Shapeless Causes

Abstract

I mark a pathway from certain ordinary observations about shapes and their causes to a surprising philosophical thesis about the shapelessness of some causes. I begin by motivating a certain principle of explanation that applies to geometrical states of objects. I put forward the principle as a hypothesis that accounts for wide range of data, and I defend it against certain counterexamples expressed in the contemporary philosophical literature. I then give a new argument for the conclusion that *if* the principle of explanation is true, then there is at least one non-geometric causally-capable thing that figures into an ultimate causal explanation of contingent, geometric states. My goal is to reveal a connection between an empirically-motivated principle of explanation and an interesting philosophical thesis about the kinds of causes there can be.

Shapeless Causes

1. Introduction

Could a concrete object capable of causal activity lack a (determinate or indeterminate) spatial boundary or geometric form? It is commonplace to suppose that *abstract* objects, such as the number twelve, the relation of greater than, or the English language, are non-spatial and causally effete. But could any causally-capable ("concrete") objects lack geometry? I will set out a new argument for the thesis that there is (or was) at least one causally-capable thing that has no geometric form—not even point-sized. Such a thing would either span infinite, boundary-less space or would be altogether non-spatial. The result is a conditional: if a certain principle of explanation is true, then there are (or were) geometric-less concreta.

The conclusion of the argument is relevant to a range of current philosophical debates. For example, philosophers of mind debate whether a non-spatial "soul" could have causal powers.[1] My argument's conclusion implies that causes need not be spatially situated. The argument is also relevant to debates over the ultimate explanation and nature of physical reality. If the argument is sound, then two significant results follow: (i) there is an ultimate explanation of spatial-temporal geometries, and (ii) that explanation involves a non-spatial or pan-spatial cause.

2. The Principle

I will begin by motivating the following principle of explanation:

> (E) For any geometrical state G, if G obtains, then there is an explanation of its obtaining,[2] where

[1] See, for example, Kim 2005, 70–92.

[2] When I say that something *p* is a causal explanation of the obtaining of *o*, I mean that *p* is a true proposition that reports the causal activity of one or more entities that together bring about the obtaining of *o*. I give examples in the main text next to further illustrate the notion of a causal explanation.

(G) *g* is a geometric state iff *g* is any state according to which *such and such geometrical properties are instantiated at such and such spatial-temporal positions*.[3]

A few clarifications are in order. First, I shall put aside the question of whether geometric states of spacetime regions could be caused, since I intend the principle to apply only to geometric states of the *occupants* of spacetime regions, rather than to the regions themselves.

Second, by "geometric properties," I have in mind such properties as shapes, sizes, distance relations, and various topological, affine, metrical properties. I do not have a precise definition to offer, but the general strategy and structure of the argument of this paper is adaptable to a variety of ways of precisely characterizing a geometric property; and I take it that the basic concept is sufficiently graspable for my purposes.

Third, principle (E) is mereologically flexible: it is consistent with (E) that geometric states are instantiated by *fusions* of spatial occupants, and it is also consistent with (E) that there are no such fusions and that pluralities of spatial occupants jointly instantiate geometric states.[4]

Fourth, (E) is compatible with a variety of views about explanations. I use the term "explanation" to refer to a proposition that in some way accounts for why some situation obtains.[5] But I leave it open whether or not explanations must determine (necessitate) their explanandums. It could be, for instance, that a certain quantum event is indeterministically explained by its prior states together with certain probabilistic laws. Alternatively, it could be

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[3] The argument doesn't turn on a particular theory of states. If you prefer, you may interpret the argument in terms of causally explaining true propositions (or facts) that specify geometric configurations.

[4] I am grateful to [removed] for prompting these clarifications.

[5] I assume, at least for the sake of argument, that there is an intelligible sense in which facts may explain the obtaining of a situation. Of course, we sometimes talk of *people* explaining something, such as a difficult philosophical concept. I take that sort of explanation to be epistemological or conceptual. The notion I have in mind is metaphysical.

that a quantum event is *deterministically* explained, perhaps by the fact that some prior state caused it. Note that contingent causation is compatible with deterministic explanation: the fact *that x causes y* determines—and perhaps explains—*y*, even if *x* doesn't *need* to cause *y*. Also, I don't require that the explanation be a full or complete explanation. Partial explanations will work, too, where a partial explanation may, for example, give some informative reason for why a fact obtains without logically entailing that fact.

