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# Divine Foreknowledge and the Arrow of Time

## On the Impossibility of Retrocausation

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ALAN G. PADGETT

Recent discussion of divine foreknowledge has raised again the old issue of whether or not it is possible to bring about the past, that is, to cause the past to be what it was.<sup>1</sup> In this essay I argue that such backward causation against time, or retrocausation, is impossible and thus cannot help us out of the problem of divine foreknowledge and human freedom. However, this should close the door to only one of many ways of solving this dilemma.<sup>2</sup>

To begin, what does it mean to say that some event is impossible or necessary? A good heuristic device, stemming from Leibniz's philosophy, is to speak of "possible worlds." Clearly, the world might have been different, even considering the whole history of the world past, present, and future. The story of the world, all of it, might be different. Let us understand a "possible world-story" to be a coherent and compossible set of descriptions of what the world might have been like.<sup>3</sup> Every event or object we stipulate as being in that particular story brings with it any essential and necessary properties into the world-story in question. Further, to qualify as a *world-story*, for every object or event mentioned in the story, a full description occurs in that world-story. Finally, all necessary truths we assume to be affirmed in every world-story, though we lack time and knowledge to stipulate every part of the story.<sup>4</sup>

How best to say that something "happens" or "exists" in a world-story is a delicate matter. To say that some event "happens" in a world-story, as in any story, is to say that the description of that event is affirmed in that world-story. An object is real in a story when its existence or reality is affirmed in that story. A necessary event, then, is one whose description is affirmed in all possible world-stories which we could (given prior stipulations and constraints) coherently tell. An impossible event is one whose

description is never coherently affirmed in any story. I will argue that retrocausation is never properly affirmed in any world-story because it is incoherent or incompatible with other, prior parts of the story of each possible world.

What, then, is backward causation? By retrocausation I understand a complex event in which one event causes another event which is prior to it in time. Thus a present event might cause a past event to be what it was, or a future event might cause a present event to be what it is. Retrocausation involves making the past what it was, not "changing" the past (changing the past is incoherent).<sup>5</sup> I exclude, from the beginning, all non-causal relationships between things from consideration as examples of retrocausation. For example, I would allow for the retrosatisfaction of truth conditions for future-tensed propositions. In other words, I allow that what happens in the future is what makes future-tensed propositions true or false. This is because the satisfaction of truth conditions is a logical, not a causal, relationship; it is not an example of retrocausation. We can agree to treat future-tensed propositions as true or false in the abstract language-game of logic, even if no one can know their truth-value until what they describe takes place (or not). Backward causation against the arrow of time I understand to be a causal force that occurs between real objects and events, not a relationship between ideas or propositions.

What is it, then, for one thing to cause another? Theories of causation abound in the literature.<sup>6</sup> I shall adopt one for the purpose of this essay; however, I claim that any adequate theory of causation will come, *mutatis mutandis*, to the same conclusions I reach here.

In brief outline, let us agree for the purpose of this argument that one event or thing causes another against a background of certain relevant states of affairs. Among these states are:

1. the initial conditions at a time
2. the causal powers of the objects involved
3. the relevant relationships between the objects involved
4. the nature of the objects involved

An "object" is a continuant or "substance": God, people, and trees are examples of objects in this sense. Objects in concrete relationship create events in spacetime.<sup>7</sup> Given these objects, relationships, and states, event A causes event B if the occurrence of A brings about or makes to be the case the occurrence of B in the context of that state of affairs.<sup>8</sup> Because such causation is based upon the nature of the objects involved, I am interested here only in natural causation in this sense, viz. effects brought about by the natural powers of existing, real objects.

Sometimes philosophers speak of causation in terms of laws of nature. But the laws of nature are merely our description of the law-like regularities of physical objects. So talk about laws of nature reduces to talk about the nature and causal powers of objects. Thus, the account I give of causation includes so-called laws of nature. For example, it is a law of nature that nothing can be accelerated beyond the speed of light. But clearly, this law is our description, a quite general one, of the nature of physical objects and their causal powers. The "laws of nature" are a particular kind of description of the nature and causal powers of physical objects.<sup>9</sup>

One refinement is still needed for this summary outline of causation. Sometimes we find that many events work together to cause some effect. In this case, A will have to be considered a complex event, a mereological sum of events. Retrocausation would then take place when A, or some part of A, is temporally after its effect, B. To take an example from Dummett, if I pray that my son would be among the survivors of a shipwreck in the past, but which I have just heard about, if my prayer is efficacious, then it will be part of the cause of my son being among the survivors. This would be an example of retrocausation, even though my prayer is only a part of a large complex event which causes my son to have been among the survivors.

