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Against Chronogeometrical Fatalism

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It is widely believed, among those who have given much thought to the matter, that an acceptance of Minkowski spacetime would make it no longer possible to maintain our traditional understanding of ourselves as free and morally responsible agents. Such “chronogeometrical fatalism,” as it has been dubbed, has obvious affinities with the two classic forms of fatalism: “logical” or “future-truth” fatalism, which derives its fatalistic consequences from the existence of true future-contingent propositions; and “theological” fatalism, which rests on the alleged implications of positing an essentially omniprescent knower. My real interest in this paper concerns the connections between these various forms of fatalism, and in particular, whether chronogeometrical fatalism brings more to the table than logical or theological fatalism. What makes the latter question pressing for defenders of chronogeometrical fatalism is that logical fatalism is widely rejected as fallacious, and the verdict on theological fatalism is at best mixed. What is it about chronogeometrical fatalism that should make its threat to free agency more credible than the one posed by logical or theological fatalism? The answer I shall argue for is: *nothing*. In sum, if logical and theological fatalism leave free agency intact, then so does chronogeometrical fatalism.

The inquiry will proceed under a couple of restrictions. First, I do not propose to challenge Minkowski spacetime, either with respect to its conceptual credentials or as an empirically confirmed deliverance of modern science, nor do I propose to question whether it does indeed have the various implications around which the essay is organized. Some of these supposed implications are in fact controversial; but I shall do nothing to controvert them. (It should go without saying that I do not thereby waive the right to question their *interpretation*!) My justification for citing them is simply that they find support in the literature. Instead of disputing them, I will accept them as correct consequences of Minkowski spacetime, and restrict my attention to their further implications for human freedom and moral agency.

The second restriction is that I will be making do, at least initially, with a pretheoretical and undefined notion of “free agency.” This procedure requires some comment, since a failure to be clear about the operative notion of “free agency” is arguably the least satisfactory aspect of earlier treatments of “Minkowski agency.” The reason I will not be starting off with a definition of “free agency” is that only some clauses of this definition (supposing I could even formulate such a thing!) would be relevant to the ensuing discussion, and these can best be developed in the context of the various implications of Minkowski spacetime, as we examine them in turn. (Why leave unnecessary hostages to fortune?) But I can provide at least the following, rather minimal, guidance. Whatever the word ‘free’ contributes to the phrase “free agency,” it must be that in virtue of which we are *moral* agents—it’s the freedom required for moral responsibility that we are

interested in preserving (if possible) from the threat posed by the Minkowskian “block universe.” More generally (if this isn’t already implicit in the preceding point), we don’t want to bother with a notion of free agency that is so attenuated, and makes so little difference to the world, that it would be compatible with just about anything. That would make my job of rescuing free agency from the toils of Minkowskian fatalism too easy! (Here’s an “operational” definition of the sort of unsatisfactory freedom I have in mind: it’s what compatibilists try to avoid in their analyses of freedom, and incompatibilists claim they cannot avoid.) If free agency is possible in Minkowskian four-space, our possessing such agency should be something worth caring about.

I have organized the discussion that follows around various supposed implications of Minkowski spacetime, taking them in increasing order of strength. In each case I say why free agency might be thought jeopardized, and I then explain why the worry is groundless. I begin with a very minimal thesis implied by Minkowski spacetime.

Thesis 1. The future has (either now or tenselessly) a truth value.

One of the two conclusions Hilary Putnam derives from Minkowski spacetime and recapitulates at the end of his seminal article is that “contingent statements about future events already have a truth value.”¹ What is so threatening about that? Well, this claim functions as the principal premise in well-known arguments for fatalism, beginning with Aristotle’s “sea-battle tomorrow” argument in *De Interpretatione* 9. All such arguments are at bottom of the following form:

- (1) It’s true that P (where P is a contingent proposition about a future event)
 - (2) If it’s true that P, then necessarily P
- So necessarily P

This argument, if sound, can obviously be used to show that any and all of one’s future actions are necessary; and if that’s the case, it is understandable why our status as free agents might be thought threatened.