Fifth, and finally, I don't require that an explanation consist of a single cause or a single effect: perhaps many events can work together to explain why certain geometric states obtain.

Principle (E) may remind you of the principle of sufficient reason employed in certain cosmological arguments. But (E) is not nearly as strong, since it is focused only on geometric states—and thus it isn't susceptible to the same criticisms.[6] I will consider potential counterexamples to (E) shortly, and in section 4, I will look closer at (E)'s relationship to explanatory principles in other, related arguments. I am working with (E) here only because I wish to show its connection to a certain interesting thesis about the kinds of things that can be causes.

Let me get on the table two reasons someone might accept (E). First, someone might find (E) intuitively plausible in its own right. Consider that people naturally express curiosity when they encounter an arbitrary configuration. One encounters a giant triangular object next to your car. Unsurprisingly, one wonders how that object got there: what caused it? Maybe nothing. Yet curiosity suggests that one expects there to be an explanation, and perhaps this expectation is based upon a rational intuition that any given geometric state has an explanation. Those who have this intuition may have some reason, then, to think (E) is true.

[6] I'm thinking of the criticisms posed by van Inwagen (1983, 202–4), Rowe (1997, 103–11), and Ross (1969, 295–304).

Second, someone may consider (E) to provide the best way to make sense of various experiences with geometric states having an explanation. Principle (E) seems to hold for big states and small states of all sorts: neither size nor complexity seem to make a difference.[7] But now suppose that some geometric states, such as those at the Big Bang, say, can and do obtain without any explanation. Then we face the challenge of accounting for why we don't routinely observe arbitrary states, such as a tornado of particles or a random configuration of cubes, snapping into existence on street corners without any explanation at all.[8] Why would *some* shapes, such as the first ones to be instantiated, be allowed to be exemplified without explanation and not others? It may seem to some philosophers, at least, that differences in shape are irrelevant to an explanation requirement. As a final, related consideration, it may seem extraordinarily surprising that there isn't constant chaos *if* infinitely possible geometric configurations (shapes) can come to be exemplified at any place and time for no reason at all. On the other hand, the absence of chaos is just what we'd expect if (E) is true: (E) entails that arbitrary geometric states do not obtain without at least some explanation.[9] These considerations may, for some, add credence to (E). (I will address the prospect of counterexamples in a moment.)

Of course, there are other, more restricted principles that can account for the same data: for instance, a principle restricted to geometric states in a certain neighborhood of spacetime

[7] Notably, the classical "fallacy of composition" objection to certain causal principle doesn't apply to (E)—the principle that every geometric state has an explanation. One may think that (E) applies to *big* states without first seeing that (E) applies to *parts* of those big states. That is to say, one doesn't infer that big states have an explanation just on the grounds that their parts do. Rather, one may find states of all sizes seeming to have an explanation.

[8] See, for example, Pruss 2009.

[9] That isn't to say that (E) subsumes all cases of explanation. No doubt there are contingent facts *other than states* that have an explanation, too: for example, one might think that the fact *that there are no unicorns* has an explanation in terms of the causal history of our universe. I restrict the scope to states because (E) accounts for the instances of explanation relevant to my argument.

would account for why we don't encounter arbitrary, unexplained contingent states. But such restrictions turn on differences in size and shape that don't seem to be *relevant*: if a giant triangle cannot be instantiated without an explanation, then it may seem that a microscopic chiliagon (million-sided polygon) cannot, either. Moreover, if simplicity is a virtue of a hypothesis, then simplicity seems to count in favor of (E), other things being equal. Indeed, I am not aware of any plausible principle of explanation that is simpler than (E) that accounts for the wide variety of cases of explanation we seem to find in our world, *other than* principles that entail (E).[10] Some philosophers could therefore reasonably think that (E) provides a plausible account of our experience with explanations.