This sketch of the idea of causation leaves open the issue of time in the concept of retrocausation. The philosophy of time is, if anything, even more complicated than causation.<sup>10</sup> With respect to the reality of the temporal process from past to future (or just "process" for short) philosophers basically fall into two camps. There are those who follow the process theory (or A-theory, or tensed theory) and those who reject that view in favor of what I call the stasis theory (or B-theory, or tenseless theory).<sup>11</sup> According to process theories (which come in several types), temporal passage is an objective part of the world. Stasis theorists deny this proposition, holding that past, present, and future are subjective or mind-dependent properties of events. Remember, the "time" we are talking about here involves the passage from past to present to future, not the anisotropy of time nor the measure of time.

Possible world-stories fall into three large classes with respect to the reality of process in that world-story. First, there are those which are altogether timeless, where time itself does not come into the story. Second, there are those temporal world-stories in which the process theory of time is true. Third, there are stasis worlds in which past, present, and future are subjective and are not affirmed as part of the "real" or external world. These are all the possibilities there are regarding worlds and time. I shall argue that retrocausation, it turns out, is impossible in all three of these world-stories, and therefore is impossible in all world-stories we could coherently tell.

First of all, do these three options exhaust all possibilities? Yes, they do. For time must be part of a world or not. If it does not occur, then we have the first class of world-stories. If it does occur, then either process is part of that world-story or it is not. If it is, then we have the second class of world-stories. If it is not, then we have the third class. So all possible world-stories are included in these three classes.

We begin by considering the case of the first class of worlds. In such stories, events (if there are any) are completely timeless. The concept of retrocausation, however, entails a temporal separation between events. So retrocausation is impossible in the first class of worlds, by definition.

Our next consideration is the class of world-stories in which the passage of time is of ontological importance for the objective world, that is, world-stories that affirm the process theory of time. Our discussion of this class will turn on a rational intuition or noetic insight I offer for your consideration: the causal impassibility and impotence of the unreal. If something lacks reality, how can it be changed in any way, in a causal sense? If something lacks reality, how can it affect real things? On the process theory of time, the past is unreal. For this reason, it can no longer be affected by nor affect the present. I cannot now make the past be what it was, because those events are gone and

cannot be changed: they no longer exist. Likewise, the future is not real and can have no effect on the present. For only what is real can directly cause anything to happen.<sup>12</sup> Now the past, of course, does affect the present, but only through a causal chain, that is, only through *indirect* causes.

Imagine the history of every object in the world-story, divided by the smallest episode in each object's life. The smallest episodes will be the ones (however short) in which no change takes place in that object. According to the process view, only present episodes of objects are fully real. The present episode of any object we will understand to be in a process of becoming. The former episode is falling away into the past, and thus into non-reality. The future episode of the object is coming into being, passing from non-reality to reality. Only the present episodes of all objects are fully real. The present instant (NOW) will thus be an abstract, conceptual, durationless pointer which picks out all those real episodes for every existing thing in the universe which are simultaneous with all other real episodes. Only present episodes are fully real; and only what is real or actual can directly bring something about (i.e., apart from a causal chain of events).

The standard objection at this point is that the process theory would not allow us to bring anything about. For if I cannot affect nor effect the future, then the future will never get here. For the very next moment is, after all, future relative to the present. If I cannot bring about the future, then all causation must be simultaneous if it is to happen at all (the objection goes). But that conclusion lands us in an infinite regress of simultaneous causes rather than a temporal progression of causes.

