of response won't work to Craig's advantage is that it's not clear whether the revised thought-experiment results in a metaphysical absurdity like Hilbert's Hotel. Hilbert's Hotel was absurd because of the counterintuitive implications that resulted from having an actually infinite number of things existing all at once. To claim that the same absurdity can be generated with an actually infinite number of non-existing things like past events makes it seem like Craig's complaint is with the mathematical legitimacy of infinity, not just the idea that the actual infinite is instantiated in reality. It's true that the number of past events is the same as the number of even past events, in Craig's scenario, and this is a straightforward implication of saying that the number of past events is actually infinite. But what is *metaphysically* absurd about this, if the events don't exist? It still remains that the only conclusion we're able to draw from the absurdities that are generated from mentally numbering and then mentally shuffling past events is this: an infinite number of past events cannot exist. And as we've seen, the presentist is already on board with *that*, regardless of whether or not she thinks that an infinite number of them have occurred.<sup>21</sup>

Because HHA has been variously formulated, Craig might concede that a presentist would be unaffected by the contention that an actually infinite number of things cannot exist. Instead, he might say, we should examine the second formulation of HHA:

- (A1\*) An actual infinite cannot exist.
- (A2\*) A beginningless series of equal past intervals of time is an actual infinite.
- (A3\*) Therefore, a beginningless series of equal past intervals of time cannot exist.

Although the presentist escapes the original argument by avoiding a commitment to an infinite number of things existing, this alternative formulation doesn't explicitly say anything about an infinite number of things existing, but instead talks about the existence of actual infinities themselves.

To assess this response, we need to ask what premises (A1\*) and (A2\*) are supposed to mean, and whether adequate support has been provided for them. First, we'd want to know what it means to say that 'an actual infinite cannot exist'. The most natural interpretation of this claim seems to be that an actually infinite *number of things* cannot exist. Yet we've already seen the problem that accompanies this formulation of the premise, since it allows presentists (Craig included) off the hook. We want to find a reading of this premise which doesn't have this defect. So what can it mean to say that 'an actual infinite cannot exist' which does not reduce to 'an actually infinite number of things cannot exist'? If we speak of things this way, then it apparently must be the case that, if an actual infinite *could* exist, then it could exist even when the number of existing things is finite.<sup>22</sup> One way of helping us get a grip on this is to ask what way of formulating the argument will allow Craig to get what he wants – namely, the conclusion that there cannot have been an actually infinite number of events prior to now. Here's a first approximation of the principle he needs:

(M\*) It is metaphysically impossible for there to be a time before which an actually infinite number of things have existed.

With that in mind, we can see that (M\*) would help Craig's argument go through. But what reason has he given (or could he give) in support of this principle? Recall that Hilbert's Hotel was an illustration in which an actually infinite number of rooms existed all at once. At best, that could justify (M) from earlier, but it leaves open the possibility that (M\*) is false. What we'd need is some other illustration which shows that an actually infinite number of things cannot even compose a series in which almost all of the things no longer exist.

One possibility is briefly mentioned by Craig and Sinclair, in their article from *The Blackwell Companion to Natural Theology*:

Aquinas' own example of a blacksmith working from eternity who uses one hammer after another as each one breaks furnishes a good example of an actual infinite, for the collection of all the hammers employed by the smith is an actual infinite. The fact that the broken hammers still exist is incidental to the story; even if they had all been destroyed after being broken, the number of hammers broken by the smith is the same. (Craig & Sinclair (2009), 116)

While I again agree with Craig that the number of hammer-breaking events in such a scenario is actually infinite,<sup>23</sup> it's not clear to me whether such a scenario is really impossible. If the blacksmith has been making a new hammer out of new materials each time his old hammer breaks, then presumably the world would be populated with an actually infinite number of broken hammer pieces. *This* can be

ruled out by the use of a 'Hilbert's Hammer Collection' thought-experiment, as I granted earlier in the article. But if the blacksmith has been merely fixing the same hammer every time it breaks, then I'm not yet convinced that the scenario is impossible. Something more must be said to motivate the intuition that the eternal blacksmith scenario is absurd (i.e. metaphysically impossible). While I of course find the scenario hard to fathom, it's no more difficult to imagine than any other past-eternal scenario. And, in any case, it's hard for me to fathom *either* a world without beginning *or* a world with an absolute beginning. So I'll leave it to Craig to offer up some other thought-experiment to justify (M\*).