One response to this argument, which was at least entertained if not endorsed by Aristotle, is to deny premise (1) on the ground that contingent statements about future events lack a truth value. If Putnam is right in holding that Minkowski spacetime has been scientifically confirmed and that it entails the truth-valuedness of future contingents, then this move is obviously unavailable. So we have at least a partial (and favorable) answer to the question whether chronogeometrical fatalism brings more to the table than logical fatalism: it does, since it has resources not available to logical fatalism alone for defending against a common response to fatalistic arguments. But this advantage of chronogeometrical fatalism is less significant than one might think. For one thing, there are independent logical grounds for adherence to (1), such as a commitment to unrestricted excluded middle; it’s doubtful, then, that a successful defense of (1) requires an appeal to Minkowski spacetime. Most importantly, however, chronogeometrical fatalism’s relative advantage in the battle over premise (1) is in the end irrelevant, since

the war over the foregoing argument is already lost on other grounds. Premise (2) is a mess, and sinks the argument whether or not premise (1) is acceptable.

The occurrence in (2) of the operator ‘necessarily’ is ambiguous between what the medievals called the “necessity of the consequence” and the “necessity of the consequent.” Parsing it the first way yields

(2’) Necessarily (if it’s true that P, then P)

while parsing it the second way gives us

(2*) If it’s true that P, then necessarily (P)

The latter has the virtue of rendering the argument valid; unfortunately, there is no reason to accept (2*) as true, short of an antecedent commitment to the argument’s conclusion. (It’s certainly not generally the case that what’s true is necessary!) The former, on the other hand, *is* (tautologously) true; its vice is that the resulting argument is no longer valid. What follows from (1) and (2’) is simply *P*; it’s a modal fallacy (sometimes called “Sleigh’s fallacy”) to suppose that *Necessarily P* can be inferred from (1) and (2’). In sum, if the worst implication of Minkowski spacetime is that future contingents have truth value, there is no need to worry that human freedom or agency is thereby compromised.²

Thesis 2. The future is real.

The other implication Putnam makes special note of at the end of his article is that “future things are real, even if they do not exist yet.”³ If reality is four-dimensional, the “now” is no more ontologically privileged than the “here” and there are no grounds for thinking that the future (what comes *after* the now) is less real than the past (what comes *before* the now).

How is the claim that the future is real to be taken? If truth is correspondence, and there can be correspondence only between reals, then the claim that “future things are real” may be doing nothing more than expressing a minimal condition for future contingents to have a truth value. In this case Putnam’s second conclusion does not appear to have any extra “bite” to it. Why think that the “reality” of the future provides some independent support for fatalism, above and beyond what was supposed to be provided by future truth? At the very least we would need to learn more about the force of the claim that future things are *real*. Let us therefore move on, hoping that the trouble the future’s reality generates for human freedom (supposing such trouble is genuine) might be brought out by some item further down the list.⁴

Thesis 3. The future is determinate.

This claim is often encountered, and indeed seems an unexceptionable implication of Minkowskian four-space. It may also be regarded as an implication of the previous

claim—that the future is real—on the grounds that there is no such thing as a vague or indeterminate reality; so if the future is real, it must be determinate. But it's not clear how to employ the supposed determinateness of the future in an argument for fatalism that is any better positioned for success than the one we looked at under Thesis 1. What exactly does determinateness add to truth?

Since these first three implications of Minkowski spacetime seem to go together, while the one we will look at next is arguably an advance beyond these three, it is worth pausing here to see whether any light can be shed on the fatalistic threat stemming from the future's truth *cum* reality *cum* determinateness by approaching the matter from a different direction. The *belief* that the future will unfold in a particular way, because its going that way is somehow *already guaranteed*, is commonly thought to make the exercise of agency problematic, quite apart from whether its simply *being the case* that it will go that way has any adverse consequences for agency. Call this “doxastic fatalism.” And let's adopt “metaphysical fatalism” as a label for the austere, stripped-down core of chronogeometrical fatalism which goes no further than Theses 1-3 (as these have been parsed up to this point). Insofar as the “doxastic” element in doxastic fatalism does some real work in the argument, doxastic and metaphysical fatalism will be distinct.

