The Grim Reaper Kalam Argument:

From Temporal and Causal Finitism to God

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The Kalam argument for God's existence, which was pioneered by John Philoponus (490-570), developed by Islamic philosophers such as al-Kindi and al-Ghazali, and championed in recent years by William Lane Craig (Craig 1979) and by me (Koons 2014), is an attempt to prove that the universe must have had a cause, a role which God seems best suited to fit. The argument typically takes the following form:

1. Whatever begins to exist must have a cause.

2. The universe began to exist, because time itself is bounded in the past.

Therefore, the universe had a cause.

The first premise has a great deal of intuitive appeal, and there are severe epistemological costs to countenancing the idea of uncaused origins. For instance, the skeptical scenario popularized by Bertrand Russell—How do we know that the universe didn't simply appear 5 minutes ago?—would be a live possibility in the absence of an a priori causal principle similar to premise 1. So, let's focus on premise 2. In section 1, I will examine several strategies for defending premise 2. In the following section, section 2, I will

introduce Benardete's Grim Reaper paradox. Sections 3 and 4 will comprise the use of the Grim Reaper paradox to defend both the finitude of the past and the thesis of causal finitism. I will consider some objections in section 5 and conclude in section 6 with some arguments for deriving god-like characteristics from the eternal first cause.

1. The Overall Strategy for Defending Premise 2

The typical Kalam strategy for defending premise 2 is to argue that time past is not eternal, that is, that there is some finite temporal bound to all past events. Now, it is not immediately obvious that a finite bound to the past entails that the "universe" began to exist. First, it is not obvious that there is such a thing as *the universe*: perhaps the plurality of things that exist at a time t do not compose a single whole at t. We might try to avoid this composition question by modifying premise 2 into 2.1:

2.1 There is a time t such that everything existing at t began to exist at t, and nothing existed at any time prior to t.

In order to get the desired conclusion, we would also have to modify premise 1 as follows:

1.1 If some things *xx* began to exist at time *t*, then there must be some thing *y* or things *yy* not among the *xx* such that *y* (or the *yy*) caused the *xx* to begin to exist at *t*.[1]

We will also have to rule out the possibility that the things coming into existence at the first moment of time might have been caused by things existing at later times:

3. If the *yy* cause the *xx* to exist at *t*, then the *yy* exist at *t* or at some time earlier than *t* or eternally.

Form 1.1, 2.1, and 3, we can reach the conclusion that something that exists eternally caused the beginning-to-exist of all the things that existed at the first moment of time (if there is such a first moment).

There is, however, a further lacuna to fill: from the fact that the past is finite in extent or duration, it does not follow that there is a *first* moment of time. For example, it could be that no event occurs 14 billion or more years ago, but for every length of time L years less than 14 billion years, there are events that occurred exactly L years ago. That is, there might be a finite bound on the past, with past moments that approach arbitrarily close to that boundary, but no moment that reaches it, i.e., no absolutely first moment. (Think of the set of positive real numbers, which approach arbitrarily close to zero without actually including it.)

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[1] I am using double letters as plural variables, following George Boolos's plural quantification (Boolos 1984). One should read 'yy' as 'the y's (plural)'.

Instead of looking for proof of the finitude of the past, we should look instead for support of what Alexander Pruss (2016) has called *causal finitism*. If we can show that every event has a finite causal history (i.e., no causal loops and no causal infinite regresses), then we can infer that there are *uncaused* events. If we can further assume that everything that begins to exist at a time must have a cause *and* that every non-eternal or fully temporal thing must have begun to exist at some time (because the past is finite), then we can conclude that all uncaused things must be eternal in nature (i.e., existing "outside" or "beyond" time itself). At that point, we might be able to show that such an eternal cause of temporal events must be relevantly godlike.

Here is a version of this Pruss-inspired argument:

P1. Every event has a finite causal history (no causal loops or infinite regresses).

P2. For everything that begins to exist (at some point in time), the event of its beginning to exist must have a cause.

P3. Every non-eternal thing began to exist at some point in time (since the past of each non-eternal thing is finite in length).