Yet another avenue is open to Craig to respond to our hypothetical presentist. Craig might claim that, since the argument would obviously work to show that the past is finite given the B-Theory of time (in which all events are equally real), it's plausible to think that it must work for the A-Theorist as well (*ibid.*, 115). After all, how could one's metaphysical theory of time make a difference to whether past events are finite or infinite in number? It would be strange indeed if one's acceptance of the B-Theory forced her to conclude that the universe had a beginning, whereas her acceptance of the A-Theory would have kept open the possibility of a past-eternal universe. We can formulate this line of argument as follows:

- (C1) If HHA is sound given the B-Theory, then it's sound given the A-Theory.
- (C2) HHA is sound given the B-Theory.
- (C3) Therefore, HHA is sound given the A-Theory.

And here I think there's at least some plausibility to premise (C1). But one person's *modus ponens* is, of course, another person's *modus tollens*. I think the following argument is more compelling:

- (C1) If HHA is sound given the B-Theory, then it's sound given the A-Theory.
- ~ (C3) HHA is not sound given the A-Theory.
- ~ (C2) Therefore, HHA is not sound given the B-Theory.

It seems to me that we have at least as much reason to accept ~ (C3) as we have to accept (C2). I've shown, taking words straight from Craig's own writings, that there is a clear inconsistency in what he says about the A-Theory and presentism on the one hand and HHA on the other.

On a similar note, one can see in Craig's more recent writings that he tries dealing with the problem we've raised by noting that, on a 'growing block' theory of time, the objection can't even get off the ground, since that view posits that past events do exist (*ibid.* and Craig (2010b), 456). And he's right about that. The primary objection I've been pressing in this article wouldn't have got any traction if we were evaluating how a growing block theorist could reply to HHA. But I don't



see how this helps Craig's case, since *he* is a presentist, not a growing block theorist. If I agree with Craig that presentism really is the only coherent version of the A-Theory, then I've got to examine how the argument fares against my own position. Craig's argument should not sway the presentist, even if it *should* sway the growing block theorist. Craig could, I suppose, renounce presentism and start endorsing a view that he's previously said was incoherent. Otherwise, I can't see how the growing block theory is going to offer any comfort to Craig, who remains a presentist.

Lastly, Craig has recently offered one other response that might apply to the presentist's objection. He claims that on a presentist ontology, past events still have some sort of ontological status not shared by future events. He writes:

Everything that has happened has been actualized. As the medievals put it, these events have exited from their causes and are therefore no longer in potentiality. The actual world thus includes both what does exist and what did exist. But events which have yet to take place, being pure potentialities, are, on a tensed view of time, not part of the actual world . . . Even if past events do not exist, they are still part of the actual world in a way that future events are not, since the actual world comprises everything that has happened. (Craig (2010b), 456)

In context, Craig is here arguing against Morrision's claim that HHA commits Craig to the view that the future must be finite. Craig is trying to show that there is a relevant difference between the past and the future which allows the argument against the infinite past to go through but which does not similarly apply to the future. The strategy is to say that, although neither past nor future events exist, past events are part of the actual world, whereas future events are not. Might this strategy help Craig overcome the problem that HHA is unsound given the truth of presentism? After all, if Craig is right, then the presentist who believes that the universe is past-eternal is positing a world in which, so to speak, an infinite number of things have appeared on the radar – that is, an infinite number of things belong to that world in *some* sense.

It's not clear to me why this should be a problem – i.e. why I should be motivated to reject the notion that the actual world is something to which an actually infinite number of past events *belong*, in some sense. The past events aren't *real*, according to the presentist; they don't *exist*.<sup>24</sup> By positing such a world as this, we are not thereby embracing the (allegedly) absurd conclusion that an actually infinite number of things exist, as was the case with Hilbert's Hotel. So I don't know what the problem is supposed to be. Whatever else can be said against this line of response on Craig's behalf, HHA would need to be reformulated if he wants to use this ontology to overcome our objection. Here's a rough sketch of how Craig could reformulate HHA:

(D1) There cannot be a world in which an actually infinite number of things have been actualized.

- (D2) If the actual world is one in which the universe is past-eternal, then there is a world in which an actually infinite number of things have been actualized.
- (D3) Therefore, the actual world cannot be one in which the universe is past-eternal.

