**Why there can’t be a Self-Explanatory series of Infinite Past Events**

In a recent article, Jeremy Gwiazda has argued that it is impossible for anyone to complete what James Thomson, in a famous article of some years ago, describes as a *supertask*.[[1]](#footnote-1) A supertask is a task that one accomplishes by doing an infinite number of serially ordered sub-tasks one-by-one, and through so doing, reducing the number of such sub-tasks to zero, thereby achieving a determinate result.[[2]](#footnote-2) A successful instantiation of such a procedure would be a *completed supertask*. Further, corresponding to the realization of a completed supertask would be a *supertask set*, i.e. the actually infinite set consisting of all the realized sub-tasks resulting from the procedure that realizes a completed supertask and by means of which the determinate result of a completed supertask is accomplished.[[3]](#footnote-3)

 Although the original context in which the notion of a supertask was introduced concerned *tasks*, and thus one kind of intentional action aimed at a particular outcome, intentional agency plays no essential role in the problem of concern to me here. As such, the argument concerning supertasks that I will develop here is intended to be equally applicable to any process that exemplifies the structural features of a supertask, whether or not it is intentionally directed. Thus, although I will initially develop the argument with respect to supertasks, I will not limit its results just to such cases. I shall call any process that exemplifies the structural features of a supertask *analogous* to a supertask, a completed process of this sort *analogous* to a completed supertask, and the resulting set consisting of all the discrete members of the series through which that process reaches a determinate result *analogous* to a supertask set. The analogy is intended to be strict, so that any results provable about supertasks will also apply, *mutatis mutandis*, to their analogues.

 In this paper, I will present a version of Gwiazda’s argument and apply it to a claim made by Hume in his *Dialogues Concerning Natural Religion*, i.e. his claim that it is possible that the present state of the universe be the product of a self-explanatory series of infinite past states of the universe.[[4]](#footnote-4) Adapting Gwiazda’s argument to this context, I shall then apply it to Hume’s claim in the *Dialogues*, and conclude that the possibility envisaged by Hume is not possible after all, even in principle. I shall then draw some implications from this claim for the Second Way of St. Thomas as presented in the *Summa Theologiae*.

 I

 David Hume goes to Hell, where he is appointed librarian at the Infernal Infinite Library. The Library consists of an infinite number of books, divided into a number of collections each of which also consists of an infinite number of books. To his chagrin, he discovers that one of those collections consists of volumes of divinity and school metaphysics, books he is persuaded contain nothing but sophistry and illusion. Remembering that he had recommended that such books be burned, he decides to take his own advice and sets about the task of burning the library’s collection of metaphysics and school divinity books. However, since it’s a big job to burn an infinite number of books, he decides to make the task more manageable. He divides the collection in half and proposes that he burn half the books himself, while burning the remainder will be the task of his girlfriend, Lazy Lola.[[5]](#footnote-5) Lola also despises books of divinity and school metaphysics, but as her name implies also desires to work as little as possible. Therefore, she resolves to begin burning books only when her part of the task of book burning ceases to be *isomorphic* to David’s. This will occur just in case there comes a point in the process of burning all the books where the books remaining for David to burn are fewer than those remaining for Lola to burn. This, in turn, will obtain just in case a point is reached at which, placing the books remaining for David to burn in one-to-one correspondence to those remaining for Lola to burn, the number remaining to David is fewer than that remaining to Lola. At that point, Lola will begin to burn her books in an attempt to re-establish isomorphism between her part of the task and David’s.

 Hume sets to work with a will, enthusiastically burning volume after volume, while Lola sits and does her nails. Although David works steadily and continuously, because half of an infinite set is itself a set consisting of an infinite number of members, it continues to be an infinite set no matter how many individual members are removed from it. Because of this, no matter how many of the books in the collection he burns, he still has the same number of books to burn as he did before, namely, an *infinite* number. More than this, he will never even succeed in *reducing* the number of books he has left to burn. No matter how many books of divinity and school metaphysics he manages to burn, there will still be an infinite number of books remaining in the set of books still to be burned. At no point, then, will the number of remaining books equal a finite set, one capable of being reduced one-by-one to zero, by burning each book *seriatim*, resulting in a state in which all the books have been burned. As such, Hume can never actually succeed in reducing the number of books that he has to burn to zero, thereby bringing it about that the entire collection has been burned. Thus, even if he continues to burn books forever, he will never be able to complete the task of burning all the books he is endeavoring to burn.