I will now consider whether there might be counterexamples to (E). We have already seen that (E) allows for causal indeterminism—and so allows for indetermistically generated quantum events. But now consider a 'totality' state that entails *all* actual contingent (i.e. non-necessary) states, where state *S* entails state *T* iff necessarily, were *S* to obtain, then *T* would obtain. Call this totality state 'the Big State'. Observe that the Big State is a contingent state, since it fails to obtain if any actual contingent state fails to obtain. One might think that the empirical support for (E) equally supports the more general principle that every contingent state has an explanation. So, one might think that if (E) is true, then the Big State has an explanation. Yet there is reason to think that the Big State cannot have an explanation. Consider, first, that the

[10] Shieva Kleinschmidt (2011) proposes a principle of explanatory power (EP) which accounts for the same data and which someone might consider as simple as—if not simpler than—(E). The principle is basically that other things being equal, we should take the theory with more explanatory power to be more likely to be true. It's a helpful principle, and I take it that it can account for the justification of our *beliefs* in the various cases of explanation (though I don't take it to account for the cases themselves). Fortunately, my argument for formless concreta could be supported just as well using (EP), since (EP) will provide defeasible justification for the same inference I will use (E) to support.

Big State entails all actual contingent states. It may seem, therefore, that any *contingent* explanation of the Big State would be part of the very state to be explained. The result is circularity of an impossible kind. Consider, next, that if instead a *necessary* state explains a contingent state, then the *link* between the necessary state and the contingent state would itself be contingent. The problem here, it may seem, is that a contingent link between a necessary state and the Big State would be part of the very state to be explained. Again, the result is circularity of an impossible kind. One might infer, therefore, that the Big State cannot be explained.[11] (This objection only targets those who think there could have been a different universe.)

I will offer two replies to the above objection.[12] Note, first, that the objection presupposes that the contingent link between a necessary state and the Big State would itself be in need of an explanation. Someone might deny that; one might think instead that *events* can be explanatorily prior to *geometric states*. Let me clarify how this might work. Suppose there is a network of necessarily existing particles, the *n*s, can change geometric states. Suppose, furthermore, that the *n*s change by spontaneously causing certain changes to one another—according to probabilistic laws. Then we may suppose that all geometric states arise either from the contingent (non-geometric) states of the *n*s or by the *n*s' indeterministic and spontaneous production of contingent substances. In this way, the causal activity of the *n*s, though spontaneous—and perhaps unexplained—may provide an ultimate explanation of all subsequent geometric states within the Big State. In summary, even if geometrical states don't obtain without an explanation, one could think that some *causal activities* happen spontaneously.

[11] Philosophers have raised this sort of objection to the more general Leibnizian principle that every contingent fact has an explanation. Notable examples include van Inwagen (1983, 202–4), Rowe (1997, 103–11), and Ross (1969, 295–304).

[12] One could dodge this case altogether by denying that there is any such thing as the totality state. I will assume there is such a state for the sake of argument.

Of course, one might expect causal activities to have an explanation, at least in general. But this leads me to my second reply: the problem with explaining the Big State can be avoided even if causal activities must have an explanation. Consider the following logical possibilities. First, certain necessary states indeterministically explain contingent activities. So, for example, perhaps the *n*s indeterministically cause a contingent state β in accordance with a necessary probabilistic law (or necessary causal disposition). Alternatively, the *n*s cause β *because* necessarily, there is certain probability that the *n*s cause β. (Imagine, perhaps, a universe-forming inflationary scenario governed by indeterministically generated quantum fluctuations: in this scenario the *n*s cause β because—or partly because—they have a certain chance of doing so.) The explanation here may be *probabilistic* in the way that (say) smoking may provide a probabilistic explanation of getting lung cancer. These possibilities haven't been ruled out. And they reveal a way in which the contingent link between a necessary state and the Big State might itself be explained.

I suggest, finally, that even if there are counterexamples to (E), it may still be reasonable to regard (E) as a good rule of thumb. Suppose one is skeptical that (E) applies to every geometric state. For instance, one might think that although (E) holds for ordinary, familiar cases of explanation, (E) is less likely to apply to cases that are far removed from ordinary experience. In that case, one could still treat (E) as a defeasible guide to explanation, even if (E) doesn't hold across the board. One might think that for any case taken out of hat, one has a *prima facie* reason to think that (E) applies to that case. My goal so far is only to get (E) on the table as a working hypothesis.

3. The Geometric Argument

In this section, I will argue that if (E) is true, then there is, or was, a "size-less" (geometrical-less) concrete thing.[13] I begin with a definition. Let 'GEOMETRY' designate a specification of the *complete* spatiotemporal geometry of the entire cosmos or multiverse. GEOMETRY is simply the biggest "shape"—i.e. a state of the form *such and such geometric properties being instantiated at such and such spatial-temporal positions*.[14] Here, then, is the Geometric Argument for a size-less concrete thing:

(1) GEOMETRY is a geometric state.

