# A New Kalam Argument: Revenge of the Grim Reaper

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## 1. Introduction

The Kalam argument (Craig 1979) is an attempt to establish the existence of a first cause by first demonstrating that time itself had a beginning. Kalam defenders appeal to the causal principle that everything that begins to exist had a cause of its existence.

In this paper, I provide a new way of arguing for the beginning of time, building on Benardete's Grim Reaper paradox and appealing to a version of David Lewis's 'patchwork principles' of modal metaphysics.

## 2. The Benardete Grim Reaper Paradox

Alexander Pruss (Pruss 2009) has deployed the Grim Reaper paradox (Benardete 1964, Hawthorne 2000) as an argument for the discrete character of time. In Benardete's paradox, we are to suppose that there is an infinite number of Grim Reaper mechanisms, each of which is engineered to do two things: first, to check whether the victim, Fred, is still alive at the Grim Reaper's appointed time, and, second, if he is still alive, to kill him instantaneously. The last Grim Reaper (Reaper 1) performs this dual task at exactly one minute after noon. The next-to-last Reaper, Reaper 2, is appointed to perform the task at

exactly one-half minute after noon. In general, each Reaper number n is assigned the moment $1/2^n$ minute after noon. There is no first Reaper: for each Reaper n, there are infinitely many Reapers who are assigned moments of time earlier than Reaper n's appointment.

It is certain that Fred does not survive the ordeal. In order to survive the whole ordeal, he must still be alive at one minute after twelve, but, we have stipulated that, if he survives until 12:01 p.m., then Reaper 1 will kill him. We can also prove that Fred will not survive until 12:01, since in order to do so, he must be alive at 30 seconds after 12, in which case Reaper 2 will have killed him. In the same way, we can prove that Fred cannot survive until $1/2^n$ minutes after 12, for every n. Thus, no Grim Reaper can have the opportunity to kill Fred. Thus, it is impossible that Fred survive, and also impossible that any Reaper kill him! However, it seems also to be impossible for Fred to die with certainty and yet to do so without any cause.

The original Grim Reaper paradox requires some assumption about causality: that Fred cannot die unless someone or something kills him. I would like to eliminate that dependency. Consider the following variation: the Grim Place. In place of asking whether a pre-existing victim Fred is dead or alive, we will focus instead on the question of whether or some Grim Reaper has issued a death warrant. Let's say that each Grim Reaper #n can issue a death warrant by placing a particular kind of point-sized particle in a designated position, exactly distance of $\frac{d}{2^n}$ meters from a plane P. Each Grim Mover n

checks to see if a particle is already at a distance of $\frac{d}{2^i}$ meters from plane P, for some i > n: that is, he checks to see if any earlier Reaper has issued a "warrant". If a particle has already been placed in one of the designated spots, then the Grim Reaper #n does nothing, other than maintaining the status quo.

If there is no particle in an appropriate location, then the Grim Reaper #n issues his warrant, placing a particle exactly $\frac{d}{2^n}$ meters from P. We can now prove both that at 12:01 that some particle is located with d meters of the plane, and that no particle is located there. Suppose that there is no particle at any location $\frac{d}{2^i}$ meters from plane P, for any i. This is impossible, since if there were no particle $\frac{d}{4}$ meters from P, then Grim Reaper #1 would place a particle in the position $\frac{d}{2}$ meters.

Thus, there must at 12:01 pm be some particle in an appropriate position. Suppose that the particle is located at that time in position $\frac{d}{2^n}$ meters from P. This means that every Grim Reaper who's number is greater than n did nothing, contrary to our hypothesis. Thus, this option is also impossible.

Let us try to be more explicit about the premises needed to generate the paradox. (In this context, by 'paradox' I mean a set of individually plausible but mutually inconsistent propositions.) First of all, we must assume that a single, isolated Grim Reaper scenario is metaphysically possible:

**P1. Possible Grim Reaper (PGR).** There is a possible world W and a region R such that R has a finite temporal duration d seconds, there is a Grim Reaper wholly contained within R, and throughout R the Grim Reaper has the power and disposition to create a particle and place it at a designated position d meters from the plane P if there is no Fred particle closer to the plane than d meters, and otherwise to maintain any Fred particle that is within d meters of the plane in its initial position.