Nevertheless, when it comes to the most interesting case of doxastic fatalism, that of a fully *rational* agent whose fatalistic conclusions do not rest on some error of fact or logic, there is a very intimate relation between doxastic and metaphysical fatalism. If metaphysical fatalism is a *failure*—if the future's truth/reality/determinateness does not have the fatalistic implications advertised—then it's not clear how someone's *belief* in the future's truth/reality/determinateness should rationally compel them to endorse fatalism. Likewise, if metaphysical fatalism *succeeds*, it's not clear how a fully rational agent, cognizant of its success, could resist becoming a fatalist about a future action which they already believe they are going to perform. It seems to me, however, that this conclusion *can* be resisted by a fully rational agent, and that metaphysical fatalism is to that extent dubious.

Suppose that your quirky Uncle Clarence—the one who invented the time machine when everyone said it was impossible—shows up at your 17th birthday party with an unusual gift. “I know you've been anxious about some upcoming decisions,” he tells you. “So on my last trip into the future I took along a video camera and recorded some of the key moments in the rest of your life.” He hands you a brightly wrapped box. “This will tell you, for example, whether you get into Harvard, and whether you accept. Happy viewing!” When you view the tape later that night, you find that it's everything Uncle Clarence claimed it to be. But now you have a problem: you must *live* the scenes that you have watched on tape. What will that be like? In ordinary life you deliberate among alternative courses of action, reach decisions which resolve your uncertainty, and then act on your newly acquired intentions. That's what it is to be an active participant in your life rather than a passive spectator or an actor reading a script. But it looks like your viewing of the tape has condemned you to the latter category, at least with respect to the episodes filmed by Uncle Clarence. How can you engage in deliberation when you already know how it will turn out? How can you resolve uncertainty with a decision when there is no uncertainty to resolve? How can you acquire an intention to act in a

particular way if your prior knowledge makes intention-acquisition pointless? By telling you what the future holds in store, the video short-circuits the route by which you usually approach your own actions, namely, through deliberation, decision-making, and intention-acquisition. This leaves it deeply problematic how you can even *be* an agent with respect to those future actions.

The videotape in this story is simply a vivid representation of the determinate truth, and indeed *reality*, of future contingents in Minkowski four-space. If knowing these truths has the implications canvassed in the preceding paragraph, it would seem that these implications can be avoided only through ignorance of such truths, and it seems somehow unsatisfactory to suppose that human agency rests on ignorance and is impossible without it. One response is to accept this conclusion and try to make us feel better about it. A better response is to reject the conclusion.

Why should the belief that one will perform a particular action make it impossible to acquire the intention to perform that action? The idea is apparently something like this. The point of intention-acquisition is to *settle* the question of what one is going to do; but knowing what one is going to do *also* settles this question. So if one already knows what one is going to do, there is nothing left to be settled by intention-acquisition. Intention-acquisition is therefore pointless if not impossible when one already knows what one is going to do. All that remains for the unfortunate individual endowed with detailed knowledge of his future actions is to go through the motions laid out in the script; since all questions about one's future course of action have already been settled, the intentionality essential to genuine agency is stultified.

To see what is wrong with this assessment, let us return to Uncle Clarence's videotape. After the scene in which you are granted tenure at UCLA, there is just one more episode on the tape, this one apparently coming some years later. You are wearing a robe and sandals, and the dozen other men and women around you are similarly attired. You are all chanting—nonsense, so far as you can tell. Outside the rough-hewn room in which you are assembled, the sun has not yet risen for the day. A bearded figure wearing Gucci loafers under his robes enters the room, and as you observe yourself joining the others to make obeisance, the sorry truth of the matter finally sinks in: you have joined a New Age religious cult! Your shock and consternation know no bounds. Whatever could have possessed you to give up the comfortable academic position you had striven so long to attain? That must have been one doozy of a midlife crisis! But this is evidently what the future holds in store for you.