(2) Every geometric state has an explanation. (E)

(3) Therefore, GEOMETRY has an explanation. (1, 2)

(4) No fact featuring *only* things that have a size (spatial form) explains GEOMETRY.

(5) No fact featuring only non-concrete (non-causal) things explains GEOMETRY.

(6) Therefore, there is a fact featuring at least one size-less (spatially formless) concrete thing. (3–5)

Let us consider each premise in turn. Premise (1) says that GEOMETRY is a geometric state. This premise is meant to fall out of the definition of a 'geometric state': a geometric state is any state according to which *such and such geometric properties are instantiated at such and such spatial-temporal positions*. GEOMETRY is such a state because GEOMETRY specifies the geometrical properties of all objects at all times and places. So, GEOMETRY counts as a geometrical state. (As

[13] I am assuming, at least for ease of presentation, that every shaped thing has a size, and therefore that anything without a size has no shape—and so no geometric form. This assumption isn't essential to my basic argument strategy, however, for we may express the argument of this paper in terms of *any* geometric property to support the conclusion that there is a causally-capable thing lacking the geometric property in question.

[14] A complexity arises if *presentism* is true. On presentism, 'GEOMETRY' never obtains simpliciter because it includes geometries that aren't presently instantiated. To iron out the definition of 'GEOMETRY' for presentists, let 'these shapes at these locations at these times' pick out past-tense "geometric" properties of presently existing objects. So, for example, present things have the past-tense property of *being preceded by a geometrical state g at time t*.

before, GEOMETRY need not consist of a single fusion of things; it may be a state of many things jointly.)

Then with (E) in hand, one has a reason to infer that GEOMETRY has a causal explanation. It is worth emphasizing here that GEOMETRY differs from other geometric states in terms of degree of complexity. In the final section, I will consider whether such a difference may make a difference with respect to an explanation requirement.

Premise (4) is next: no fact featuring only things that have a size (spatial form) explains GEOMETRY. The basic motivation for (4) is to avoid circular explanations.[15] Suppose that *contra* (4) that there are some things, the *o*s, that have a size, and that *their* states or activities alone figure into the explanation of GEOMETRY. Then since the *o*s are themselves sizable objects, the facts about their positions in space are *part* of GEOMETRY. That is to say, the spatiotemporal profile of the *o*s is among the very facts that the *o*s are supposed to explain. The difficulty here is that in order for the *o*s to explain their own spatiotemporal profile, it seems they must *already* have a spatiotemporal profile. The most straightforward way for things to explain a spatiotemporal profile is for them to *cause* it to obtain. So, it would seem that the *o*s can only explain GEOMETRY if at least some of them can cause their own spatiotemporal profile to obtain. But how can anything cause its own spatiotemporal profile to obtain? It seems that each *o* should have a position in space and time *before* (in the order of explanation) it can cause positions in space and time. If that is right, then the *o*s cannot be the *entire* cause of GEOMETRY. Even in an infinite regress of causes, we won't have an explanation as to why the *total* spatiotemporal geometry obtains. Why not instead some other geometry, or none at all? No fact solely about the

[15] The problem of circularity may remind you of the problem we encountered with explaining the Big State. Recall that to escape that problem I suggested we may suppose either that the Big State lacks an explanation or else that it is ultimately explained by an external, necessary reality. In either case, circularity goes away. My suggestion here will be similar: to avoid a circular explanation of GEOMETRY, we must suppose either that GEOMETRY lacks an explanation or else suppose that it is ultimately explained by an external, non-geometric reality.

*o*s seems to answer that.[16] It seems, therefore, that the *o*s cannot provide the sole explanation of their own spatiotemporal profile—anymore than copying geometry books from other geometry books can explain why there are all the geometry books in the first place.[17]

Moreover, even if there is a sense in which the parts of GEOMETRY somehow explain the whole, we are still left without a (non-circular) explanation of the parts and their arrangement. Compare: an infinitely extended cylinder obtains because each of its (atomic?) subsections obtain, yet it remains to be explained why there are all those very subsections arranged cylinder-wise. If the subsections provide the sole explanation of the subsections, then we have circularity in plural form. More to the point, we lack the sort of external explanation that seems to be required to adequately account for why there is this particular spatio-temporal geometry at all. (To be clear, some of the *o*s may explain some of the spatio-temporal profile of *other o*s. It's just that no *o*s could explain *all* the geometry without being among the very *o*s whose complete spatio-temporal geometry is to be explained.)