Therefore, every non-eternal thing is ultimately caused to exist by some eternal (godlike) thing.

Can we get the finitude of the past (P3) from Pruss's causal finitism (P1)? No, we can't, at least not in the context of relativity theory. Relativity theory enables us to distinguish

between the past of an individual event (the 'past light cone' of the event) and the past of the entire universe. If the universe is infinitely large (spatially), then it could be that each event has a finite past, but there could still be no finite bound on all of the universe's past light cones. However, to get the desired result (namely, the existence of an eternal or supra-temporal cause), we don't need for the past of the universe to be finite in extent. It is sufficient for the past *of each temporal thing* to be finite at each point in time.

Can we use causal finitism to get this narrower result?

Suppose that we have a thing x that exists in time and suppose that causal finitism is true. This means that each event in the history of x must have a finite causal history. Is this enough to entail that x must have begun to exist at some point in the past? Couldn't the history of x begin with an event or state that is infinitely extended in the past direction? Let's call such an initial state a *simple infinitely long past state* or SILPS.

We can refute the possibility of a SILPS by posing a dilemma: either time itself has an intrinsic measure (in which sense time can pass in the absence of change) or it does not. If time does *not* have an intrinsic measure, and the initial state of x is a simple state, without discrete parts, then that state cannot have any temporal duration, much less an infinite duration (since there are, ex hypothesi, no changes concurrent with this state by which time could be extrinsically measured). Hence, we must suppose that time itself has an intrinsic measure.

However, this is also inconsistent with a SILPS, since if time has an intrinsic measure, then any extended period of time has discrete proper parts corresponding to the measurable proper parts of that period of time. If an event or state has a duration corresponding to that extended period, then it too must have temporal parts corresponding to the proper parts of the period of time. Thus, the state is not simple or "uneventful" after all. This is a strong argument, although it will not persuade those who think that extended simples (like extended Democritean atoms) are metaphysically possible.

Here is a version of the argument without the assumption of a finite past (P3):

P1. Every event has a finite causal history (no causal loops or infinite regresses).

P2. For everything that begins to exist, the event of its beginning to exist must have a cause.

P3.1 If something has existed for an infinite period of time, then it must have an infinite causal history (because a simple infinitely long past state is impossible).

Therefore, every non-eternal thing is ultimately caused to exist by some eternal (godlike) thing.

Since my argument for P3.1 is less than ironclad, I will argue *both* for causal finitism (in section 4) *and* for the finitude of the past of each temporal thing (in section 3). This provides support for both arguments: the original argument (which depends on both

causal finitism and the finite duration of the past) and the revised argument (which depends on causal finitism and the impossibility of SILPS).

2. Benardete's Grim Reaper Paradox

In Jose 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, and, if he is already dead at the appointed time, to do nothing. 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 $1/2^{n-1}$ minutes 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 after 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 $1/2^{n-1}$ 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 Placer. 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 Placer has issued a death warrant. Let's say that each Grim Placer #n can issue a death warrant by placing a particular kind of point-sized particle in a designated position, at exactly the distance of $d/2^n$ meters from a plane P. Each Grim Placer #n checks to see if a particle is already at a distance of $d/2^i$ meters from plane P, for some $i > n$: that is, he checks to see if any earlier Placer has issued a "warrant". If a particle has already been placed in one of the designated spots, then the Grim Placer #n does nothing, other than maintaining the status quo.

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

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 $d/2^n$ meters from P, for some n. This means that every Grim Placer whose number is greater than n did nothing, contrary to our hypothesis. Thus, this option is also impossible.

3. From the Grim Reaper to a Finite Past

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. In this version, Placer 1 is set to act at the first moment of 1 B.C., Placer 2 at the first moment of 2 B.C., and so on ad infinitum. Once again we can generate the contradiction: some particle must be placed within d meters of the plane, but there is no finite distance from the plane such that a particle could have been placed there.