 For the same reason, Lola will never have to burn any of her books. Since no matter how many individual items are removed from an infinite set an infinite number of members remain, there will never be a time at which her task of burning half of the metaphysics and school divinity collection will cease to be isomorphic to David’s. At any point in the book burning process, and regardless of how many books Hume manages to burn, it will still be possible to place David’s remaining books in one-to-one correspondence with Lola’s. Thus, Lola will never even begin to burn her books. Hume can burn books until the cows come home, and Lola will still be sitting there, doing her nails. At some point, Hume will realize that his project of burning all of the books in the divinity and school metaphysics collection is a Sisyphean task. At that point, the Devil will be laughing, having found the perfect way to torment Hume’s soul for all eternity.

 The moral of the story is not far to seek. It is impossible to complete a supertask, i.e., a task consisting of an infinite series of discrete, temporally ordered sub-tasks done one-by-one with the intention of reducing the number of such sub-tasks to zero and thereby achieve some determinate result. The reason for this is that the size of an infinite set is unaffected by the number of members that are removed from it. So, if what we are considering is an infinite set of (presumably finite) sub-tasks, no matter how many of these sub-tasks we accomplish (and thereby remove from the set of tasks to be done) we shall still have just as many of sub-tasks to accomplish as we did before. No matter how hard we try, it will be impossible to reduce the number of sub-tasks in an infinite set of such subtasks even by one, regardless how many such sub-tasks one undertakes and accomplishes. Further, no matter how many such sub-tasks we accomplish, we will never be able to reduce the set of remaining sub-tasks to a finite set of such sub-tasks. As such, reducing the number of such sub-tasks to zero one-by-one will be impossible in principle. When these discrete subtasks are temporally ordered in such a way as to require their being completed one-by-one in a particular order to realize that determinate result, successively reducing their number to zero, it becomes clear that such a series can never terminate in the intended determinate result. Again, this is because (as we have seen) no matter how many of the sub-tasks in this series are in fact completed, there are always just as many needing to be completed as there were before, thus no way to reduce their number to any finite number, let alone to zero, thereby producing the intended result. To put the point another way: *just as it is impossible to convert a finite set into an infinite set by adding one member at a time, so too is it impossible to convert an actually infinite set into a finite one by subtracting one member at a time.* Supertasks, then, cannot be completed even in an infinite amount of time and a completed supertask, like the act of counting to infinity, is therefore impossible in itself.[[6]](#footnote-6) More than this, since a supertask set would be the actually infinite set formed in the process of realizing a completed supertask, given that a completed supertask is impossible in principle, no such set could be formed in that way. As such, no such supertask set could ever exist, even in principle.

 II

 In ST 1, Q2, Art 3c, Thomas Aquinas presents his five proofs for God’s existence, the second of which goes as follows:

 The second way is from the nature of the efficient cause. In the world of sense we

 find there is an order of efficient causes. There is no case known (neither is it,

 indeed, possible) in which a thing is found to be the efficient cause of itself; for to

 do so it would be prior to itself, which is impossible. Now in efficient causes, it is

 not possible to go on to infinity, because in all efficient causes following in order,

 the first is the cause of the intermediate cause, and the intermediate is the cause of

 ultimate cause, whether the intermediate cause be several, or one only. Now to

 take away the cause is to take away the effect. Therefore, if there be no first cause

 among efficient causes, there will be no ultimate, nor any intermediate cause. But

 if in efficient causes it is impossible to go on to infinity, there will be no first

 efficient cause, neither will there be an ultimate effect, nor any intermediate

 efficient causes; all of which is plainly false. Therefore, it is necessary to admit a

 first efficient cause, to which everyone gives the name of God.[[7]](#footnote-7)

While this argument has been accused of committing just about every fallacy in the book, most of the modern criticisms of this argument derive from Hume’s discussion of the cosmological argument in his *Dialogues Concerning Natural Religion*, part IX. The passage relevant to this argument runs as follows:

 …in tracing an eternal succession of objects it seems absurd to inquire for a

 general cause or first author. How can anything that exists from eternity have

 a cause, since that relation implies a priority in time and a beginning of existence?

 In such a chain, too, or succession of objects, each part is caused by what

 preceded it, and causes that which succeeds it. Where then is the difficulty? But

 the *whole*, you say, needs a cause…Did I show you the particular causes of each

 individual in a collection of twenty particles of matter, I should think it very

 unreasonable should you afterwards ask me what was the cause of the whole

 twenty. This is sufficiently explained in explaining the cause of the parts.[[8]](#footnote-8)