One might resist the above argument by supposing that certain *o*s only *contingently* have a size. For then it may be that certain *o*s, though they enjoy a size *now*, used to be in a non-spatial, size-less state that grounds or explains the beginning of their spatial profile. However, if we suppose that some *o*s enjoyed a size-less state of existence, then we have reached the conclusion of my argument: that is, there is or was at least one size-less concrete thing. So, we have a dilemma: either the *o*s always have a size, or there was a time when one or more of them

[16] There is the famous Humean objection that the *whole* need not be explained if each part is sufficiently explained (Hume 1959, 58-9). But that objection doesn't apply here because if (E) is true, *then* the whole of GEOMETRY has an explanation. Moreover, the reasons given for (E) aren't based upon inferring an explanation of a whole from there being explanations of certain parts. For example, one may be inclined toward (E) in part because differences in size and complexity are manifestly irrelevant to a difference with respect to an explanation requirement.

[17] The geometry book example is from Leibniz in "On the Ultimate Origin of Things".

were size-less. The first horn has the problem of circularity. The second implies the conclusion I'm after: there are—or were—formless concreta. So, this way out of the argument doesn't help.[18]

The final premise is (5): no fact featuring only non-concrete things causally explains GEOMETRY. My argument for this premise is that facts about *abstract* things—such as, properties, propositions, relations, sets, etc.—are inadequate to explain why GEOMETRY obtains. GEOMETRY is a fact about the spatiotemporal positions of concrete, physical objects. But abstract things, as I am thinking of them, lack the power to bring about the massy objects that instantiate GEOMETRY. Recall that I am using the term 'concrete' to pick out causally capable things (*whatever* they are). It seems, then, that the total explanation of GEOMETRY will make reference to the causal activities of one or more non-geometric, concrete things.

I should emphasize that GEOMETRY is a very specific configuration among many other possible configurations. Therefore, the prior *probability* that GEOMETRY obtains is plausibly very low. As a result, GEOMETRY is not plausibly explained in terms of an intrinsic likelihood that it obtains; its intrinsic likelihood is plausibly zero.[19, 20]

[18] [Removed] suggested to me the following explanation of GEOMETRY: GEOMETRY divides into a contingent part and a necessary part, where the contingent part is explained by the necessary part, and the necessary part is explained by virtue of its necessity. Note that this proposal implies that some size is exemplified of necessity. It seems to me, however, that we should prefer modal *continuity* here: that is to say, no difference with respect to the mere size makes a difference with respect to the necessity of its exemplification; if any size is necessary, *all* sizes should be necessary, one might think. Moreover, a world with a slightly different geometry at each time *seems* possible, doesn't it? Those who assess the matter differently are invited to try out the alternative argument I gave for the modal fatalists.

[19] Cf. van Inwagen 1996, where van Inwagen suggests that the fact the existence of something is *very likely* may explain why there is anything at all. Notice that explaining why there is anything at all is very different from explaining GEOMETRY, which is merely one particular contingent reality among a sea of infinitely many possible alternatives.

[20] A related idea is that GEOMETRY obtains because (i) some *initial* sizable objects were likely to exist uncaused, and (ii) the initial objects are at the head of a causal chain that causally explains the rest of the spatiotemporal profile. It seems to me that this proposal results in the same sort of inexplicable arbitrariness as the suggestion that certain states are exemplified of necessity. Why should *some* shapes and sizes have a high chance of being exemplified uncaused but not others? Why should a difference with respect to shape or size make a difference

Let me draw out a scenario to illustrate one way GEOMETRY could be explained by the activities of non-geometric things. Recall the *n*s: they are necessarily existing particles. Suppose that the *n*s (or some necessary concreta) *could* lack a size. So, for instance, imagine that ontologically prior to the Big Bang, the *n*s are in a size-less (formless) state of pure "energy". To be clear, this "energy" is not located. It doesn't even occupy a *point-sized* location. It exists causally *prior to* space-time as we conceive it. But the "energy" has a disposition to change into (else: produce) a scattered array of particles. And that's exactly what it does. The Big Bang follows. In this scenario, measurable time itself *results from* the initial transition from un-located "energy" to located particles. The geometry of our universe then unfolds as things causally interact in accordance with indeterministic, probabilistic laws. In this way, certain facts about the *n*s could conceivably provide an ultimate explanation of GEOMETRY. [21]