Secondly, we appeal to some version of David Lewis's Patchwork Principles (Lewis 1983, 76-7). Much, if not most, of our knowledge of possibility is based on patchwork principles, since we have little direct access to alternative possibilities. Instead, we have to rely on our direct knowledge of the actual world, as well as the license to cut-and-paste or recombine various regions of the actual world into a new arrangement.

**Binary Patchwork.** If possible world $W_1$ includes spatiotemporal region $R_1$, possible world $W_2$ includes region $R_2$, and possible world $W_3$ includes $R_3$, and $R_1$ and $R_2$ can be mapped onto non-overlapping parts of $R_3$ ($R_{3.1}$ and $R_{3.2}$) while preserving all the metrical and topological properties of the three regions, then there is a world $W_4$ and region $R_4$ such that $R_3$ and $R_4$ are isomorphic, the part of $W_4$ within $R_{4.1}$ exactly duplicates the part of $W_1$ within $R_1$, and the part of $W_4$ within $R_{4.2}$ exactly duplicates the part of $W_2$ within $R_2$.

Following Lewis, I will assume that 'intrinsicality' and 'exact duplication' are inter-definable:

**Definition of Intrinsicality:** a property P is *intrinsic* to a thing x within region R in world W if and only if x is P throughout R in W, and every counterpart of x in any region R' of world W' whose contents exactly duplicate the contents of R in W also has P throughout R'.

Binary Patchwork licenses recombining region $R_1$ from world $W_1$ with region $R_2$ from world $W_2$ in any way that respects the metrical and topological properties of the two regions, so long as there is enough 'room' in spacetime as a whole to fit the two regions in non-overlapping locations (as witnessed by the two regions $R_{3.1}$ and $R_{3.2}$ in world $W_2$). The Binary Patchwork principle can plausibly be generalized to the case of infinitary recombinations:

**P2. Infinitary Patchwork (PInf).** If S is a countable series of possible worlds, and T a series of regions within those worlds such that $T_i$ is part of $W_i$ (for each i), and f is a metric and topology structure-preserving function from T into the set of spatiotemporal regions of world W such that no two values of f overlap, then there is a possible world W' and an isomorphism f' from the spatiotemporal regions of W to the spatiotemporal regions of W' such that the part of each world $W_i$ within the region $R_i$ exactly resembles the part of W' within region $f'(f(R_i))$.

In order to apply the Patchwork principles to Benardete's story, we must assume that the relevant powers and dispositions are intrinsic to the things that have them when they have

them. Otherwise, we cannot assume that the joint possibility of an infinite number of Grim Reaper scenarios follows from the possibility of a single scenario, taken in isolation.

**P3. Intrinsicality of the Grim Reapers' Powers and Dispositions (PDIn).** The powers and dispositions ascribed to each Grim Reaper are properties intrinsic to that Reaper in its corresponding region and world.

We also need to assume that the processes described in the Grim Reaper paradox are, in principle, arbitrarily compressible in space and time. This involves assuming that there is no metaphysically necessary intrinsic scale to spacetime.

**P4. Compressibility of Spacetime (CompST).** If property P is intrinsic to x in region R of world W, and R has a finite temporal duration, then there is a counterpart x' of x and a counterpart P' of P such that P' is intrinsic to x' in region R' in a world W', and an isomorphism f from the parts of R to that parts of R' that preserves the topological properties of R, and such that, for each sub-region S of R, f(S) has exactly one-half the temporal duration and one-half the length of S in every spatial dimension.