In opposition to Aquinas’ claim that there can be no secondary efficient causes (caused causes) without a first (i.e., uncaused) cause, Hume claims that we can envisage just such a scenario, as follows. He simply imagines an infinite series of such causes, each of which is caused by the member preceding it and causes the member succeeding it, constituting an ordered series terminating in the production of the present state of the universe through some sort of immanent process involving additive succession in time. In that case, Hume suggests, the need for a first cause is obviated, for three reasons. First, since the series, being beginningless, never came into existence, the question “Why does it exist?” is thereby made otiose. Second, since each of the members of the series has a cause in the form of a previous member of the series, the existence of each individual member of the series is explained by that of the previous member of the series that produced it, and thus the existence of the whole series is accounted for by that fact. Thirdly, since in explaining the existence of each of the members of the series we have explained the existence of the whole series, there is nothing further to explain in this regard, so that to press the question further is simply to beat a dead horse. One might ask, “What is there about the existence of the series as a whole over and above the existence of the members of the series that needs to be explained?” The answer to this rhetorical question is, apparently, “Nothing.”

 The standard response to this, defended at length by William L. Rowe, is that what remains unexplained here is that there is any such series at all.[[9]](#footnote-9) Surely (as Hume himself notes), even if this series does in fact exist, it need not have existed.[[10]](#footnote-10) It is apparently coherently conceivable that this series need not have existed *at all*, and therefore both logically and metaphysically possible for it to have failed to exist. This fact cannot be explained by showing how each of the members of the series is accounted for by reference to some other member of the series. Quite the contrary, this explanation presupposes the existence of the series as a whole along with all its members as a necessary condition for each of these individual explanations to be possible in the first place and thus for any of those individual members to exist. It thus begs the question against the question, “Why does this series exist at all?” rather than explaining that fact.

 I think that this response is obvious, just, and quite sufficient to answer Hume. However, many continue to resist this response, clinging to the intuitions that the existence of such a series is metaphysically possible, that the series itself is nothing more than the sum of its members, thus nothing in it own right, and that, if such a series were actually to exist, each of the members of that series would have a sufficient explanation for its existence by reference to another member of that series. These are intuitions to which I am also susceptible, so it seems that in this case it is just one intuition against another. However, I think we can use the argument of the last section to show that the scenario as described by Hume is not possible after all because incapable of explaining the existence of the *individual* members of that series, without which his strategy for excluding the question concerning the series as a whole must fail.

 According to Hume, the present state of the universe is the product of an infinite, temporally ordered series of previous past states of the universe, produced one-by-one through some immanent process involving additive succession in time and terminating in the production of that present state. In that case, production of the present state of the universe is an outcome that is accomplished through the production of an infinite number of causally ordered prior states of the universe, one-by-one, by means of some immanent process involving additive succession in time, terminating in the production of that present state. However, such a process will clearly be structurally analogous to a supertask as I defined it in the first part of this paper. Since each member of the set was produced in time by an efficient cause, there was a time at which it did not exist, i.e. the time prior to which it was produced by its immediate predecessor in the series. Each such state, then, must be produced in time from a previous state. The series then was formed in time, one-by-one, for each successive state in reference to its immediate predecessor state which produced it. At the same time, just because each member of the series depends on its immediate predecessor for its existence, each state in the series depends for its existence on the entire series of previous states. That is because the failure of any member of that series to occur or exist would have prevented the existence of all of its successors, including the state currently under discussion. At the same time, since this series is beginningless, such that every member of that series bears the successor relation to a previous member of the series, this set of preceding states will be an actually infinite set formed one-by-one by some immanent process occurring in time. By means of this immanent process, a new state will be added to the universe at each moment – this is what is meant by “additive succession.”

 On the envisaged Humean scenario, then, the existence of the present state of the universe thus presupposes that entire actually infinite set of states, formed one-by-one in time through an immanent process involving additive succession, as a necessary condition for its existence. This, however, makes this scenario strictly analogous to the procedure involved in attempting to complete a supertask. This is because it supposes that the present state of the universe is the causal result of an actually infinite series of previous states of the universe, each of which had to occur in time, one-by-one, in order to achieve a determinate result: the existence of the present state of the universe. In the envisaged Humean scenario, then, the analogue of a supertask is the production of the present state of the universe, and the analogue of a supertask set the set of all the previous states of the universe prior to that present state. The analogue of the sub-task in this case will be the production or *bringing into being* of each of those previously non-existent states, something that occurs one-by-one through additive succession in time. At the same time, however, this series must be *completeable* and thus such that the number of sub-task analogues progressively reduces to zero, thereby producing the present state of the universe as its determinate result. As we saw in part one of this essay, however, no such procedure can succeed in producing its result; neither can it do so in this case.