While this argument might be worth investigating, I'm not convinced that Hilbert's Hotel applies to the relevant premise (D1). I'll leave it to Craig to prove otherwise.<sup>25</sup>

### Conclusion

Craig's philosophical arguments for a finite past are crucial for the success of the *kalam* cosmological argument. In this article we've looked at one of two such arguments Craig has defended. We've found that the argument is powerless against proponents of presentism. And if Craig is correct to equate the A-Theory with presentism, then the argument is ineffective against the A-Theorist. Since Craig's other argument for premise (2), as well as the *kalam* cosmological argument in general, depends upon the truth of the A-Theory, it turns out that these arguments are in tension with one another. The possible lines of response that we've looked at are not sufficient to overcome the force of the objection.<sup>26</sup>

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## Notes

1. The specific wording of this argument tends to vary slightly depending on the publication.
2. Abstract objects, Craig reminds us, cannot stand in causal relations.
3. Craig (2011a) has stated:

The primary argument[s] that I give for the finitude of the past are philosophical arguments – based on the impossibility of the existence of an actually infinite number of things, and then secondly on the impossibility of *forming* an actual infinite by successive addition. So I see the scientific evidence as merely confirmatory of a conclusion that has already been reached on the basis of philosophical arguments.

4. We need to keep this fact firmly in mind. Craig cannot determine that the cause was timeless unless he shows that time had a beginning, and that the beginning of time had a cause. Throughout this article, when I speak of the hypothesis that the universe is past-eternal, that can be read as the hypothesis that time is past-eternal.
5. Although I cannot defend that thesis here, a good basic sketch of some of the reasons that convince me can be found in (Morrison (2003), 288–289). Craig has similarly stated that time could have preceded the existence of the universe, which makes me wonder how strong he thinks the empirical evidence can possibly be for establishing that time had an absolute beginning (Craig (2011a)).
6. Moreover, there's yet another formulation of the argument to be found in a more recent publication. See (Craig & Sinclair (2009), 103), where the second premise in the argument is stated: 'An infinite temporal regress of events is an actual infinite.' It's not entirely clear to me what (if anything) hangs on the different formulations of these premises, or why Craig has been motivated to state the argument in so many different ways.
7. Craig is thinking of a divergent sequence which tends to infinity. A potential infinite is a collection that is increasing such that the number of its members will eventually be larger than  $K$ , for any real number  $K$ .
8. I'm ignoring the fact that such actions as moving into and out of a room would take time, especially when one must travel extremely long distances (light years?) to reach the room that's twice the number of one's current room, once the room number is sufficiently high. Perhaps God could shuffle the guests about instantaneously, so that this would not be a worry. In any case, I won't worry about it here.
9. Craig is welcome to explain how such a thought experiment would work, if he cares to go this route. Here's a possibility: imagine a realm with an actually infinite number of numbers. Now suppose a new number comes along wanting to be added to the collection. In this case, we simply need to shift all of the other numbers around in such-and-such a way, and as a result we will have accommodated the new number. Or suppose a number decides to leave this Platonic Heaven. Nevertheless, the same number of numbers remains as before. I confess that this thought experiment doesn't make any sense to me, and it gives me no intuitions about whether there can be a Platonic Heaven.
10. We should keep in mind that every argument in favour of Platonism (at least those versions which include an infinite number of abstract objects) counts against (A1). Craig seems to think the burden of proof here is on his opponents to prove Platonism and rebut all of the alternatives (Craig (2008a), 107–108).
11. I'm not sure whether Plantinga explicitly commits himself to saying that the number of worlds is actually infinite in any of his publications, but he confirmed this via email on 28 June 2012.
12. For Lewis's view of possible worlds, see Lewis (1986). On the number of worlds, see Lewis (1973), 90n. Of course, I have granted for the sake of argument that there cannot be an actually infinite number of concrete objects, which would rule out Lewis's view.
13. A good discussion of these issues, and more, can be found in Morrison (2002).
14. Surely it would be strange to talk about an hour or a minute coming into existence and passing out of existence. When would an hour come into existence? When would it cease to exist? An hour later?

Would we want to say that the nine o'clock hour comes into existence at 9.00, and passes out of existence at 10.00?