If P4 were false, this would have to be because of some essential, intrinsic feature of spacetime, such as granularity, which would itself be inconsistent with the hypothesis of infinitely dense time. Thus, if we suppose that time is dense, then it is reasonable to assume infinite compressibility. Finally, we need to state the hypothesis for the reductio:

**H1. Possibility of Bounded and Non-Well-Founded Time Sequence. (BNWF)** There is a possible world W and a spatiotemporal region R in W such that (i) there is a time t within R and a finite temporal interval d such that no part of R begins earlier than d before t, and (ii) R has infinitely many temporally extended parts such that these parts can be put into a sequence (ordered by the natural numbers) in which each successive part in the sequence is wholly earlier in time than its predecessor.

We can prove both that some GR has issued a death warrant, and that no GR has done so.

**Proof A. Some GR has acted.**

1.Assumption for reductio: no GR has acted at any time.

2.Consider any GR #n.

3. By hypothesis, no GR with number m greater than n has acted.

4.By the definition of the GR role, if no GR #m with number greater than n has acted, then GR #n has issued a death warrant.

5. So, GR #n has acted.

6. Contradiction. (1, 5)

**Proof B. No GR has acted.**

1.From previous proof, we know that some GR has acted. Say, GR #n.

2.By the definition of the GR role, if GR #n has acted, then no GR #m, with m > n has acted.

3.So, no GR #m, with m > n has acted. (1, 2)

4.So, no GR #m, with m > n+1 has acted. (3)

5.By definition of the GR role, if no m > n+1 has acted, then GR #n+1 has acted. So, GR #n+1 has acted. (4)

6. But, n+1> n. Contradiction. (3, 5)

A slightly more formal version:

1. Start with a possible Grim Reaper in world W and region R, with finite duration $d_0$. (From P1 Possibility of Grim Reaper)

2. Next, locate a world W' with a region R' containing a non-well-founded infinite series of non-overlapping temporal parts. (Assumption of H1.BNWS, for reductio)

3. For each number n, locate a possible world $W_n$ and region $R_n$, with duration $\frac{d}{2^n}$, containing a counterpart of the Grim Reaper. (From 1, P2 Intrinsicality of Powers, and P3 Possible Compressibility of Spacetime)

4. Find a single possible world W* with region R* containing a non-well-founded infinite series of non-overlapping temporal parts ($R_0$, $R_1$, etc.), with each $R_i$ containing a counterpart of the Grim Placer. (From 3, 4, and P1 Infinitary Patchwork)

5. In world W*, at the end of each period $R_i$, a particle is located some distance $\frac{d}{2^j}$ from the plane P, for some $j \geq i$. (From P1)

6. In world W*, at the end of each period $R_i$, if a particle is located at distance $\frac{d}{2^i}$, then at the end of period $R_{(i+1)}$, no Fred particle was located at distance $\frac{d}{2^j}$ for any $j > i$. (From P1)

7. In world W*, at the end of period $R_0$, some particle is located some distance $\frac{d}{2^n}$, for some n. (Instantiation of 5, replacing 'i' by 0)
8. So, at the end of period $R_{(n+1)}$, no particle was located at distance $\frac{d}{2^j}$, for any j > n. (From 6, 7)
9. But, at the end of period $R_{(n+1)}$, some particle was located at distance $\frac{d}{2^j}$, for some j > n. (Instantiation of 5, replacing 'i' by 'n+1') Contradiction.
10. So, there is no possible world containing a non-well-founded infinite series of non-overlapping temporal parts. (Negation of H1.BNWS)
11. Consequently, if temporal structure is symmetrical, then it is impossible for time to be dense. (From 10 and H4.STS, by Lemma 3)

**3. From Grim Reaper to the Kalam Argument**

In fact, as Alexander Pruss has observed (Pruss 2009), the Grim Reaper paradox suggests not only that no finite time period can be divided into infinitely many sub-periods but also that it is impossible that there should exist infinitely many time periods, all of which are earlier than some event. It seems to provide grounds for thinking that time must be bounded at the beginning: that there must be a first period of time. If not, we could simply construct a new version of the Grim Placer paradox. As in the original version, we postulate the possibility of a Grim Placer, who creates a particle and places it at a designated spot, if and only if no particle is already located at a spot corresponding to any earlier Placer.