 To echo Hume: “Where, then, is the difficulty?” Here is one. Recall in the Hume book-burning case that David burns each book individually on his way to pursuing his goal of burning all the books. Suppose that he has just burned book N. At that point, he will have managed to burn all the books in the collection up to N. That set of books terminating in N will represent a subset of the infinite set of books that David proposes to burn. However, since no matter how many members of an actually infinite set are removed from it an infinite number of members remains, by burning all the books up to and including N, Hume will not have succeeded in reducing the remaining books to be burnt to less than an infinite number. Hence he will not have reduced the book-burning task to a task with a finite number of remaining subtasks that he can complete one-by-one, gradually reducing them to zero with the determinate result that all the books are burned. He is thus no closer to completing his supertask than he was when he began. Indeed, it is evident that, given the conditions stated above, he cannot complete his supertask, even in principle.

 In a like manner, in the envisaged Humean scenario, we are supposing that the present state of the universe is produced by an actually infinite set of preceding states of the universe occurring one-by-one in time, through which a new state of the universe is added to it at each moment. Since the present state of the universe has not always existed, there was a time when it did not yet exist. So, going back to a time prior to the production of the present state of the universe, let us pick some earlier point of time at which some other state of the universe was the present state of the universe: call this point P. Now the production of the present state of the universe presupposes that an actually infinite series of prior states of the universe has elapsed prior to its production. As such, the set consisting of P and all the states of the universe prior to P will constitute only a subset of the actually infinite number of prior states of the universe having to be produced in order to produce the present state of the universe. However, as we have seen, no matter how many members are subtracted from an infinite set, that set has no fewer members than it did before, so that an infinite number of members remain in that set.[[11]](#footnote-11) In the same manner, no matter how many members of a *projected* actually infinite set have been produced, one-by-one, on the way to completing such a set, there still remain an infinite number of further members of that set needing to be produced in order to achieve the determinate result for which the completion of that set is a causally necessary condition. Thus, no matter how many of those prior states of the universe have actually been produced prior to P there yet remains an infinite number of states still to be produced in order to produce the present state of the universe. The number of remaining states to be produced, then, can never be reduced to less than an infinite number, regardless of how many have been produced prior to P. At no point, then, will the remaining set of states of the universe necessary to produce P constitute a finite set, such that by producing those states one-by-one the set of states still remaining to be produced will progressively be reduced to zero, terminating in the production of the present state of the universe. In that case, the present state of the universe cannot have been produced in that way, even in principle.

 It will not do to argue that, supposing that an actually infinite set of antecedents had produced the present state of the universe, that the “distance” between any P and the present state of the universe would be a finite set, such that the present state of the universe would be causally accessible from every P in the series. The same, after all, would hold in the case of Hume’s book burning project. We could simply assign a number to each of the books burned, beginning in reverse order; no matter how far we counted back that book would be assigned a finite number and thus be countable from the point at which zero tasks remained. However, that is irrelevant to the argument here. We are not here concerned with what would be the case if a supertask, or the analogue of a supertask, could (*per impossibile*) be completed. The argument here concerns the *completability* of such a task or its analogue, a condition clearly necessary for the *possibility* of its completion, and concludes that no such task or analogue could be completed even in an infinite amount of time, *in principle*. To assume the completability of such a task or analogue in this context is thus to beg the question against the argument by assuming what is in dispute.

In the Humean scenario, then, the present state of universe as thus envisaged has to be regarded as the product of the analogue of a completed supertask, and the set of past states of the universe analogous to a supertask set. However, as we saw in part I of this essay, no supertask can be completed, even in principle, no matter how much time we allot to it; neither can a supertask set exist. The same, then, has to apply to their analogues in the envisaged Humean scenario. As such, the present state of the universe cannot be the product of the analogue of a completed supertask nor could the analogue of a supertask set consisting of all of the previous states of universe have been formed in the way envisaged. Therefore, the present state of the universe *could not* be the product of such a process, even in principle. Thus, *it is not* the product of an infinite, temporally ordered series of previous states of the universe produced one-by-one through some immanent process involving additive succession in time.

 One may attempt to evade this conclusion by proposing that what makes a supertask impossible is the same thing that makes counting to infinity impossible. The suggestion would be that, since no matter how many tasks I accomplish the number of my accomplished tasks will always equal only a finite number, to complete a task requiring that I complete an infinite number of subtasks is impossible. However, one may seek to turn this fact to advantage in the other direction. If I trace back the antecedents of the present state of the universe back through the previous states of the universe, and for exactly the same reason, I will never have traversed an infinite number of such antecedents and thus can never arrive at a set of antecedents constituting a completed supertask, even if I trace those antecedents back forever. So despite the fact that there are an infinite number of such antecedents, there is no supertask here after all.[[12]](#footnote-12)