The answer to this problem from a process perspective is to *think of the present in two ways*: the present episode of all real objects, and the NOW understood as an abstract and conceptual point. The NOW points to all real episodes, without reducing all real episodes to a durationless instant. Think of this abstraction as a kind of red laser pointer, which highlights the present episode in all real things, without reducing those episodes to its own abstract, durationless instant. So the present episode of some real object is in the process of becoming. It is not a mere instant of time. As the history of an object advances, it passes from one episode to the next one: what is now present becomes past (unreal), and what was only potential (future) becomes actual (present). Such an understanding of becoming does allow for temporal passage. But what counts as future (and therefore as merely potential rather than fully real) changes with the passage of time. Thus *the future never becomes real as future*, but only in the process of becoming. In the process of becoming, what was (merely) future becomes actual (present).<sup>13</sup> So the process theory of time is coherent with our intuition about the causal impassibility and impotence of the unreal.

Given the intuition that what is not real cannot directly causally affect us, nor can it be affected, it turns out that any possible world-story which affirms the process theory of time cannot consistently affirm any description of retrocausation. For any such description would imply a contradiction when joined with our insight about the causal impotence and impassibility of the unreal. Any stories which we would like to tell about retrocausation will not be affirmed in any possible world-story with prior commitments to both our basic intuition and the process theory of time.<sup>14</sup>

Perhaps the proponent of retrocausation will want to reply that our intuition about the causal impotence and impassibility of the unreal may be true but is not logically

necessary. However, before taking this move she ought to reflect on the following point. Part of what we mean when we say something is real is that it can, at least in principle, causally interrelate with other things. So part of what we mean when we affirm that something is unreal simply is that it is causally impotent and impassible. Our intuition, then, upon a little reflection, turns out to be an analytic truth. It is therefore affirmed in all possible world-stories.

This leaves us with the third class of worlds, those that affirm the stasis theory of time. In this class of world-stories, duration does occur ("time" in one sense of the word), but temporal process is either denied altogether, or relegated to an illusion, or understood in some way to be merely subjective. On such theories, the passage from future to present does not change the reality or unreality of any object or event. Any experience of the A-series (as McTaggart called process) simply will not be affirmed in such stories; or it will be seen as a kind of secondary quality, caused by the primary qualities of before, after, and simultaneity. What is objectively real, on the stasis theory, is the B-series of ordered events in a before-after series.<sup>15</sup>

Even within the third class of world-stories, however, retrocausation is not universally affirmed. There are some subclasses of worlds in which retrocausation is impossible. One well-known world is the so-called Gödel universe, based upon certain solutions to the equations of general relativity discovered by Kurt Gödel.<sup>16</sup> In the Gödel world-story, the matter in the universe is in rotation, and the universe possesses a spatial homogeneity—but not isotropy. This model of the universe allows for closed time-like curves for world-lines of objects, and thus for "time travel."<sup>17</sup> While the majority of the matter in this universe travels "forward" in time, some world-lines are possible which are closed, time-like loops. Indeed, for any two points P and Q on the world-lines of massive material objects, where P is before Q on that line, it is possible in the Gödel universe to travel in such a way as to move "forward" in (local) time, and still travel from Q "back" to P.

The problem with worlds like this, where one can travel backward and forward in "time," is that the distinction between before and after seems rather arbitrary. True, for any given mass it will be possible to designate a local, proper time for that object and its world-line. But the universe as a whole does not seem to have any objective, universal way of deciding which direction is "past" and which is "future." The mathematics will work in either direction! Granted that the Gödel universe is temporally orientable, in closed time loops any instance of forward causation is also just as truly called a case of backward causation. P comes "before" Q in one perspective, and just as validly P comes "after" Q in another perspective.

Perhaps, one might respond, this is just the way things are. Temporal order is a matter of perspective and convention. If this is so, then of course what *looks like* retrocausation is possible. For the "retro" part of backward causation will not be true universally, and also not true for God (I assume for this paper that God is also temporal in some sense). What is measured as retrocausation in one frame of reference will be normal, forward causation in another frame of reference. But of course in this case what we do not have is genuine retrocausation, that is, backward causation against an objective arrow of time.