We can reconstruct the argument, assuming H2 -- Possible Infinite Past with Infinitely Many Parts -- as the hypothesis for reductio. This argument proves the negation of H2, namely, that the past is necessarily finite in its number of parts:

**H2. Possible Infinite Past, with Infinitely Many Parts (PIPIP).** There is a possible world W and a region R and time t of W such R has a temporal part wholly earlier than d units before t, for every finite interval d.

We must distinguish H2 from H3, Possible Quantitatively Infinite Past.

**H3. Possible Quantitatively Infinite Past (PQIP).** There is a possible world W, and a region R and time t of W such that R is wholly earlier than t, and R has infinite duration.

H3 is entailed by H2 (given standard mereology) but it does not seem to entail H2, since H3 is compatible with there being a set of earliest spacetime regions of infinite duration but with no proper parts. We could call this a simple infinite past. The Grim Placer argument does not establish the impossibility of such a simple infinite past.

H3 would entail H2, however, if such a simple infinite past were impossible. Consider hypothesis H4:

**H4. No Simple Infinite Past**. No spacetime region can have an infinite duration without having infinitely many proper parts or overlapping an infinite series of temporally finite and temporally disjoint regions.

For it to be possible for a simple region to have measurable temporal duration without parts, the simple region would have to either contain a process with a natural beginning and end or temporally overlap with one or more such processes. Thus, we can reasonably embrace the possibility of simple regions with *finite* duration, a duration corresponding to the natural distance between the two endpoints in processes of this kind. However, a simple region with an *infinite* duration in the past would have to contain only processes without a natural beginning, and we might well ask how any such process could have a temporal measure, without having actual proper parts or overlapping in time with other regions. Time is the measure of change, which seems to require both a terminus a quo and a terminus ad quem. This assumes, of course, that time has no intrinsic metric of its own. The point can be put in the form of a dilemma: if time is intrinsically self-measuring, then any extended period of time is divided (in and of itself) into an infinity of actual sub-periods, and so no simple unit of time can be extended. If time is not self-measuring, then a simple period of time (a period in which no process begins or ends) cannot have temporal extension. Either way, an infinitely extended simple past is impossible.

Here's another argument for H4. A simple region can have a temporal measure only if it is potentially divisible into parts. The idea of 'potential parts' and potential divisibility is

familiar from longstanding Aristotelian accounts of matter and spatial extension. For Aristotelians, an undivided, continuous mass has no actual parts. It can be said to have 'potential parts' in the sense that there are other worlds or other times at which the mass is in fact separated along some inner surface. This idea of 'potential parts' could be extended, by analogy, to temporally extended processes. A continuous, undivided process could be thought of as having no actual parts but as having potential parts, corresponding to possible worlds in which the process is interrupted or articulated by alteration at some instant internal to the process's lifespan. By the same token, we could suppose that the spatial region occupied by a continuous body and the temporal region occupied by a continuous process are both actually undivided, although divisible into potential parts. A region would be divisible into temporal parts only if it contains one or more processes that can potentially be stopped or interrupted. A process P is potentially stoppable only under certain conditions:

(i) P itself has a natural, finite measure, based on the normal distance in time between its terminus a quo and terminus ad quem, a measure that can be shortened by accelerating P, or

(ii) There is another process P' that, when it reaches its terminus ad quem, has the power of terminating P, and P' is stoppable before the termination of P.

However, if the early history of the world consists entirely of processes without finite measures, then none of those processes is potentially stoppable, and hence none of the

spatiotemporal regions containing them is even potentially divisible in the temporal dimension. Regions that contain no temporal parts at all (actual or potential) and that temporally overlap only other regions without temporal parts cannot have a temporal measure. Hence, a mereologically finite past must be a quantitatively finite past.

Consider, for example, the following scenario (as suggested by an anonymous referee):

> Suppose the laws of nature are such that a 'primeval atom' with no internal structure might decay, generating a Big Bang and the universe as we know it. Before it did decay nothing happened. We may suppose that the laws of nature can be formulated to describe this primeval atom as having existed for an infinite time with an unchanging infinitesimal probability of decay per second.