 This is evasion indeed. As I just noted, since the previous states of the universe are causally ordered, so that existence of the entire series of successors is dependent on each predecessor, the existence of the present state of the universe presupposes each (individually) and every (collectively) of the previous states of the universe as a necessary condition for its own existence. If *any* of those antecedents had failed to exist, occur, or obtain, then *all* of its successor states, including the present state of the universe, would have failed as well. Thus, as depicted in Hume’s scenario, the present state of the universe presupposes the existence of the entire series of previous states of the universe as a necessary condition for its own existence. The set of such states, however, is stipulated to be beginningless, such that each member of that series stands in the successor relation to a preceding member serving as the efficient cause of its existence, and thus constitutes an actually infinite set. As such, the existence of the present state of the universe does after all presuppose the analogue of a supertask set as a necessary condition for its existence, not just some finite subset of that set of previous states of the universe that we could in principle trace back from the present moment and imagine being indefinitely extended into the past. However, a set of this sort can exist only if the analogue of a completed supertask is possible given the constraints of the envisaged Humean scenario. Since, as we have seen, no such analogue is possible even in principle, no such set can exist. Therefore, the present state of the universe cannot have been the product of an infinite series of causally ordered successor states produced one-by-one through some immanent process involving additive succession in time.[[13]](#footnote-13)

 Let us move on. Let us call the immediately preceding state of the universe the *proximate efficient cause* of the present state of the universe. Using Gwiazda’s terminology, we can define the proximate efficient cause of the present state of the universe as the last task in a series the completion of which means that the number of remaining tasks in the series = 0. Given what I just argued in the last paragraph, the existence of the present state of the universe presupposes the existence of every previous state of the universe as a necessary condition of its existence, including the immediately preceding state of the universe serving as its proximate efficient cause. This is because if any of these prior states had failed to exist, neither would that present state of the universe. However, since the proximate efficient cause of the present state of the universe in its turn presupposes the prior existence of every state of the universe of the universe that precedes it, and that set also has an infinite number of members, then on the envisaged Humean scenario its existence, in turn, also has to be product of a the analogue of a completed supertask. In the envisaged scenario, then, the existence of the present state of the universe depends on the existence of its proximate efficient cause and the existence of that proximate efficient cause requires, in turn, that it be produced by the analogue of a completed supertask. However, as we have seen, the analogue of a completed supertask is impossible and, because of this, no analogue of a supertask set can exist. Therefore, since in the envisaged scenario no such analogue can exist, even in principle, neither the present state of the universe nor its proximate efficient cause will be possible on that scenario and thus neither will exist.

 We can generalize this argument, by iterating it for each preceding member of the series conceived of as the causal product of the operation of all of its predecessors taken as a whole within the constraints of the envisaged Humean scenario. In each case, the existence of that state of the universe will presuppose the existence of every previous state of the universe as a necessary condition for its existence. Since we have defined that set of previous states to be beginningless, hence consisting of an infinite set of members each of which stands in the successor relation to a previous member of that set serving as its efficient cause, it follows that every member of that set presupposes the analogue of a completed supertask as a necessary condition for its existence. However, the analogue of a completed supertask is impossible, for the same reason that a supertask is, as we saw above. Therefore, in the envisaged scenario, none of those previous states of the universe can have existed, since one of the necessary conditions for their existence (as individual members of that set) cannot be met, even in principle. In the envisaged scenario, then, none of them can exist and, supposing that the conditions of that scenario obtained, none of them would exist. Further, since on Hume’s account the series is nothing more than the sum total of its members, neither would the series exist. Nor, then, would the present state of the universe that, after all, is a member of that series. We can safely conclude, then, that the present state of the universe, which clearly does exist, is not the product of an infinite, temporally ordered series of previous states of the universe produced one-by-one through some immanent process involving additive succession in time. The envisaged Humean scenario, therefore, is not possible after all.[[14]](#footnote-14)

 III

 Now let’s get back to Aquinas. To begin with, let me note some things that I have not claimed or argued for in this paper. First, I have not claimed that there could not exist an infinite, temporally ordered series of causally related states of the universe terminating in the existence of the present state of the universe. Along with Aquinas, I suppose that such a scenario is logically possible, just not so on the lines suggested by Hume. Second, I have not claimed that an infinite series cannot have a last member, but rather that a series with such a member could not be produced in the way that Hume suggests. Nor have I claimed or argued that, if such a series were to exist, that the existence of each of its members could not be explained by reference to other, previous members of that series, but only that this is not sufficient, within the strictures of the envisaged Humean scenario, to account for the existence of the series *as a whole*. Of course, any or all of these claims could be true, but nothing I say here depends on that being the case. In the end, all of these turn out to be red herrings in the present context.