What's your situation now, having viewed the tape to the end? You know that sometime in your mid-forties you are going to face a defining moment in your life as two very different visions of the good life contend for your allegiance. You also know the ultimate outcome of that struggle. There is a sense, then, in which the question whether the life of a cult follower or the life of a university professor is already *settled* for you. It is settled in the sense that you are now prepared to assent to the truth of a certain proposition: *I will choose cult X over UCLA*. But you are most emphatically *not* prepared to assent to the choice itself. Your 17-year-old self is absolutely horrified at how your 40-something self

is going to mess things up. A cult member is the very last thing you want to be! It is clear that your will is far from settled, even if your belief *is* settled by the irrefutable evidence of Uncle Clarence's videotape.

We can now sum up the problem with this Minkowski-inspired attack on agency as follows. While knowledge of a determinate future, like intention-acquisition, resolves unsettled beliefs, what one comes to believe as a result of foreknowledge is a *propositional* belief about *what will happen*, whereas what one comes to believe as a result of intention-acquisition is a *practical* belief about *what to do*. The former does not entail the latter; so even if the propositional belief is acquired first, it may still be necessary to go through the actual process of intention-acquisition (including protracted deliberation, if that is what is required) in order to achieve the practical belief. It is therefore unnecessary for one to be ignorant of the future in order to retain one's sense of agency.⁵

This strongly suggests that nothing in metaphysical fatalism—i.e., chronogeometrical fatalism cashed out solely in terms of Theses 1-3—rules out free agency. Let us therefore augment these first three theses with

Thesis 4. The future is “closed.”

Let me indicate immediately what sort of force the word ‘closed’ is supposed to have here. If all propositions about the future have determinate truth-values, we might say that the future is *alethically* closed; if someone knows what the future holds in store, we might say that the future is (to that extent, and for that person) *epistemically* closed. Neither alethic nor epistemic closure, I have argued, has any adverse consequences for free agency. What we now have to consider is a stronger sense of closure, in which alternatives to the way the future *will* unfold are ruled out by the way the past *has* unfolded: given the actual history of the world up to T, only one future subsequent to T is *possible*.

Because “closed” has modal force (alternative possibilities are excluded), this thesis is better positioned than earlier theses to yield a fatalistic conclusion. To say that the future is closed is to attribute to the future a characteristic thought to apply to the past; it is to say that the future, instead of being “open” and in that respect different from the past, is instead in this respect just like the past. And that is fatalism, since “a fatalist,” according to Richard Taylor, is someone who “thinks of the future in the way we all think of the past.”⁶

But why think that the future *is* closed? Arguments for this conclusion typically employ some sort of “transfer principle,” whereby the closedness of the past—call this “temporal necessity”—gets transferred to the future. The *Rubaiyat of Omar Khayyam* offers a nice characterization of the necessity in question:

The moving finger writes; and, having writ,
Moves on: nor all thy Piety nor Wit

Shall lure it back to cancel half a Line,
Nor all thy Tears wash out a Word of it.

An argument is then offered for why this “temporal necessity” cannot be restricted to the past, but spills over into the future. In *theological* fatalism, for example, God is supposed to *know* in advance the truth values of propositions about future contingents, and because His beliefs are infallible, He not only *is not* but *cannot* be mistaken in those beliefs. If God believed, prior to my birth, that I would agree to read a paper on Minkowski spacetime at the 2007 Chicago APA, then there is no alternative to my so agreeing—since an infallible deity already has a belief about my decision in place, it is “too late” for me to decide otherwise. This gives arguments for theological fatalism a modal force that is lacking in arguments for logical fatalism, like the one Aristotle gives in *De Interpretatione*.