There are alternative ways in which GEOMETRY might be thought to be explained.[22] Someone could prefer a non-causal explanation, such an axiarchic explanation that GEOMETRY obtains because *it is good* for it to obtain, or an explanation in terms of abstract laws or non-causal teleological principles.[23] It is worth emphasizing that these alternatives don't allow for an ultimate *causal* explanation of GEOMETRY—and so one may be left wondering how abstract

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with respect to the probability of exemplification; if any size is likely to obtain uncaused, *all* sizes should be likely, one might think. Moreover, why should the probability of an uncaused size be the precise value it is, rather than slightly higher or lower? Any specific value may seem intolerably arbitrary and inexplicable. (By contrast, arbitrariness goes away if an initial geometric state results from the activities of a necessary, geometric-less reality; for then the likelihood of the effect could be explained in terms of the nature of the cause.)

[21] I have been assuming that non-spatial things can exist in time. If that is not possible, then the conclusion of the argument is all the more intriguing: it implies that there is at least one concrete thing that is either trans-spatial or non-temporal.

[22] There is, for instance, John Leslie's proposal (1979) that the cosmos is to be explained by the *value* of its existence (or something like that).

[23] I owe these further options to [removed].

laws or principles could effectively bring it about that there are the specific, massy spatial objects that the laws or principles say there "should" be. Nevertheless, I take axiarchism and the "law" explanation to be in the spirit of my more general proposal: that the ultimate explanation of the configurations of matter would be a *geometric-less* reality. If my argument forces a choice between an abstract explanation (such as axiarchism or the "law" explanation), geometric-less concreta, and a widely-applicable principle of explanation, that will be progress enough.

Let us recap. I have argued that GEOMETRY cannot be adequately explained solely by sizable things. An adequate explanation should instead make reference to one or more size-*less* things. And these things must be *concrete* things capable of producing effects in space, since otherwise they would fail to adequately explain why objects have their specific spatiotemporal positions. It follows, then, that *if* there is a causal explanation of the spatiotemporal geometry of our universe, *then* there is (or was) at least one size-less concrete thing. Principle (E) implies that the spatiotemporal geometry of our universe has a causal explanation. So if (E) is true, then the conclusion follows: there is a fact featuring at least one concrete thing that has no size—and no geometry. (I should note that it is compatible with the conclusion of my argument that the "formless" causes occupy an infinite, boundary-less space. Maybe energy fields could be that way, and maybe perturbations within them could give rise to geometric structures. This possibility illustrates that my argument's conclusion is compatible with a robust naturalistic ontology.)

4. Generalizing the Argument

The Geometric Argument inspires a wider inquiry into a family of explanation-based arguments, including traditional cosmological arguments and certain of the more recent arguments on

grounding.[24] How does the Geometric Argument relate to this larger family? Gaining a grip on this question can help us better assesses potential strengths, weaknesses, and deeper implications of the Geometric Argument. Moreover, the related arguments contribute to the larger investigation into the nature of a causal foundation, each from a unique angle. For these reasons, I'd like to abstract away from the details of the Geometric Argument and see what we might learn by reflecting upon the argument's general structure.

So consider the following schema:

(7) Every state of type T has an explanation.

(8) There is a maximal T-type state (one that includes all other T-type states).

(9) No fact featuring only T-type things (i.e. things that instantiate a T-type state) explains a maximal T-type state.

(10) No fact featuring only non-causal things explains a T-type state.

(11) Therefore, there is a fact featuring at least one causal, non-T-type thing.

The Geometric Argument is one instance of the above schema, where T = geometric state. There are others, of course—infinitely many. Here are some classic examples of instances of T: contingent state, material state, complex state, temporal state, and so on. Each argument produces a provocative result, since each concludes that a foundational reality exhibits an "unusual" type, like necessary existence, immateriality, simplicity, or a-temporality. All these arguments are united by a single, simple schema: the Ts are ultimately explained by some non-T.