 It is also important to note that I have not claimed that an actually infinite set, i.e. a set with an actually infinite number of members, is impossible. Intuitively, it seems that such sets can and do exist, for example, the set of truths, the set of propositions, and the set of integers.[[15]](#footnote-15) I have only claimed that a particular kind of actually infinite set cannot exist, namely, a supertask set or the analogue of such a set. Thus, unlike proponents of the Kalam Cosmological Argument, I do not have to defend the strong thesis that an actually infinite set is impossible, even in the case of the kind of infinite set discussed by Aquinas and Hume. Again, this claim may be true, but my argument here does not rely on that being the case.

 Finally, I am not opening the door to a revival of Zeno’s paradoxes. We can follow Aristotle, Kant, and modern physics in treating space and time as *continua* rather than as composed of discrete points and moments as proper parts. In that case, space and time, while infinitely divisible in the imagination, do not have to be understood as infinitely divided in actuality. They are thus only potentially infinitely divisible rather than actually infinitely divided, so even if we continue to divide a line-segment forever, this will never result in an actually infinite set of discrete points. As such, in taking a step from point A to point B I do not have to traverse an actually infinite number of discrete intermediate points existing between A and B. Thus described, taking a step does not constitute a supertask, let alone a supertask that I manage to complete in a finite amount of time.[[16]](#footnote-16)

 Now let me consider the implications of the foregoing for the *secunda via* of St. Thomas. In the *prima via*, Aquinas has already argued for the existence of a first cause, and rightly or wrongly, takes it that he has proved this. In particular, on the basis of the principle *ex nihilo, nihil fit*, Aquinas has already excluded the possibility (if that is what it is) that anything, including the physical universe as a whole, could have simply popped into existence out of nothing for no cause or reason whatever.[[17]](#footnote-17)

 In the *secunda via*, Aquinas then turns to two further possibilities for the origin of the universe. The first, that something might be the efficient cause of its own existence, he excludes due to its logical impossibility. In order for something to be the efficient cause of its own existence, it would have to exist prior to its own existence in order to bring itself into existence, something evidently impossible. The second, that there might exist an infinite series of intermediate causes (=caused causes) existing without a first (=uncaused) cause terminating in an ultimate effect (=something caused without itself being a cause of anything else), Aquinas rejects by denying that such a series is possible. Without a first cause, he says, there can be no intermediate causes and thus no ultimate effect. As commentators have noted, Aquinas is not here asserting the claim that there must be a first event or excluding the possibility that the world might be actually eternal in time.[[18]](#footnote-18) Unlike St. Bonaventure and other proponents of the Kalam cosmological argument, Thomas claims that it is impossible on philosophical grounds alone to exclude the possibility that the universe is temporally eternal or that an ordered, infinite series of *per accidens* causes could exist.[[19]](#footnote-19) More than this, he criticizes the arguments given by Christian, Jewish, and Muslim writers to the effect that the existence of an actually infinite set is impossible.[[20]](#footnote-20) Despite this, Aquinas does not hesitate to deny that such a series of causes could exist without a first, uncaused cause acting to bring it into existence.

 The argument of part II of this paper helps us to see how Aquinas can be right about this. For Aquinas, even if the universe consists of such a series, and even if the coming into existence of each individual member of the series can be explained in terms of another member of the series acting as its proximate efficient cause, the question concerning the existence of the series as a whole remains on the table and requires a distinct answer. That is because that series is a contingent, rather than a necessary, being – as is shown by the fact that, as we noted Hume himself admits, we can apparently coherently conceive of that series as having failed to exist, even if it does exist in fact. On that basis, we can see that this series needs an efficient, existence-producing cause itself existing, not temporally prior to that series, but instead as something existing outside of that series, producing it as a completed totality, along with all its temporal and causal relations, in a single, timeless of act of creation. As we have seen, there is no way to produce such a series by some process involving additive succession in time, since to suppose this is to suppose that this series was produced by a process analogous to a completed supertask and the set consisting of the past states of the universe analogous to a supertask set. Just as such a series can explain the existence of the present state of universe only by being posited as a completed whole, so too can it exist as such only through being caused to exist as a completed totality, just as the universe itself is supposed to be according to the thesis known as four-dimensionalism.[[21]](#footnote-21)