The key questions, obviously, are these: (1) whether Minkowski spacetime does indeed entail or presuppose that the future is closed, in the relevant sense; and (2) whether its being so closed is incompatible with the exercise of free agency. With regard to question (1), I’m doubtful that an affirmative answer can be established independent of the very fatalistic intuitions whose cogency is in dispute. That Minkowski spacetime has no room for alternative possibilities is supposed to be somehow *obvious*, not something that must be deduced by first identifying some subset of spacetime events that are even more obviously “closed” and then employing some transfer principle to extend this closure to all events.⁷ The expression “block universe,” widely employed as a synonym for Minkowski four-space, conjures up a picture of all events locked solidly (and fatalistically) into place. It’s “too late” for anyone to access an alternative pathway, *not* because the past is already given and the closure of the past is transferred to the future, but because the *whole thing* (including the future) is already given. That’s the picture, anyway, and it’s quite seductive. But we need to keep our wits about us, since fatalistic arguments are notoriously seductive, even when the arguments are recognized to be fallacious. (Example: *Either I will be hit by a car while crossing this street, or I won’t; if I will, any precautions I take will evidently be ineffective; if I won’t, any precautions I take will evidently be unnecessary; therefore it is pointless to take precautions when crossing this street.* It takes some concentration to identify what is wrong with this argument, and more concentration to remain free of its spell even after reaching the right diagnosis.) It’s just not clear how Thesis 4’s picture of a “block universe” with all events “already given” adds anything to the truth, reality, and determinateness of Theses 1-3. It does add a suggestive picture; but a picture isn’t an argument.

The basic problem with securing a favorable answer to question (1) can be summed up as follows. *Closed* is a relative modality: a proposition *p* is closed *relative to* some set *S* of propositions; *p* is closed relative to *S* when *p*’s truth value is *settled* by *S* (i.e., *p* or not-*p* is entailed by *S*). Of course, any proposition will be closed, in this sense, relative to some *S* (if only relative to the set consisting of that proposition itself). Whether there is anything at all philosophically interesting about *p*’s closure relative to *S* therefore depends on what *S* is. Thesis 4 points out that future events are closed relative to the set of all spacetime events (trivially so, since every future event is a member of that set). But

this would have the philosophically interesting consequence that future events are impervious to free agency only if the set of all spacetime events is the set that is *relevant* to such a conclusion. It's the relevance of this set that requires, but so far lacks, argument. Given the failure of logical or "future truth" fatalism, it is especially appropriate that anyone defending chronogeometrical fatalism on the basis of Thesis 4 should assume the burden of proof; this burden is hardly discharged by employing the metaphor of a "block universe" as a fatalistic intuition-pump.

Suppose, however, it *could* be shown that Thesis 4 is true in the philosophically interesting sense that Minkowski spacetime *excludes alternative possibilities*. (For those who like pictures: the "block universe" picture occludes any "branching futures" picture.) This brings us to question (2): does free agency really require alternative possibilities? The idea that it does—at least when it comes to the freedom presupposed by moral responsibility—is captured in the so-called Principle of Alternate Possibilities, or

PAP A person is morally responsible for what he has done only if he could have done otherwise.

But Harry Frankfurt, in a famous article, has presented a counterexample to PAP which has convinced many that PAP is false. The classic Frankfurt-type counterexample involves Jones killing Smith in circumstances that would otherwise constitute a paradigm case of free and morally responsible agency, with the addition of one unusual detail: that a third party, Black, equipped with the requisite sci-fi devices, *would have* intervened in the process to *make* Jones decide to kill Smith if Jones had been about to decide otherwise. In such a scenario, it seems that the agent (Jones) is morally responsible for his action, and thus free in the sense required for moral responsibility, because he reached his decision and acted on it without Black's intervention; yet it also seems that he had no alternatives, since Black's presence in the scenario guarantees that, one way or another, Jones would decide and act as he did. If Frankfurt is right, then, an absence of alternative possibilities does not by itself entail an absence of free and morally responsible agency. Of course Frankfurt's critique of PAP is controversial, the subject of a lively ongoing debate. What it does show, however, is that Minkowski spacetime—at least when this is cashed out in terms of Thesis 4—does not license an easy inference to fatalism, bypassing complex philosophical debates over the requirements for free agency.⁸

PAP addresses one of the two standard conditions for free agency that have been linked ever since Aristotle's *Nicomachean Ethics*. The other condition is the *source* or *origination* condition: the agent must, in the appropriate way (compatibilists and incompatibilists offer different accounts of what this is), be the source or origin of the action. It is this condition, rather than the alternative possibilities condition, that is operative when we think of moral responsibility in terms of "buck-stopping": I am morally responsible for X if *the buck stops here*; that is, insofar as the causal/explanatory chain terminating in X can be traced back to me. Since Thesis 4 says nothing about the explanatory/causal order, it is impotent to show that the source condition is never satisfied. And while it does entail that the alternative possibilities condition cannot be

satisfied, we have noted how Frankfurt-type counterexamples to PAP have called this condition into question. Since Thesis 4 has been assumed true only for the sake of argument, and fatalism is not a simple consequence of this thesis in any case, the grounds so far uncovered for holding that Minkowski spacetime subverts free agency must be judged tenuous at best.