Reflection on the Gödel universe leads us to some conceptual necessities for any world-stories which affirm retrocausation. Two things must be affirmed in any

world-story in order to make a claim of retrocausation significant: (a) time must be anisotropic, and (b) the purported case of retrocausation must be in a topologically "open" world-line, one which not only in fact but even in principle cannot be closed. For strictly speaking any "forward" causal connection in a closed time-line could be just as well called a case of retrocausation. The idea of backward causation includes the notion that one is going backward against something, after all, and not just arbitrarily choosing a temporal starting point and direction (or "arrow"). Thus not every world-story in the third class (i.e., stasis worlds) can coherently affirm a genuine and significant case of *backward* causation.

According to some philosophers, time and causation are merely human points of view. Many of these philosophers have been idealists, but not all. Gödel himself may be included among them.<sup>18</sup> In some world-stories, therefore, "backward" and "forward" are just a matter of perspective, and thus there is no ontologically real arrow of time. In such worlds, genuine retrocausation does not occur because the ordering of events as before and after is merely conventional. In order for the "backward" part of the concept to be meaningful for the problem of omniscience (i.e., for God), the arrow of time needs to be ontologically real. This provides us with a third criterion, viz. (c) temporal order and causal asymmetry must be ontologically genuine. Let us call the world-stories which affirm all three of these criteria STAT worlds (stasis theory with an objective arrow of time).

In order for there to be any theologically meaningful use for the idea of "backward causation," these three criteria must be affirmed. It is indeed logically possible that event A might cause event B, and B would *seem* to be earlier in time to some human (but not to an omniscient, omnipresent God). The problem is that such an event would not be ontologically genuine retrocausation, only apparent retrocausation. In such cases, God could easily know what looked like "future" to us but was not really future, not future to God.<sup>19</sup>

We turn our attention now to that set of worlds where the stasis theory of time is affirmed, along with our three criteria for theologically meaningful retrocausation (i.e., STAT world-stories). If the A-series of past, present, and future is not an objective part of the world, according to STAT world-stories, what accounts for the ordering of events in an objective B-series at all? That is, what accounts for the temporal anisotropy of time in these worlds? This is a key question for those who would assert the coherence of retrocausation. As Mellor wrote, "If only the A series existed, that would be the direction of time. But as it doesn't, the difference between *earlier* and *later* must be sought elsewhere."<sup>20</sup> According to Mellor, what gives temporal order to events is their causal order: "The direction of time is the direction of causation."<sup>21</sup> One event occurs before another, in time, because the first event is a cause of the second or the second event is simultaneous with some effect of the first. When one affirms, then, that A is before B in time, in those world-stories which affirm a causal explanation for temporal anisotropy, one means that A is causally prior to B or A is simultaneous with some event that is causally prior to B. However, when that is what one *means* by temporal precedence, then clearly the affirmation of a description of retrocausation is analytically false, that is, it implies a contradiction. When the arrow of time simply means the direction of causation, backward causation against the arrow of time is conceptually incoherent.

A more traditional stasis theory about what temporal order consists in, for STAT world-stories, is the view of Grünbaum.<sup>22</sup> According to this theory, the difference between earlier and later in time has to do with the increase of entropy. Roughly, the ability of a system to do "work" is a measure of entropy.<sup>23</sup> Increase in entropy entails the dissipation of energy from part of the system to the whole and a decrease in the whole system's ability to do work, that is, a decrease in available energy. An increase in entropy involves necessarily a dissipation of energy from some part of the system to the system as a whole.

If we affirm a physical theory of the order of time in a STAT world-story, then event A is before event B if and only if entropy (or some other physical process) has increased between A and B. This implies that event A is part of an episode of a system with lower entropy than another episode of that system which includes event B. But now we have to ask, how is it possible on this theory for B to cause A? To cause A, some object (or objects) of which B is an expression will have to bring about A. And these objects will have to expend energy, that is, do some "work." Remember we are considering cases of natural causation, brought about by real objects. B can only cause A when the objects-in-relation we call B bring about A. But that means that these objects will have to increase entropy in order to change from B to A. This in turn implies, however, that B must (on this theory) be temporally prior to A. And this contradicts our original supposition, viz. that A was before B in time. So any work that objects in the future might exert to cause the past to be what it was will increase entropy between the future and the past. But this is contrary to the theory of temporal order under consideration. This means that on the theory of temporal order advocated by Grünbaum, once again, retrocausation is impossible.