 Further – and regardless of whether it consists of a finite or an infinite number of members – without such a cause no such series can exist Thus, even if the universe consists of an infinite series of temporally ordered, causally dependent events terminating in the present state of the universe, something more is required for it to exist than just the members of that series, despite the fact that each member of the series finds the proximate efficient cause of its existence in the operation of another member of that series. There also has to be an efficient cause for the existence of that series *as a whole*, acting as the external, efficient cause positing that entire series in actuality along with all its temporal and causal succession relations through a single, timeless act of creation. This first cause will be either the efficient cause of the existence of the first event in the series, if it has a first member, or of the existence of the entire series if it does not. Thus, without a first cause, there can be neither intermediate causes of existence nor any ultimate effect in existence. Thus, without a first cause, nothing would exist at all, including the present state of the universe, “All of which,” as Aquinas laconically avers, “is pretty plainly false.” The *secunda via* is thereby vindicated, and along with it the claim that the First Cause exists, *so far forth*. Its complete triumph only awaits a defense of the *prima via*, to which I encourage readers to look elsewhere.[[22]](#footnote-22)

1. Jeremy Gwiazda (2012) “A Proof of the Impossibility of Completing Infinitely Many Tasks,” *Pacific Philosophical Quarterly* 93 (1):1-7. [↑](#footnote-ref-1)
2. Actually, Thomson defines a supertask as a task that requires that one perform an infinite number of tasks in a finite amount of time according to some schedule. Since this latter qualification makes no odds in this context, I will ignore it here. [↑](#footnote-ref-2)
3. These are my own contributions, and may be unnecessary complications; however, I believe that they will make the exposition clearer. [↑](#footnote-ref-3)
4. I make no assumption that Gwiazda would either agree with my conclusions here or approve of the use I have made of the insights I believe I have derived from reading his article. [↑](#footnote-ref-4)
5. Here I am freely adapting Gwiazda’s example, derived in turn from one of Thomson’s. Hume’s dividing the task in half is easily done: he simply has to begin at the first shelf in the collection and burn every other book, leaving the remainder for Lola to dispose of. [↑](#footnote-ref-5)
6. William Lane Craig (among others) has declared that consequences like these show the concept of an actually infinite set is incoherent. In the case we are now considering, it is natural to assume that when Hume burns the first book in the collection of divinity and school metaphysics that set of books contains one less book than it did before. However, since this set of books is an infinite set, it contains the same number of books both before and after Hume burns the first book and thus does not contain one less book than it did before. This is a contradiction. The usual response to this is to claim that in arriving at this conclusion critics of infinity confuse an infinite set with a very large finite set. What would be a contradiction in the case of a large finite number is merely a definitional consequence when applied to infinity. Well, you can believe that if you want; whether you buy this does not affect my point in this essay. [↑](#footnote-ref-6)
7. In Thomas Aquinas, *Summa Theologica*, New York, Benzinger Brothers, 1911, 13. [↑](#footnote-ref-7)
8. Hume, *Dialogues Concerning Natural Religion*, second, edition, ed. by Richard Popkin, Indianapolis, IN, Hackett, 56. I have omitted one sentence, in which Hume compares the envisaged series of efficient causes to a collection of countries or bodily organs, the uniting of which is simply into a whole is merely the result of an arbitrary act of “uniting” performed by the mind. This is no help to his cause. However, the disanalogies between the two cases are often overlooked, as in Paul Edwards’s famous essay, “The Cosmological Argument,” reprinted in Donald R. Burrill, ed., *The Cosmological Arguments*, Garden City, NY, Anchor Doubleday, 1966, 101-123, especially 113-115. [↑](#footnote-ref-8)
9. See William L. Rowe, *The Cosmological Argument*, New York, Fordham University Press, 1978, 151-67. [↑](#footnote-ref-9)
10. See Hume, *Dialogues*, op. cit., 56. Hume admits this claim only by implication, but is clearly committed to it by what he says elsewhere. [↑](#footnote-ref-10)
11. This holds even if we subtract an infinite subset from an infinite set, and thus will hold even if an infinite subset of an infinite set has already been realized (=has occurred or existed) by the time that, e.g., P is produced. Let the set be the set of all integers, and from that set, let us subtract all the even integers, leaving only the odd integers remaining. The result is still an infinite set with an infinite number of members. Thus, even if the set is beginningless the point stands and no such analogue to a superset is possible. [↑](#footnote-ref-11)