Thesis 4 was stronger than Theses 1-3 inasmuch as it extended to future events a *modal* property characteristic of past events *qua* past. But there was nothing in Thesis 4 to suggest that the future isn't (really and fully) *future*. That's the job of

Thesis 5. The future cannot even be distinguished from the past in any nonarbitrary way.

Even if unusual cases can be constructed in which an absence of alternatives is insufficient to negate free agency, there certainly appear to be many cases (the *normal* cases, one might think) in which a person lacking alternatives is unfree, *and* it is (in whole or in part) *because* the person lacks alternatives that they fail to qualify as free. I'm surely no longer free with respect to my *past* actions, and one rather important reason for this, it would seem, is that Omar Khayyam's cosmic scribe has already recorded those actions: alternative narratives are no longer accessible to me—or to anyone. Aristotle notes that “this alone is lacking even to God, to make undone things that have once been done,”⁹ and Aquinas comments: “As such it is more impossible than the raising of the dead to life, which implies no contradiction, and is called impossible only according to natural power.”¹⁰ If the future is closed in *this* sense—if Minkowski spacetime implies that we must now, without qualification, think of the future in the same way we think of the past (to revert to Richard Taylor's characterization of fatalism)—then even the Frankfurtian critic of PAP should agree that there is no room in reality for free agency.

Of course Thesis 5 considerably overstates the sober Minkowskian truth of the matter. Suppose I embark on a putative exercise of free agency at spacetime point 0. Then special relativity, far from undermining the distinction between past and future, supports the notion of an *absolute* future, defined by the light-cone centered on 0. Thesis 5, of course, isn't denying *this* sense in which there is a real distinction between past and future relative to a given point; rather, it is asserting that there is some *other* sense (or senses) in which the distinction can no longer be maintained in quite so neat a way as was possible under pre-relativistic views of time and space. This is supposed to follow from the relativity of simultaneity, which can be artfully exploited to yield some pretty counterintuitive results.

Consider Roger Penrose's famous puzzle about the launching of the Andromedan invasion fleet, which, when Bob and Alice cross paths on Earth, is yet future with respect to Bob but is already past with respect to Alice, and the yet more astonishing results that appear to follow when an Andromedan named Carol is introduced into the picture. Because Bob and Alice are in motion relative to each other, they determine slightly different inertial frames, with attendant differences in their planes of simultaneity. If Bob and Alice are walking in opposite directions along the Earth-Andromeda axis, their

encounter (call this event *E*) will define, relative to their respective frames of reference, planes of simultaneity that intersect the worldline of Andromeda some days apart. Any event, such as the launching of an invasion of Earth, that takes place on Andromeda during this period, has already occurred at *E* relative to Alice's reference frame, but has not yet occurred at *E* relative to Bob's frame. Moreover, if the Andromedan launch (call this event *L*) lies in Alice's past at *E*, it must surely be regarded by her, at *E*, as inevitable. But when Bob encounters Alice at *E*, how could *L* be inevitable for Alice but not for Bob? It seems clear to Penrose that if *L* is inevitable at *E* for one frame, it is inevitable at *E* for any frame. Now take matters a step further and suppose that an Andromedan named Carol is walking toward Earth at the time that the invasion fleet is launched. Her plane of simultaneity intersects the worldline of Earth some days after *E*, making *E* inevitable for her at *L*. Once the relativity of simultaneity is granted, there appears to be no way to stop the steady march of inevitability as it spreads throughout the entire block universe.¹¹

It was to characterize the supposed upshot of this set of thought-experiments that Roberto Torretti coined the term 'chronogeometrical *determinism*,' for which I have substituted Steven Savitt's more apt 'chronogeometrical *fatalism*.'¹² But how compelling are the considerations adduced in the last paragraph? Things went mighty fast near the end there, so let's slow it down, beginning with the last acceptable step: that if *L* is inevitable at *E* for some frame, it is inevitable at *E* for any frame.