In such a case, I can press the dilemma I mentioned earlier: either there is an intrinsic metric to the pure passage of time, or not. If there is, then the infinite past is actually divided into an infinite number of periods, contrary to the conclusion of the Reaper paradox. If there is no intrinsic measure of time, then the imagined scenario is impossible, since it supposes an extended period during which absolutely nothing happens.

Here is a second scenario that is more difficult for me to dismiss:

> Suppose that, before the Big Bang, there was a single, infinitely extended process of locomotion, by which two membranes were continuously moving close to each other. When they collided, they produced the Big Bang.

As an Aristotelian about motion, I have to admit that locomotion can involve the covering of distance by means of a continuous, undivided process. However, I would question whether the imagined scenario is really coherent, on the grounds that nothing in it licenses us to speak of measurable *spatial distances* before the collision, since distance, like temporal duration, derives its measure from finite processes, bounded at both their beginning and their end. Without real spatial distances, real locomotion would also be impossible. Once again, there is a dilemma: either space is self-measuring, or it is not. If it is self-measuring, then every region of space has an infinity of actual parts, and every process of locomotion through that region a correspondingly dense infinity of temporal parts, contrary to the conclusion of the Grim Reaper. If space is not self-measuring, then the imagined scenario is impossible.

## 4. Objections

### 4.1 Dispositions Need not be Intrinsic

Jennifer McKitrick[1] has argued that many dispositions are not intrinsic to their bearers. For example, weight is a disposition that depends upon the strength of the ambient

[1] Jennifer McKitrick, "A case for extrinsic dispositions," *Australasian Journal of Philosophy* 81(2007):155-74.

gravitational field. However, even if McKitrick is right about some dispositions, all that we need to assume is that the powers and dispositions that are definitive of the Grim Reaper scenarios are intrinsic to those situations, which is clearly the case. Each GR has a power to produce a particle of a certain kind under certain circumstances. Its having that power does not depend on anything else being arranged in a certain way.

**4.2 Dispositions and Powers can Fail**

In the argument for the contradiction, I assumed that all of Grim Reapers are effective at exercising the specified powers. However, causal powers may fail, and a thing may act on occasion, in a way contrary to its dispositions.

This objection fails, since the argument does not require the assumption that powers are always or necessarily exercised successfully: only that it is possible for a power to be exercised successfully. Let's assume that whether or not a power is exercised successfully, and whether nor not some disposition is followed in exercising it, is a matter intrinsic to the situation in which the exercise occurs. If so, we can assume the P2, the Infinitary Patchwork principle, applies to the multiplication and arrangement of an infinity of *successfully executed* Grim Reaper scenarios.

### 4.3 Neo-Humeanism

The argument does not depend on assuming that all powers and dispositions are intrinsic, but it does depend on assuming that some are. On a Neo-Humean account of causal powers (as advocated by David Lewis and Theodore Sider – Lewis 1986 and Sider 2000), any power or disposition that anything has depends on the pattern of events involving similar things across the history of the world. If this neo-Humean account is right, then the Patchwork Principle does not apply to scenarios specified in terms of causal powers or dispositions.

However, the very fact that neo-Humeanism entails the extrinsicality of powers and dispositions provides compelling grounds for rejecting it. The neo-Humean account gets the order of explanation between powers and their manifestations wrong, making the possession of powers dependent on the pattern of manifestations. Any modification of the neo-Humean account that avoids this consequence would be compatible with the intrinsicality of the relevant powers and dispositions, and the applicability of Patchwork to the Grim Reaper scenarios.

### 4.4 The Amazing Vanishing Particle

The Grim Reaper argument tacitly assumes that once a particle has been created and placed in a particular position, it persists there throughout the rest of the GR sequence. Why not suppose instead that in such a case infinitely many particles would be generated

by infinitely many Grim Reapers, with each particle spontaneously vanishing at some time between its production and the production of the next particle? The vanishing particles could be supposed either to simply cease existing altogether without a trace, or to be transported instantaneously to a distant location or parallel universe.