Let us try to be more explicit about the premises needed to generate the paradox. First of all, we must assume that a single, isolated Grim Placer scenario is metaphysically possible:

P1. Possible Grim Placer (PGR). There is a number d such that for every positive integer n there is a possible world W and a region R such that R has a finite temporal duration d seconds, there is a Grim Placer wholly contained within R, and throughout R the Grim Placer has the power and disposition to create a "Fred" particle and place it at a designated position $d/_{2^n}$ meters from the plane P if there is no unique particle located at $d/_{2^i}$ meters from P for some $i > n$ (eliminating all other particles located within d meters of P, if there are more than one), and otherwise to maintain the unique Fred particle that is located at $d/_{2^i}$ meters from P 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 Spatiotemporal 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 Spatiotemporal 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 infinite recombinations:

P2. Infinite Spatiotemporal Patchwork (PInfSP). 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 Placer scenarios follows from the possibility of a single scenario, taken in isolation.

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

Our hypothesis for the reductio will be the possible existence of a world with an entity that has an infinite past:

HIP. Hypothesis of the Possibility of an Infinite Past. There exists a possible world W´ and a spatiotemporal region R´ in W´ such that 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 within the backward time cone of its predecessor, and each part is large enough to contain a Grim Placer.

1. Start with a possible Grim Placer in world W and region R, with finite duration d.

    (From PGP, the Possibility of Grim Placer)

2. Next, locate a world W' with a region R' containing a non-well-founded infinite series of non-overlapping temporal parts, each of duration d and each in the backward time cone of its predecessor. (Assumption of HPIF, for reductio)

3. Find a single possible world W* with region R* containing a non-well-founded infinite series of non-overlapping temporal parts (R_1, R_2, etc.), with each R_i containing a counterpart of the Grim Placer. (From 1, 2, and Infinite Spatiotemporal Patchwork)

4. Assume that, in world W*, there is after period R_1 no particle located at any distance $d/2^n$ from P, for any $n > 0$. (Assumption for second reductio)

5. Therefore, there is after period R_2 no particle located at any distance $d/2^n$ for any $n > 1$. (From 4)

6. Grim Placer #1 in period R_1 in world W* placed a Fred particle at distance $d/2$ from P. (From 5, and the Possibility of Grim Placer)

8. Contradiction (4 and 6). So, after R_1 in W*, there is some particle located at some distance $d/2^n$ from P, for some $n > 0$.

9. Therefore, no particle is located any distance $d/2^j$ from the plane P, for any $j > n$. (From 8, the Possibility of the Grim Placer)

10. Therefore, no particle is located any distance $d/2^j$ from the plane P, for any $j > n+1$. (From 9)

11. Therefore, Grim Reaper $n + 1$ placed a particle at distance $d/2^{n+1}$ from P. (From 10, and the Possibility of the Grim Placer).

12. Contradiction (9 and 11).

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13. So, there is no possible world containing a non-well-founded infinite series of non-overlapping temporal parts, each of duration d_0 and each in the backward time cone of its predecessor. (Negation of HPIF)

From the conclusion of this argument (step 12), we can deduce premise P3:

P3. Every non-eternal thing began to exist at some point in time (since the past of each non-eternal thing is finite in length).

If any temporal thing had an infinitely long past, then that past would include an infinite series of non-overlapping periods of length d, all in the past light cone of the current state of the thing in question, in contradiction to step 12. Thus, to reach the conclusion of an eternal first cause, we need only add the assumption of causal finitism. In the next section, I will argue that the Grim Placer paradox can be generalized into an argument for causal finitism.

4. From the Grim Reaper to Causal Finitism

Lewis's Patchwork Principle allows us to construct possible worlds using a spatiotemporal framework and a localized "patch" of possibility. It is very plausible that the same sort of principle would apply when we consider possible causal networks. If there is a world in which the structure of causal connections realizes a certain pattern, then we should be able to construct a new possible world by replacing each causal node

in that world by a localized causal "patch" consisting of a small event with its immediate causal antecedents and consequents.