15. Thanks to Christopher Gibilisco for suggesting this example.
16. Thanks to David Chavez for some helpful discussion regarding this difficulty for Craig's argument.
17. This is how Craig presents the argument, at least. I should note that he need not claim something so strong. He could try to argue merely that a past-eternal universe would entail that it's *metaphysically possible* that an actually infinite number of things exist. (Thanks to Wes Morrision for bringing this possibility to my attention.) I have my doubts about such an argument, but perhaps it will end up being better than HHA.
18. At this point, I should remind the reader that some metaphysicians deny that events exist – and plausibly so, according to Craig (2011b, 220). But if we believe that events don't exist, what should we make of Craig's claim that proponents of a past-eternal universe are committed to the existence of an actually infinite number of past events?
19. It's been suggested by Richard Field that, given presentism, Aristotle and Aquinas were correct to deny that the past was an actual infinite. As Field (an apparent presentist) puts the point: 'The past is not actual.' I suspect that this may be a purely semantic dispute between Field and Craig. For Craig, I take it, the past events don't have to exist in order to be correctly described as an 'actual infinite' in the sense that he *means* to use that term. Nevertheless, I admit that it is puzzling to think of non-existing things (past events) forming a 'collection', which is what Craig has to do in order to consider the series of past events as an 'actual infinite', by his definition of that term. Craig must be taking non-existing things to be definite and discrete members of a collection, and it seems to me that Field is right to question whether that is coherent. Is there a collection of unicorns, even though unicorns do not exist? Or would Craig say that the dinosaurs that once lived on this planet form a collection? Does the collection now exist even though the dinosaurs don't? I admit that I'm puzzled by all this, and I think Craig owes us an explanation for why we should think of past events as forming a collection given presentism. We could perhaps raise the worry by imagining a presentist's reply to Craig:

I think the universe is past-eternal, but it's not clear to me why you think I'm committed to the notion that there *exists* a collection of past events with an infinite number of definite and discrete members. In what sense am I committed to believing that such a collection exists, given that I don't think any of the members of that alleged 'collection' exist?

For Field's take on the present argument, which is very much in line with my own (and to which I owe a great debt of gratitude), along with Craig's response to Field, see Craig (2010a).

20. Thanks to Wes Morrision for making this point in commenting on an earlier draft of this article.
21. In conversation, Craig has responded by insisting that an actually infinite number of things can neither exist *nor have existed*. Here, I think, we should question whether Craig has given any convincing reason to believe this new claim.
22. Imagine the presentist again, who claims that an actually infinite number of things cannot exist, yet that there have been an actually infinite number of past events (which no longer exist). Craig needs to rule out such a view. So the series of past events, none of which exist, is said to compose an actual infinite, and the series is therefore rejected as metaphysically impossible. The point is that the series must be taken to be something over and above its members, since the series 'exists' on the hypothetical presentist's view, but the members of the series don't.
23. By this I just mean to say that there have been an infinite number of such events, not that past events are 'actual' in any sort of metaphysical sense. See my comments in note 19.
24. It's worth mentioning, though, that, in his debates at least, Craig has fallen into the habit of speaking of past events as 'real', despite what he says in his writings (e.g. the passage characterizing presentism, quoted earlier). See his opening statement in his 2011 debate with Stephen Law, or his opening statement from his 2011 debate with Peter Millican.
25. I should mention one last line of argument on Craig's behalf, which was originally brought to my attention by William Dembsar. A presentist might be inclined to say that we need presently existing 'tensed facts' to serve as truth-makers for past-tensed propositions. If this is so, then if the universe is past-eternal, there would presumably be an actually infinite number of such facts. Isn't such an outcome absurd? Since I don't have the space here to assess this argument fully, I'll simply respond by noting four things. First, the account of truth-makers would need to be filled out in order to see

whether this is a problem that only arises if the universe is past-eternal. After all, if there would still be an actually infinite number of such facts even on the supposition that the universe began to exist a finite time ago, then this line of argument would prove too much! Second, if there are truths about the future, and if each of these truths requires a presently existing truth-maker, then this argument would seem to entail that the future cannot be infinite. Third, speaking for myself, it doesn't seem intuitively absurd to me that there could be an infinite number of facts. If facts count as things, then we should go back and question our earlier concession that an actually infinite number of things cannot exist. Fourth, Craig himself does not accept the sort of truth-maker account that Demsar has in mind (Craig (personal communication) and Craig (2001a)). Presentists like Craig sometimes deny that truths about the past and future require truth-makers.

26. A very early version of this article was presented as a paper at a philosophy graduate student colloquium at the University of Nebraska-Lincoln. A later version was presented at the 2012 Midwest Evangelical Philosophical Society meeting. I'd like to thank everyone who attended those talks and discussed the paper with me during Q&A. The article has benefited from the helpful comments and advice of numerous individuals: Patrick Arnold, William Demsar, Luke Elwonger, Richard Field, Greg Janzen, Robin Le Poidevin, Chris Tweedt, and an anonymous referee for *Religious Studies*. Especially helpful were extensive comments on earlier drafts provided by Christopher Gibilisco, Wes Morriston, Adam Thompson, and Preston Werner. Lastly, I must thank David Chavez for suggesting the title.