

## Article

# Time Travelers (and Everyone Else) Cannot Do Otherwise

G. C. Goddu

Department of Philosophy, University of Richmond, Richmond, VA 23173, USA; ggoddu@richmond.edu

**Abstract:** Many defenders of the possibility of time travel into the past also hold that such time travel places no restrictions on what said time travelers can do. Some hold that it places at least a few restrictions on what time travelers can do. In attempting to resolve this dispute, I reached a contrary conclusion. Time travelers to the past cannot do other than what they in fact do. Using a very weak notion of can, I shall argue that the correspondingly strong cannot do otherwise applies in the case of backwards time travel. I defend this result from objections.

**Keywords:** time travel; fatalism; can; could have; open options

## 1. Introduction

Suppose you have a functioning unrestricted time machine—you set the time and the location, push the button, and voilà, there you are. Suppose also that the universe is what Nikk Effingham calls Ludovician [1]. Hence, the events of the past (or any time) cannot be changed. Time is not bifurcated in any way. Your unrestricted time machine takes you to the one and only 1889, not some hyper-temporal extension of 1889 or the way 1889 is now [2–5], or 1889 in some other universe [6,7], or an 1889 than is somehow not earlier than 2024 [8,9]. Given these assumptions, what can you do with your unrestricted time machine? Can you visit the building of the pyramids or buy Apple stock in 1985 for \$1.61 a share? Can you prevent the assassination of Abraham Lincoln in 1865 or kill baby Adolf in Austria in 1889? Can you travel back in time and kill your maternal grandfather before your mother is conceived, or kill yourself as a small baby?

Most defenders of the possibility of time travel to the past claim that, even with the assumptions of (a) access to an unrestricted time machine and (b) no bifurcation in time, time travel places no (or few) restrictions on what time travelers can do, though in many cases we know in advance what they will not do or what they will fail to do should they try. See, for example [10–12]. I used to think so as well, but in trying to resolve whether we should accept no restrictions or few restrictions, I reached a contrary conclusion: time travelers to the past cannot do other than what they in fact do, and so cannot do many of the ordinary things we thought they could do, let alone the more challenging things, such as retro-suicide, we were not sure they could do. My goal is to defend this contrary conclusion.

In Section 2, I shall lay out a way for determining what we can do or could have done. In Section 3, I shall provide the background for the problem of what time travelers can do, and where the issue stands in the philosophical literature. In Section 4, I shall apply the model of Section 2 to the case of time travel, and argue that if the model does capture a plausible way to answer questions about what we can do, then time travelers into the past cannot do other than they in fact do. In Section 5, I shall offer a diagnosis for why there is the strong intuition that time travelers can do more than they in fact can. In Section 6, I shall consider objections and offer replies. I shall conclude that time travelers (and everyone else) have no genuine alternatives between the time of the traveler's arrival in the past and the traveler's departure in the future, and so, in a quite ordinary sense, cannot do other than what they in fact do.



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## 2. A Very Weak Sense of Can

I suspect that any of you can stop reading this article before reaching the end. Here is one way to model this fact about what you can do. Suppose God has frozen the universe at this particular moment. God now surveys all the ways the universe, as it is up to this point, could unfold from this point. If, in one of the ways God surveys, you do stop reading before reaching the end, then you can stop reading before reaching the end. Here is something you cannot do—you cannot now avoid having read some of the article (even if perhaps you are wishing you had.) In all the ways the universe can unfold from this point on, in none of them do you avoid having read some of the article—it's just too late for that.

Call the ways the universe could carry on from a point, regardless of whether there is a God to survey them or not, unfoldings. We could then define what one can do in terms of unfoldings, as follows:

**Can:** Given the way the universe,  $U$ , is up to  $t$ ,  $A$  can do  $x$  iff there is an unfolding of  $U$  from  $t$  in which  $A$  does  $x$ .

You now can stop reading this article before reaching the end and never finish, as long as there is an unfolding of the universe from now in which you in fact do stop reading before reaching the end and never finish.

Note that this is a very weak sense of what you can do. Even though I now know not a lick of Chinese, I, according to the definition, can speak Chinese. Why? Because it is quite plausible that there is an unfolding from now in which at some point in the future, I learn Chinese and actually speak it. Can I speak Chinese fluently in the next five minutes? No. There is no unfolding, given that the universe operates the way we think it operates, of the universe from now in which I speak Chinese fluently in the next five minutes. Perhaps we could call this very weak sense of what I can do, as what is *open* to me. Speaking Chinese is open to me; speaking Chinese fluently in the next five minutes is not. Never finishing this article is open to you; never reading any of it is not.

But even if you cannot now avoid having read some of the article, you could have avoided it. We can also capture this fact in terms of unfoldings.

**Could Have:** Given the way the universe,  $U$ , is at time  $t$ ,  $A$  could have done  $x$  iff there exists an unfolding of  $U$  from some  $t'$  prior to  $t$ , in which  $A$  does  $x$ .

So even if there is no unfolding from right now, in which you fail to read some of the article, there are, presumably, several unfoldings from times earlier than now in which you do not read any of the article. On the one hand, you could have avoided reading this article, because at some point in the past you could have chosen to do otherwise than you in fact did. So, if God froze the universe just before that decision point and surveyed the ways the universe could unfold, there would be an unfolding in which, because of your choice, you do not read the article at all.