I will assume that a causal network in a world can also be cashed out in terms of causal powers. If node n_1 is linked by a directed edge to n_2, then the event $e(n_1)$ corresponding to node n_1 should include some entity's having some causal power relevant to the occurrence of event $e(n_2)$.

Suppose that N is a directed graph, consisting of nodes and directed edges, representing some of the causal-power connections of this kind in possible world W_0. That is, every node in N is an event in W_0, and whenever nodes n_1 and n_2 are connected by a directed edge from n_1 to n_2 in N, the event $e(n_2)$ is causally dependent on event $e(n_1)$ in W_0, in the sense that the event $e(n_1)$ includes the existence of some entity with the causal power to influence the occurrence of event $e(n_2)$. Now suppose that we find a function g from the nodes of N to events in a set of worlds U, such for every event-node n_i in N, $g(n_i)$ is an event in a possible world W_i, where for every node x that is a predecessor of n_i in N, there is in world W_i an event y such that y is an exact duplicate of $g(x)$, regardless of the world in which $g(x)$ is located, and for every node z that is a causal successor of n_i in N, there is in world W_i an event u that is an exact duplicate of $g(z)$. Then there should be a single world W* containing exact duplicates $d(g(n_i))$ of each of the events $g(n_i)$ forming in W* a causal-power network corresponding to N. That is, if n_j is causally dependent on n_i in N, then $d(g(n_j))$ is causally dependent on $d(g(n_j))$ in W*. Let's call this the Causal Power Network Patchwork Principle (CPNPP).

Now assume that causal finitism is false, that is:

Hypothesis of Causal Infinitism. There is a possible world W containing an infinite descending chain of causal-power dependencies.

Now, all we need is to assume that there is a single possible world W_t that contains three causally connected Grim Placers: Grim Placers 1, 2, and 3, each of whom has the power to place a particle at a distance of $d/2^n$ meters from the plane (for $n = 1, 2,$ or 3), and each of whom is disposed to place a particle there if and only if no Placer with a larger number has already placed a particle within d meters of the plane, with Placer 1's choice causally dependent on Placer 2's choice, and Placer 2's choice causally dependent on Placer 3's. Call this the Possibility of a Placer Trio (PPT).

Now, all we have to do is to combine both the Possibility of the Placer Trio and the Possibility of Causal Infinitism with the Causal Power Network Patchwork Principle and the Intrinsicality of the Grim Placers' Causal Powers to derive our familiar contradiction. We want a constructed world W* in which all the nodes of the causal regress are filled by events that duplicate the Grim Placer scenario. The Possibility of the Placer Trio ensures every individual GP event in that regress can be immediately preceded and succeeded by another duplicate of the GP event. Consequently, we can deduce both that there will be, in the constructed W*, some particle within d meters of P, and that there can be no particle within d meters of P, a contradiction. Since the Possibility of the Placer Trio and

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Intrinsicality of Causal Power are obviously true, we can deduce the falsity of the Possibility of Causal Infinitism. Thus, we can deduce a version of causal finitism:

No Causal Regresses. There is no event in any world whose causal power history of contains is an infinitely descending chain.

We can also use a version of the Time-Travel Grandfather paradox to exclude the possibility of causal loops. We can then defend a version of the original, Pruss-inspired Kalam argument:

PP1.1 There is no event in any world whose causal-power history of contains is an infinitely descending chain.

PP1.2 There are no loops in the causal-power history of any event in any world.

PP2.1 For everything that begins to exist (at some point in time), there must exist some entity with the causal power to influence the event of its coming into existence.

PP2.2 If entity x has the causal power to influence the beginning of the existence of entity y, and entity y has the causal power to influence the beginning of the existence of entity z, then entity x has the causal power to influence the beginning of the existence of entity z.

P3. Every non-eternal thing began to exist at some point in time (since the past of each non-eternal thing is finite in length).

Therefore, every non-eternal thing is ultimately caused to exist by some eternal (and therefore godlike) thing.