The unity between such arguments may inspire both excitement and worry. I'll weigh two worries in particular. First, one might worry that the Geometric Argument generalizes in costly ways. The basic thought is that if the Geometric Argument is sound, then so are many of

[24] On the grounding side, I have in mind, for example, Schaffer's arguments for an explanatory foundation (in terms of grounding) that mereologically overlaps every concrete thing. See Shaffer 2014.

these other classical arguments. Yet the classical arguments are not sound; or they have costly conclusions. So the Geometric Argument is not sound, or it is costly. To add weight to the worry one might add that the same sort of considerations I offered in support of the premises in the Geometric Argument—such as the induction-based argument—may equally be offered in support of these other arguments. So how can we accept the soundness of the Geometric Argument without accepting more than we ever wanted?

To begin to address the question, I shall highlight here a couple avenues one might explore. First, one might look closer at the classic arguments and investigate which, if any, of them may be defensible after all. Maybe defensible ones are relevantly similar, for various reasons, to the Geometric Argument, whereas indefensible ones are relevantly different. An obvious drawback of this approach, however, is that debates over the classical arguments are deeply entrenched. The Geometric Argument would be severely weakened if its potential success were wedded to a successful defense of other, controversial arguments.

A second, more promising strategy is to consider each argument's principle of explanation as individually defeasible. For instance, suppose I am convinced that there is a problem with the general principle that every contingent state of affairs has an explanation.[25] Even still, I could accept *other* principles of explanation that have not been defeated. Here is an easy example: every state of a coffee mug or collection of coffee mugs has an explanation. If we plug that principle into the general argument schema above, we get an argument for the conclusion that there is causal thing that isn't a coffee mug. And the argument is sound—and uncostly. The point here is that even if there are unsound (or costly) instances of the general argument schema, it doesn't follow that all instances are unsound (or costly). One may consider

[25] Perhaps, for example, I am persuaded by van Inwagen's argument (1983, 202–4) against such a general principle.

each argument individually and ask whether its particular principle of explanation is sufficiently motivated and undefeated. The principles do not stand or fall together, and neither do the arguments.

On the other hand, skepticism of certain principles can lead to skepticism of others. For example, suppose one is unsure about the general principle that every contingent state has an explanation. Then one may have reason to be less sure of certain restricted principles. For consider that the general principle is equivalent to a conjunction of restricted principles: it is equivalent, for example, to the conjunction of <every contingent geometric state has an explanation> and <every contingent non-geometric state has an explanation>. So if the general principle is false, then one or more of the restricted principles is also false. How, then, can one decide which restricted principles to accept? And *to what extent* should one's doubts about a general principle reduce one's confidence in a given restricted principle? These are difficult questions.

Fortunately, we can sometimes make reasonable judgments about particular principles even without a general procedure for answering the questions above. For instance, I have reason to think that for each mug on my table, there is an explanation of its being on my table, and that reason is hardly defeated by doubts about a more general principle of explanation. Similarly, it seems clear to me that one could find it plausible that every geometric state has an explanation *even if* one hosts doubts about the even more general principle that every contingent state has an explanation. I am not suggesting that everyone must accept the principle of explanation in the Geometric Argument. My point here is just that doubts about a more general principle need not automatically cause one to doubt the restricted one.

Moreover, one may consider certain restricted principles to be *safer* defeasible guides, even if one is unsure whether the restricted principles may have exceptions. A significant advantage of the principle in the Geometric Argument is that it avoids some of the most troublesome candidate exceptions to the general principle that every contingent state of affairs has an explanation.[26] Thus, doubts about this general principle need not undermine one's reasons to accept a restricted principle, even if one's confidence in the restricted principle is reduced to an extent.

A second, related worry may arise when one considers that certain instances of the general schema are *incompatible* with the Geometric Argument. Consider, for example, that each geometric state is (apparently) an *energetic* state. So we can run the Energetic Argument, which concludes that energetic states are ultimately explained by a fact featuring a non-energetic state.[27] But what about the previous proposal, resulting from the Geometric Argument, that the geometric states are ultimately explained by an energetic state? We can't have it both ways: either energy is at the causal foundation, or it isn't. It may seem the two arguments butt against each other. We have here an example of the general problem of competing arguments.