The two cases we have analyzed are similar at several points. In fact, any physical theory of temporal order for STAT worlds will have this same problem with retrocausation. But on a stasis theory of time, if some physical, causal process does not account for temporal order, what does? Is it just a brute fact of the universe? That does seem a little hard to swallow. At this point the defender of the possibility of retrocausation may object. Why does she have to develop some theory of temporal order at all? That is, why does the defender have to affirm some view of what it is for something to be later than another in time? The answer to this objection is twofold. First, a defender of retrocausation should tell us what is meant by "retro," that is, what is meant by temporal precedence. The possibility of retrocausation is by no means obvious, and those who assert its possibility need to argue for it. The defender of the possibility of retrocausation owes us an analysis of what exactly she is asserting to be possible. The second reason is inductive. I have supplied an analysis of retrocausation in a very large number of possible world-stories, being as comprehensive as I can be, and found retrocausation to be incoherent in each world-story (that is, incompatible with other truths affirmed in each story). So I conclude that retrocausation is incompatible ("externally incoherent") unless and until defenders of retrocausation can give me some reason to believe otherwise.

I am aware that certain models or interpretations of modern physics imply or include the idea of retrocausation. But if my conceptual analysis is correct, such models and solutions will (logically must) turn out to be empirically false, or else not examples of retrocausation. More precisely, the world-lines allowed in these models will

not in fact be retrocausation, or the events connected by, e.g., a tachyon beam will be merely measured as being "past" within some inertial system and its associated metric, and not ontologically or genuinely past. In any case, as William Lane Craig has argued, there are other ways in which modern physics can be interpreted, in which backward causation does not occur.<sup>24</sup>

I offer, then, a rebuttal rather than a refutation of the possibility of retrocausation. The idea of retrocausation, when it is spelled out, is either incoherent or incompatible with other truths. I have admitted that *apparent* backward causation is logically possible, but merely apparent retrocausation does not help divine foreknowledge. This is because God will need to know what is future to God, in order to use backward causation to know the future. Otherwise, God simply uses ordinary causation to know what is present or past to the divine mind (even if that event appears to be future to humans on earth). What is future to an omniscient and omnipresent God is really future, not just apparently future to us. In conclusion, then, unless a coherent and compatible theory of temporal order is given by defenders of retrocausation, philosophers and theologians should avoid solutions to the problem of divine foreknowledge and human freedom which imply retrocausation.

#### Notes

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1. See representative essays by Michael Dummett, "Bringing about the Past," *Philosophical Review* 73 (1964), 338–59, rpt. in Dummett, *Truth and Other Enigmas* (London: Duckworth, 1978); Alfred J. Freddoso, "Accidental Necessity and Power over the Past," *Pacific Philosophical Quarterly* 63 (1982), 54–68; George Mavrodes, "Is the Past Unpreventable?" *Faith and Philosophy* 1 (1984), 131–14; Thomas Talbott, "On Divine Foreknowledge and Bringing about the Past," *Philosophy and Phenomenological Research* 46 (1986), 455–69; and Bruce Reichenbach, "Hasker on Omniscience," *Faith and Philosophy* 4 (1987), 86–92.

2. For a good review of the issues and alternatives, see Linda Zagzebski, *The Dilemma of Freedom and Foreknowledge* (New York: Oxford University Press, 1991), and John Martin Fisher, ed., *God, Foreknowledge, and Freedom* (Stanford: Stanford University Press, 1989).

3. I avoid the usual language of a "possible world" simply to call attention to the fact that possible worlds are sets of descriptions, not of objects. This insight avoids many of the problems associated with recent possible worlds ontology. In other words, I advocate a "fictionalist" account of possible worlds. See further D. M. Armstrong, *A Combinatorial Theory of Possibility* (Cambridge: Cambridge University Press, 1989).

4. Thus Stalnaker: "I am making up this world—it is a pure product of my intentions—but there are already things true in it which I shall never know." Robert Stalnaker, "A Theory of Conditionals," in *Causation and Conditionals*, ed. E. Sosa (New York: Oxford University Press, 1975), 178.