I say this is acceptable because we have some warranted inclination to accept it. But we have another inclination in the neighborhood of this one that we should resist. The argument of the preceding paragraph appears to involve a transfer principle: the inevitability of *L*, relative to Alice at *E*, *transfers* to Bob at *E*, in virtue of their co-presence at *E*. (It's like an infection spread by contact.) This transfer is problematic, however. *Pastness* doesn't get transferred: the argument doesn't show that *L* isn't really future relative to Bob at *E*. Rather, it's a particular *property* of the past—its inevitability—that is supposed to get transferred. But there are at least a couple of ways of understanding this property. Suppose we ask, at *E*, whether the Andromedans can still call off the invasion. How do we answer that question, given the relativity of simultaneity? We have to give different answers for different inertial frames. We have (or should have) no more inclination to think that *L*'s inevitability for Alice transfers to Bob than to think that *L*'s evitability for Bob transfers to Alice: relative to one frame, the invasion can still be aborted; relative to the other, it can't. If the inevitability (in this sense) of *L* at *E* in one frame made it inevitable at *E* in any frame, then reference to frames can be dropped and we can simply say that, at *E*, the Andromedans can no longer refrain from invading. But there is no more reason to say this than there is to say the opposite.

In what sense then are we warranted in supposing that if, at *E*, *L* is inevitable for Alice, it is also inevitable for Bob? It is inevitable in the sense that there is nothing that Alice or Bob *or anyone* can do *at E* to prevent *L*. *L* and *E* are *spacelike* separated; no causal chain can reach *L* from *E*. The fact that *L* is still future with respect to some frames (like Bob's) does nothing to salvage *L*'s evitability in this sense. Because *L*'s inevitability at *E*

has nothing to do with how various planes of simultaneity intersect with Andromeda's worldline, Bob does not inherit L's inevitability by transfer from Alice; Bob has it originally, in the same way that Alice has it, in virtue of L's spacelike separation from E.

Having clarified the sense in which L is inevitable at E for any frame, it should now be equally clear that the argument for chronogeometrical fatalism must break down at this point. An agent's freedom with respect to an action A depends on how matters stand for the agent as she approaches A along her worldline. What then does the inevitability of events that are spacelike separated from Alice have to do with the status of events, like her own future actions, that lie within her future lightcone? To connect these threads, the argument for chronogeometrical fatalism assumes the *transitivity* of inevitability (or some other freedom-undermining relation). Here's one way this might work: (1) L is inevitable relative to E, when Alice and Bob cross paths. But (2) Alice's decision, on the day after E, to have a pastrami sandwich on rye for lunch, is inevitable relative to L. Therefore Alice's decision to have a pastrami sandwich was already inevitable when she crossed paths with Bob the previous day. The problem is that inevitability, in the sense in which (1) and (2) are acceptable, is *not* transitive, any more than the relation on which this inevitability supervenes, *x is spacelike separated from y*, is transitive. It simply does not follow from the fact that the spacelike separation of L from E makes it impossible for Alice at E to prevent L, along with the fact that the spacelike separation of L from the event of Alice's ordering a pastrami sandwich makes it impossible for some Andromedan witnessing L to prevent Alice from ordering that sandwich, that Alice can do nothing at E to prevent her having a pastrami sandwich the next day. This argument for chronogeometrical fatalism doesn't deliver the goods.

Are there any theses that might succeed where Theses 1-5 fail? Consider

Thesis 6. The future—all of it—is causally determined by the past and present.

If this is correct, then it does rule out the most robust cases of free agency: so-called "libertarian" free acts, which are incompatible with universal causal determinism. Compatibilist accounts of free agency might still be viable; but it is unnecessary to review and assess their prospects, since the notion of Minkowski four-space does not by itself entail universal causal determinism. Of course universal causal determinism does derive much of its appeal from its supposedly being one of the deliverances of modern science. But if a freedom-threatening determinism does indeed find support in modern science, it's not in virtue of Minkowski spacetime.