Suppose that x_1 is a non-eternal thing. By P3, x_2 began to exist at some time t. By PP2.1, there is some entity x_2 with the causal power to influence x_1's beginning to exist. By P3, x_2 also began to exist, and by PP2.1 again, there is some x_3 with the causal power to influence x_2's beginning to exist. By PP2.2, x_3 has the causal power to influence x_1's beginning to exist. Premises P1.1 and P1.2 require that this chain of causal connections must terminate in some entity y with the causal power to influence the beginning to exist of all the other members of the chain. To avoid an infinite regress or vicious loop, we must (given P3) conclude that entity y is an eternal being.

5. Objections

5.1 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 (namely, the powers and dispositions definitive of the Grim Placer scenario). 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 of anything 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 Principles do 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.

5.2 The Amazing Vanishing Particle

The Grim Placer argument tacitly assumes that once a particle has been created and placed in a particular position, it persists there throughout the rest of the GP 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 Placer fails to find a "Fred" particle in any 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, GP 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 (thereby violating the no-overlap condition of the Spatiotemporal Patchwork Principles)? 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.

5.3 Conflict between the Kalam Causal Principle and Patchwork Principles

There is a problem with using the Grim Reaper paradox in combination with any of the Kalam causal principles (premises P2 or PP2.1): the necessary truth of one of these Kalam causal principle is incompatible with the Spatiotemporal Patchwork Principles (both Binary and Infinitary) upon which the argument for the finitude of the past is based. 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 Binary Spatiotemporal 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 our Kalam causal principles.

There are four possible responses, all of which have merit.

1. This objection does not apply to the Causal-Power Patchwork Principle, since that principle requires that the constructed world preserve the causal structure of the original framework-providing world. Thus, the revised version of the argument (relying on causal finitism and the impossibility of SILPS) is untouched.

2. I could deny that any of the Kalam causal principles (P2 or PP2.1) 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 necessity), or it could be that the correct causal principle is a defeasible, exception-permitting generalization (as I argued in Koons 1997).

3. I could insist that the causal principles are metaphysically necessary and claim only that the Patchwork Principles are strong but defeasible principles. One should not admit exceptions to a Spatiotemporal Patchwork Principle without strong, non-ad-hoc reasons. The causal principles provide such reasons, but no such reason is available for the defender of the possibility of an infinite past.

4. I could add a causal proviso to the Spatiotemporal Patchwork Principles, permitting the inference to possibility only in those cases in which all beginnings have adequate causes in the constructed scenario. The revised Patchwork Principle would be logically weaker than (entailed by) the original, and it would still be adequate for the Grim Reaper/Placer

argument, since the Grim Reaper stories are ones in which each event has an adequate cause in the preceding period.

6. From Cause of the Universe to God

The argument so far has given us the existence of at least one eternal or non-temporal cause of temporal events, with all temporal events ultimately caused by one or more of these eternal entities. The eternal beings have causal power but stand outside the flux of time.

What is involved in being a non-temporal entity with causal powers? It would seem that to stand outside of temporal relations altogether, a being would have to be not only eternally unchanging but also necessarily unchangeable, a being of "pure act" (to use Aristotelian language), with no possibility of unrealized potentialities. As Thomas Aquinas convincingly argues (in the *Summa Theologiae*, Part I, Question 3 and in the *Summa Contra Gentiles*, Part One, Chapters 16-28), such a being of pure act would have to be simple, incorporeal, and immaterial.

How could such a simple, immaterial, and unchangeable entity be the cause of temporal events? We have only one applicable model: that of the intentional relation between an author and a story, or between a composer and a musical work. In these cases, the internal time of the creator is disjoint from the internal time of the creation: the creator is "eternal" relative to the creation. Thus, the eternal cause of temporal events must be

something like a mind—a simple, unchanging activity of pure thought, which brings about a changing world by a kind of fiat, an act of creative will.

In addition, as I argued in Koons 1997, a first-cause argument can be combined with various versions of the design argument (pointing to the uniformity and simplicity of laws, the fine-tuning of the constants and initial conditions, or the rapidity of the origin of life) to reach the conclusion that there must be one, intelligent eternal cause of the observed universe.

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