I am not aware of any simple procedure that will correctly inform us what we should do in all cases of competing arguments. But I offer a few observations that can help us assess competitions with the Geometric Argument. First, some competitions are only competitions if certain controversial premises are true. In the above case, for example, a competition arises only if we assume both that (i) an energetic explanation of geometric states cannot itself have a further explanation, and (ii) only an energetic state could explain geometric states. Anyone who doubts

[26] I am thinking in particular of the cases that threaten us with explanatory loops or modal collapse. See, for example, van Inwagen 1983, Rowe 1997, and Ross 1969.

[27] I owe this example to [Removed].

either of these will not consider the arguments competitive. Second, where there is competition, one may have independent reasons to doubt, or find less plausible, the explanatory principle of the competing argument. For example, someone who accepts assumption (i) has reason to doubt the explanatory premise in the Energetic Argument. To echo my previous point, a reason that defeats one principle doesn't defeat them all. Third, there is really only one clear-cut competitor, which is the argument built from the type, *non-geometric* cause. Yet its causal premise lacks similar support since we don't have clear cases of non-geometric causes having a cause. Fourth, and finally, one of the virtues of the Geometric Argument, compared especially with certain cosmological arguments, is that it is compatible with a broadly naturalistic ontology. No supernatural agents are required. Thus, the argument's conclusion and principle of explanation may appeal to a wider range of philosophers, and the argument avoids obstacles that traditional cosmological arguments commonly face.[28]

These considerations are only a beginning of an open inquiry into the relationship between the Geometric Arguments and the larger family of arguments. We may wonder, for example, why some states would have a causal explanation but not others. What is the relevant difference, if any, between them? Similarly, why would some explanations be causal and others non-causal? What is the relevant difference, if any, between them? One of the values I see from studying the Geometric Argument is that this argument leads us into many far-reaching questions about causation and explanation, and it ties those questions to that ageless investigation of the foundations of reality.

[28] For one particularly penetrating presentation of some of the obstacles that cosmological arguments face in common, see Oppy 2009.

5. Reflection

I have used a general principle of explanation, (E), to challenge a common conception of causers as spatially situated, sizable objects. Yet there is something simple and elegant about an ontology in which all concreta are spatially situated. Moreover, there are famous arguments against the possibility of *non-spatial* size-less things producing effects in space. Suppose some size-less objects can causally bring about sizable objects. Then perhaps causation could also go the other way: objects with shape and size could cause there to be things that lacks shape and size.[29] We'd have dualistic causal interaction. This result is as intriguing as it is puzzling. Some may view my argument for size-less objects, then, as new reason to reject (E).

On the other hand, (E) accounts nicely for a wide range of apparent cases of explanation. If we give up (E), then we face the challenge of explaining why certain contingent geometric states have an explanation while others do not. Why, for instance, should an *n* vertex geometry, say, have an explanation, whereas a certain *m* vertex geometry have no explanation? It may seem arbitrary to suppose that certain geometries have an explanation while some more complex geometry does not. Why should a difference in mere *complexity* of geometry make a difference with respect to whether the geometry in question is to be explained? Candidate answers may seem *ad hoc*—if not question-begging. After all, contingent geometric states may seem to call out for an explanation in virtue of their *contingency*, not in virtue of their size or complexity or their location within space-time.

Of course, the question of which properties, if any, are relevant to having an explanation is deep and difficult. One standard objection to traditional *cosmological* arguments is that they invoke a causal or explanatory principle that results in a costly ontology—by requiring, for

[29] I owe this consideration to [removed].

example, more basic kinds of things, such as gods, necessary beings, and the like.[30] Skeptics of this ontology can then cite the cost of (say) multiplying complexity. And they can thereby motivate a more restricted causal/explanatory principle that is consistent with a more affordable ontology. This objection applies to my argument, too: those of us who are antecedently skeptical of non-spatial concreta may favor a weaker explanatory principle, such as that every *non-first* geometric state has a causal explanation. We may then keep our ontology free from size-less concreta.

Even still, others of us will find it at least as costly, if not more so, to suppose that a mere difference in geometry or spatiotemporal location could account for a difference with respect to an explanation requirement: why would such differences do that? The Geometry Argument brings this choice between costs into sharp focus. It appears, then, that giving up (E) carries a cost. Is the price right? That is for readers to decide.[31]

[30] See, for example, Oppy 2009. Cf. Oppy 2013.

[31] I am thankful to the following individuals for their helpful comments on previous iterations of this article: [removed].

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