What's really required for the argument to work is an assumption about the persistence of signals of a certain kind. When a Grim Reaper fails to find a "Fred" particle in the appropriate region of space, he is in effect receiving a null signal from his predecessors. He is then supposed to send a signal (in the form of an appropriately placed Fred particle) to all of his successors to the effect, "I, GR number n, am the first to have acted." We can re-formulate the argument in a way that removes all reference to the particle. What's essential is that each "Grim Signaler" (to change the name) has the passive power of receiving any signal sent by a predecessor (if there is in fact one), and the active power of sending a signal (of the form "Grim Signaler n was the first to initiate this signal") to a successor GS (again, if there is one). This pair of passive and active powers is intrinsic to each Grim Signaler.

The Grim Signaler version assumes that each GS has the power of acting directly on its successor (if there is one). Doesn't this require the various regions to overlap one another, in order to avoid action at a distance? Not necessarily. Each region could have a topologically closed boundary in the direction of the future and an open boundary in the direction of the past. In this way, each pair of regions could be adjoining without overlapping.

### 4.5 Reject the Infinitary Patchwork Principle

We could take the paradox to provide a refutation of the infinitary version of the patchwork principle, rather than of the possibility of an infinite past or of the finitary patchwork principle. However, this response seems entirely ad hoc. The intuitive motivation for the infinitary patchwork is exactly the same as that for the finite version. If there is something special about the infinitary case, it must have to do with the possibility of an infinitary temporal structure, not with the patchwork idea itself.

## 5. Is Endless Time Impossible?

Can the Grim Reaper argument establish the existence of an end to time, as well as a beginning? Consider the three future-oriented counterparts to hypotheses H1 and H2:

**H5. Possibility of Bounded and Non-Well-Capped Time Series. (BNWC)** There is a possible world W and a spatiotemporal region R in W such that (i) there is a time t within R and a finite temporal interval d such that no part of R ends later than d after t, (ii) R has infinitely many temporally extended parts such that these parts can be put into an omega-series in which each successive part in the series is wholly later in time than its predecessor.

**H6. Possible Infinite Future, with Infinitely Many Parts (PIFIP).** There is a possible world W and a region R and time t of W such R has a temporal part wholly later than d units after t, for every finite interval d.

Can we also show that time is bounded in the future: that there will be a last period of time (the denial of H6)? Or even that every region has a final part (the denial of H5)? Apparently not. The only way to construct the Grim Reaper paradox in reverse would be to stipulate that each Reaper is able to check whether or not Fred will be alive at the end of his appointed period, and to kill him if he will, which doesn't make any sense. The apparent connections between time, knowledge and action all seem to rule out the possibility of such a paradox, without providing any grounds for rejecting hypotheses concerning the endlessness of time.

If we try to avoid such impossibly forward-looking dispositions, then we would be unable to say how the Grim Reaper is to respond to finding Fred alive at the beginning of his period (since this would correspond to Fred's being alive at the end of the period in the original paradox, which is stipulated to be impossible). Similarly, we cannot say when a Grim Reaper is to 'kill' a dead Fred, since the Reaper is supposed to kill him if and only if he becomes alive at the end of his period. Thus, there is no plausible future-oriented version of the P1, the Possibility of the Grim Reaper.

## 6. The Upshot of the Argument

### 6.1 The Discreteness of Time

Does the paradox give us reason to believe that time always consists of a finite number of indivisible 'atoms' of time?

**H7 Temporal Discretism.** Every finitely long period of time has only finitely many temporal parts (actual or potential).

Let's suppose that we find some reason for rejecting H5 (Non-Well-Capped Series) as well as H1 (Non-Well-Founded Series). For instance, we might take Thomson's Lamp (Thomson 1954) or Peter Forrest's Urn (Forrest 1999) super-task to be impossible, and use that impossibility, along with the impossibility of the Grim Reaper, as grounds for rejecting the possible density of time. Whether the impossibility of temporal density gives us reason to accept Temporal Discretism depends on whether we can make sense of the idea of 'potential but not actual' temporal parts. A spacetime region R in world W has 'potential' temporal parts if and only if R has a counterpart in world W' with actual temporal parts there. I don't see any way to extend the Grim Reaper argument in order to prove that spacetime regions might not have infinitely many potential parts, in this sense. There seems to be room for an Aristotelian position here, according to which time is *potentially* infinite.