12. Bede Rundle (*Why There is Something rather Than Nothing*, Oxford, Clarendon Press, 2004, 171-172) suggests a parallel between the past and the future. Since events could continue forever into the future without ever constituting an infinite set of events or having a last member, so too could past events constitute a finite series existing forever into the past without ever having a first member. However, there is an obvious asymmetry between past and future, which Rundle dismisses too quickly. The future is an open-ended series to which new events can be continuously added and thus that possesses no intrinsic limit; the past, however, consists of a series of actually elapsed events terminating in some moment stipulated to be the present moment. . We can successively add new events to a series projected into the future, but due to the arrow of time we cannot do this with regard to the past. When we imaginatively project into the past, we are not adding members to the series, but simply reviewing members of that series already supposed to have existed. We can thus “grow” the future by adding new events to it but we cannot tack new events onto the past in the same way in order to constitute it as merely potentially infinite series. This series of past events is either infinite or consists of a determinate finite number of previous events relative to any moment taken as “now”, i.e. the present moment, since any fixed finite collection of actual things can be assigned a determinate number representing the sum total of its members. If this determinate finite series of past events is temporally ordered by the “earlier than” relation, that series will have to terminate in a first event, i.e. one that stands in the relation of “earlier than” to every subsequent event and to which no other event stands in the “earlier than” relation to that event. Thus, if the past is finite it has a first moment [↑](#footnote-ref-12)
13. Or, for that matter, the conjunction of all of those finite subsets, which presupposes that this actually infinite set of states already somehow exists. Again, my concern here is not with what would be the case if such a set existed, but with whether it could have been formed in a particular way. It is only to this topic that the current argument is addressed. See below, section III. [↑](#footnote-ref-13)
14. Thus, Michael Martin is wrong when he asserts, without argument, that an infinite series can be formed by additive succession if it is beginningless; See his *Atheism: A Philosophical Defense*, Philadelphia, Temple University Press, 1990, 105. Quite the contrary, precisely because it is beginningless, no such series can be formed, or exist, even in principle. To put the point a slightly different way, in order for the actually infinite series of events that produces the present state of the universe to exist, each of the members of the series must exist. It thus has to be possible for each one of them individually to exist. However, since the series is beginningless, each member of the series causally depends for its existence on an infinite number of antecedents, the previous states of the universe that precede it in time. In that case, each member of the series is the product of the analogue of a supertask set, one formed one member at a time, and terminating in the production of that member of that series currently under discussion. However, since no analogue of a supertask can be successfully completed in that way, neither can the analogue of a supertask set exist. In that case, however, neither can any of the members of the series, taken individually. Therefore, since there is according to Hume nothing more to the existence of the series than the combined existence of each of its members, neither can the series of such states exist. If such a series does exist, then, it cannot be the result of some sort of process like the one envisaged by Hume, since no analogue of a supertask could be completed in that manner. Thus, if an actually infinite series of previous states of the universe does exist, it must have some other cause. For more on this, see below. [↑](#footnote-ref-14)
15. These sets, which consist of abstract, sempiternal objects, are posited as existing as completed wholes without their members having been generated by some sort of process. They are thus not analogous to supertask sets, nor plausibly seen as the products of some process resulting in a completed supertask. Thus, the argument of part one does not exclude their existence. [↑](#footnote-ref-15)
16. This is the case of particular interest to Zeno, Thomson, and Gwiazda. However, my argument turns, not on the nature of time or space, but rather on temporally ordered sets of discrete items such as tasks or states of the universe. [↑](#footnote-ref-16)
17. Currently, no one bothers to defend the hoary thesis of the eternity of the world. Contemporary speculative cosmologists of an atheistic sort seem driven to make some sense out of the notion that the universe popped into existence out of “nothing.” In my opinion, they are like a drowning man grasping at straws. [↑](#footnote-ref-17)
18. Aquinas follows Aristotle in asserting that an actually infinite set is impossible (*ST*, I, I, Q7, Art 4) and yet in denying that this excludes the possibility of an eternally old universe (*ST*, I, I, Q46, Art 1 and op. cit. art 2, reply objection 7). There is no contradiction here so long as one holds, as Aquinas presumably does, that such a series, if it exists, is not self-explanatory and thus requires an efficient cause for its existence. [↑](#footnote-ref-18)
19. Aquinas, *op cit*., Art 2; however, at the same place he affirms that it is an article of faith that universe had a beginning in time. Further, he affirms that time began with the creation of the universe and thus is not infinite either in existence or duration – see *op. cit*., Art 3. [↑](#footnote-ref-19)
20. Aquinas, *op cit*., Art 2, replies. [↑](#footnote-ref-20)
21. See Theodore Sider, *Four Dimensionalism*, New York, Oxford, 2000 for an exposition and defense of this view. [↑](#footnote-ref-21)
22. See Paul Herrick’s paper, “The Cosmological Argument for the Existence of God: An Apologia,” in Richard Curtis, ed., *Reasonable Perspectives on Religion*, Plymouth, England, Lexington Books, 2010, 115-147, and the other papers by Herrick cited in endnote 10 following the above-mentioned paper. [↑](#footnote-ref-22)