5. See Bob Brier, *Precognition and the Philosophy of Science* (New York: Humanities Press, 1974), 27f.; David Lewis, "The Paradoxes of Time Travel," *American Philosophical Quarterly* 13 (1976), 145–52.
6. A good recent volume (with bibliography) is Daniel Hausman, *Causal Asymmetries* (Cambridge: Cambridge University Press, 1998).
7. On the primacy of objects in causation, see Andrew Newman, "The Causal Relation and Its Terms," *Mind* 97 (1988), 529–50.
8. "Event" here is a term of convenience. I understand an event to be a change in an object, or in the relationship between objects.
9. Thus I follow those who see "laws of nature" as constructs, e.g., D. M. Armstrong, *What Is a Law of Nature?* (Cambridge: Cambridge University Press, 1983); Nancy Cartwright, *How the Laws of Physics Lie* (Oxford: Oxford University Press, 1983); and Cartwright, *Nature's Capacities and Their Measurement* (Oxford: Oxford University Press, 1989).
10. For much of what follows, see A. G. Padgett, *God, Eternity, and the Nature of Time* (London: Macmillan, 1992; Eugene: Wipf and Stock, 2000).
11. I introduced the terms "process" and "stasis" in my doctoral dissertation ten years ago (see Padgett, *God, Eternity, and the Nature of Time*, 3–6). I prefer these terms to A and B, since as letters they convey no meaning relative to the theories they represent. I also dislike the more common terms "tense" and "tenseless" because analytic philosophers already confuse grammar with ontology all too often! Also, the term "stasis" is a technical word with no meaning in ordinary language—it cannot have the negative connotations that "block universe" and "static theory" do. So I continue to use these names for the two theories.
12. An indirect cause is one that operates through a causal chain.
13. I refute McTaggart's argument that the system of tenses in the process theory is contradictory in Padgett, *God, Eternity, and the Nature of Time*, ch. 5.
14. This is the conclusion reached by William Lane Craig in his review of the literature on this topic, *Divine Foreknowledge and Human Freedom* (Leiden: Brill, 1991), 113–57. Craig concludes, "There is no unequivocal evidence supporting either the presence or even possibility of backward causation, and there is good reason to reject its real possibility on the basis of the nature of time" (156).
15. See, i.a., Adolf Grünbaum, *Philosophical Problems of Space and Time*, 2d ed. (Dordrecht: Reidel, 1973), and D. H. Mellor, *Real Time* (Cambridge: Cambridge University Press, 1981). His view on this point is unchanged in Mellor, *Real Time II* (London: Routledge, 1998).
16. Gödel's three papers from 1949–52 on this topic are helpfully collected in Gödel, *Collected Works*, vol. 2, ed. S. Feferman et al. (New York: Oxford University Press, 1990).
17. See Howard Stein, "On the Paradoxical Time-Structures of Gödel," *Philosophy of Science* 37 (1970), 589–601; David Malamant, "'Time Travel' in the Gödel Universe," *PSA* 1984, vol. 2, ed. P. D. Asquith and Philip Kitcher (East Lansing: Philosophy of Science Association, 1985), 91–100; and Malamant, "Minimal Acceleration Requirements of 'Time Travel' in Gödel Space-Time," *Journal of Mathematical Physics* 26 (1985), 774–77.
18. See, e.g., Palle Yourgrau, *The Disappearance of Time* (Cambridge: Cambridge University Press, 1991).
19. This fact was recognized soon after the publication of Einstein's famous paper on the special theory of relativity; see Leslie Walker, "Time, Eternity, and God," *Hibbert Journal* 18 (1919), 36–48.
20. Mellor, *Real Time*, 149, his italics.
21. *Ibid.*, 150.

22. Grünbaum, *Philosophical Problems*.

23. Technically, entropy is the measure of the amount of energy it would take to return the system to its initial state.

24. I thank Leon Horsten for raising this question. For a brief overview of the philosophical interpretations and proposed "solutions" in contemporary physics which employ retrocausation, see Craig, *Divine Foreknowledge and Human Freedom*.