We have seen that chronogeometrical fatalism draws on many of the same resources as logical and theological fatalism, but that it has a few tricks of its own up its sleeve. I believe that these are just tricks, and I have tried to unmask them. Insofar as I have been successful in this task, Minkowski spacetime provides no good reason to abandon the traditional understanding of ourselves as free and morally responsible agents.¹³

¹ Putnam, "Time and Physical Geometry," *Journal of Philosophy* 64 (1967), pp. 240-47. Another seminal article in general sympathy with Putnam's is Cornellijs Rietdijk's "A Rigorous Proof of Determinism Derived from the Special Theory of Relativity," *Philosophy of Science* 33 (1966), pp. 341-4; see also his "Special Relativity and Determinism," *Philosophy of Science* 43 (1976), pp. 598-609.

² This is all familiar ground to anyone with even a passing acquaintance with the literature on fatalism. It is nevertheless worth recalling what the basic issue is and pointing out that the same issue will bedevil at least one way of drawing on Minkowski spacetime to argue for fatalism.

³ Putnam, p. 247.

⁴ In fact, Putnam's argument does appear to presuppose some extra bite to "real"; so Thesis 2, at least construed minimally, as I have done, does not yet take the full measure of Putnam's position. Putnam appears to employ a "reality" version of the "inevitability argument" discussed later under Thesis 5. I believe that it fails for reasons analogous to the reasons I will offer for judging the inevitability argument a failure.

⁵ The foregoing adapts the example, the argument, and a considerable amount of prose from my contribution to *Divine Foreknowledge: Four Views* (Downers Grove, Ill: InterVarsity Press, 2001), eds. J. Beilby & P. Eddy; see pp. 91-96.

⁶ Taylor, from the chapter "Fatalism," in *Metaphysics* (Englewood Cliffs, N.J.: Prentice-Hall, 1963).

⁷ But see Thesis 5, where one way of arguing for the thesis has this form.

⁸ See Harry G. Frankfurt, "Alternate Possibilities and Moral Responsibility," *Journal of Philosophy* 66 (December 4, 1969), pp. 829-39. Indeed, one might argue that the unavailability of alternatives to an action A, where A is an event in Minkowskian spacetime, provides an even more effective Frankfurt-type counterexample to PAP than the unavailability of alternatives when A is guaranteed by a "counterfactual intervener" like Black. Black's presence leaves Jones's freedom intact, Frankfurt explained, because Black "played no role at all in leading him to act as he did;" Black is "irrelevant to the problem of accounting for [Jones's] action," and "does not help in any way to understand either what made him act as he did or what, in other circumstances, he might have done" (pp. 836-7). But if this is true of Black, it is even more true of the block universe. Given that spacetime includes A, the question whether A or not-A will occur is (we are supposing for the sake of argument) *closed*; but this does nothing to explain why it is A, rather than not-A, that is included.

For an application of the Frankfurtian critique of PAP to the problem of theological fatalism, see my "Freedom, Foreknowledge, and Frankfurt," in *Moral Responsibility and Alternative Possibilities: Essays on the Importance of Alternative Possibilities*, eds. David Widerker and Michael McKenna (Burlington, VT: Ashgate Publishing Co., 2003), pp. 159-183.

⁹ *Nicomachean Ethics* VI.2.1139b10-11.

¹⁰ *Summa Theologiae* I.25.4.

¹¹ Penrose, *The Emperor's New Mind: Concerning Computers, Minds, and Laws of Physics* (New York and Oxford: Oxford University Press, 1989).

¹² Torretti, *Relativity and Geometry* (Oxford, New York, Toronto, Sydney, Paris, Frankfurt: Pergamon Press, 1983); Savitt, "Being and Becoming in Modern Physics", in the on-line *Stanford Encyclopedia of Philosophy* (<http://plato.stanford.edu/entries/spacetime-bebecome/>, article copyrighted 2001).

¹³ The first version of this paper, with the title "Free Agency in a Block Universe," was presented at the Conference on the Ontology of Minkowski Space-Time, Concordia University, Montreal, Canada, 2004.