### 6.2 The Existence of God

Suppose that we are convinced that not only H2 but also H3 are false. Suppose, that is, that we are convinced by the arguments in section 4 that H4 (No Simple Infinite Past) is true, and, consequently, that the past is necessarily finite in measure. Would these results have any implications for the existence of God? The most common form of the argument, according to Craig, involves an appeal to some causal principle such as this:

**Kalam Causal Principle (KCP):** every entity that has a beginning in time has a cause.

The quantitative finitude of the past entails that time itself (or, if you prefer, spacetime) has a beginning. If we suppose that causes and effects are 'separate existences' (as Hume put it), then we can reach the conclusion that there is some extra-temporal entity that it is the cause of time or spacetime itself, assuming that we are substantivalists about time or spacetime, bringing them within the scope of the KCP.

If we use the term 'the universe' to refer to the totality everything that spacetime contains, we may ask whether there is a cause of the universe. Since the universe has a beginning, we can certainly infer that it has a cause, if it exists. However, we cannot reach this conclusion without assuming something like Mereological Universalism. We need some principle to license the inference to the conclusion that there is some one thing (some entity) that is the sum of all spatiotemporal things.

Alternatively, we could try to use a somewhat stronger Causal Principle:

**Strengthened Kalam Causal Principle (SKCP):** any entities that jointly have a common beginning in time have some things that cause them (and the latter things are not among the former things).

**Very Strong Kalam Causal Principle (VSKCP):** any interdependent entities that jointly have a common beginning in time have a single, joint cause.

Either principle would (will side-stepping the need for Mereological Universalism) give us the conclusion that the universe has at least one cause, a cause which itself must be extra-temporal and, hence, immaterial.

Suppose that we were to question whether it is possible for a thing to be 'extra-temporal', given that time exists at all. Suppose, for example that we were to suppose that in the event that time itself has a beginning, everything whatsoever must have a beginning in time. In that case, the Kalam causal principles would generate an infinite regress of simultaneous causes.

An argument like the Grim Reaper could surely be used to show that such simultaneous infinite regresses were also impossible, if we could use something analogous to the Infinitary Patchwork principle, substituting a 'place' in a causal chain for a spatiotemporal region. The conclusion would be that no possible world has an infinitely

regressive causal structure (whether temporal or instantaneous). If so, then we would have to modify the Kalam causal principles, in order to make them compatible with the impossibility of such a regress. Here is a plausible replacement:

**Restricted Kalam Causal Principle.** Any thing or things that begin to exist *and that could possibly be caused to exist* are in fact caused to exist.

As in Scotus's version of the cosmological argument, this would give us an uncausable first cause.

However, there is a problem with using the Grim Reaper paradox in combination with any of these causal principles: the necessary truth of a Kalam causal principle is incompatible with the Patchwork Principles upon which the Grim Reaper argument is based.[2] Take a world in which some change is caused at time t, and take a second world in which there exists no possible cause of that change prior to t. The Patchwork Principle entails that there is a possible world like the first at and after t, and like the second before t, providing a counter-example to any Kalam causal principle.

There are two possible responses, both of which have merit.

1. I could deny that any of the Kalam principles is a necessary truth. It could be that the principles hold in all nearby worlds or nearly all nearby worlds (as a kind of nomological

[2] I am grateful to an anonymous referee for Noûs for pointing this out.

necessity), or it could be that the correct causal principle is a defeasible, exception-permitting generalization (as I have argued in Koons 1997).

2. I could add a Kalam proviso to the Patchwork Principles, permitting the inference to possibility only in those cases in which all beginnings have adequate causes in the resulting patchwork scenario. The revised Patchwork Principle would be logically weaker than (entailed by) the original, and it would still be adequate for the Grim Reaper argument, since the Grim Reaper story is one in which each event has an adequate cause in the preceding period.

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