But there is also another sort of way you could have avoided reading some of the article. You could still be sitting in that chair right now (or however you are in fact oriented) and avoid the article in its entirety because there is a way that the universe could have unfolded, most likely from a point even further back in the past than in the previous case, in which the article was scheduled for publication a month from now rather than already being available. In the first case, you could have done otherwise than you are doing right now in virtue of how you interacted with the way things were in the past. In the second case, you could have done otherwise than you are doing right now in virtue of roughly how you are right now and the fact that circumstances right now could have been different. Either way, while you cannot now avoid the article in its entirety, you could have. In terms of openness, while not reading any of the article is not open to you right now, it was open to you, for various reasons, in the past.

I have left the consistency constraints on unfoldings unarticulated. If unfoldings are merely logically possible ways the universe could continue from a given point, then there would be significantly more unfoldings than if we restricted unfoldings to physically possible ways the universe could continue. Different consistency constraints entail different

sets of unfoldings, which then entail different notions of can. I shall for the most part avoid the problem of trying to specify consistency conditions on possible unfoldings that might provide insight into such things as the can of ability or the can of moral responsibility (though as we shall see in the objections and replies, I cannot completely avoid such issues). The fact that we have no clear analysis of the can of ability combined with the fact that the can of ability is intertwined within the time travel literature makes this separation challenging.

For the purposes of this paper, however, I shall take an extremely lenient consistency condition—namely, logical consistency. What is open to me must be at least logically possible. Hence, I can, right now, snap my fingers and appear on Io a second later. Such an unfolding is logically open to me, there is no contradiction contained within it, and so there is a logically consistent way the universe, as it is now, unfolds in which I do snap my fingers and appear on Io a second later.

Secondly, I will just assume that, in our everyday universe, there are multiple possible unfoldings—not just logical ones, but physical ones as well. There are multiple physically possible unfoldings of the universe from now. What I will not specify is why there are such multiple possibilities. Perhaps indeterminism is true, or there is genuine agent causation, or some combination of the two, or whatever.

To summarize: As long as there is a way the universe unfolds from now in which you accomplish some task, then accomplishing that task is open to you and you can accomplish that task. If there is a way the universe unfolded from some time prior to now in which you accomplish the task, then accomplishing the task was once open to you and you could have accomplished the task even if you no longer can accomplish the task. So, what happens if we apply this model to time travelers? I shall answer that question in Section 4, but first I lay out the standard views on what time travelers can do.

### 3. What Time Travelers Can Do?

If you can pinch someone now, then travelling to, say, France should not make it so that you cannot pinch someone now in France. Similarly, if someone in France with the same abilities as you can pinch someone else, then the mere fact that you travelled to France should not prohibit you from pinching someone else. You generally take what you can do with you when you travel. As a result, while travel certainly removes some opportunities and gives you others—when you travel to France, you lose the opportunity to quickly see your house, but gain the opportunity to see the Eiffel tower in person—we generally do not think that such travel radically affects what you can and cannot do. Travelling in time should be no different. If you can pinch someone now, then travelling to Austria in 1889 should not make it so you cannot pinch someone once you get there. Similarly, if someone in Austria in 1889, with the same abilities as you, can pinch someone, then the mere fact that you arrived in 1889 from 2024 should not prohibit you from pinching someone.

Time travelers are just like us. They have the same physical structure, desires, and hopes, etc. They have arrived in circumstances in which non-time-travelers with those same structures, desires, hopes, etc., can do certain things. Time travelers can surely do what they can do. Frau Hitler could have smothered baby Adolf. Surely you at least could have done what she could have done. Time travel should not radically change what we can or cannot do.

But many defenders of the possibility of time travel worry that detractors will argue as follows: [10] (p. 431), [13] (p. 149), [14] (p. 116), [15] (p. 329). Since we are assuming time is one dimensional, there is one and only one 1889. One-dimensional models of time prohibit changing the past. Smothering baby Adolf would be a change of the past, so you cannot smother baby Adolf. But by the reasoning given in the previous paragraphs, you can smother baby Adolf (if you have access to an unrestricted time machine). So, if time travel into the past were possible, you both can and cannot smother baby Adolf. But that is a contradiction, so time travel is not possible.<sup>1</sup>

I, and many other defenders of the coherence of time travel, reject this argument, though *how* to reject it has become a matter of some debate. A popular response is what I shall call the *Fatalist Mistake Response*, which goes as follows: from the fact that the time traveler *fails* to kill baby Adolf, we cannot conclude that the time traveler *cannot* kill baby Adolf. For example, Paul Horwich [17] (p. 435) writes: “From the assumption that Charles was not at the Battle [of Hastings], it does not follow that he could not have been there”. The implication is that something has gone wrong with the ‘cannot’ side of the argument—that the detractor is, just like the fatalist, concluding ‘cannot’ from ‘will not’. But is the detractor really arguing from the fact that Charles was not at the battle to he could not have been? Is not the detractor arguing that his being there would entail his both being there and not being there, which is impossible?

David Lewis [13] gives a more detailed response, which I shall call the *Equivocation Response*.<sup>2</sup> The following is Peter Vranas’ [18] (pp. 520–521) summary:

The solution understands ability as compossibility with the relevant facts and explains the paradox away as due to an equivocation about which facts are relevant. . . my killing my younger self is compossible with his proximity but not with his survival, so in one sense I can kill him but in another I cannot. It is reasonable to use ‘can’ in either sense, but one must choose; what one must not do is waver, say in the same breath both that I can and that I cannot.

Strictly speaking, all the Equivocation Response shows is that we are not contradicting ourselves when we say that you can smother baby Adolf (you have the general ability to smother small children and you are, via time travel, proximate to him) and you cannot (baby Adolf grows up to be a tyrannical dictator in your past). It does not tell us what the relevant answer is when I ask of you right now, before you push the button on the time machine, “Can you, in the relevant sense, go back in time and kill baby Adolf?” Most have interpreted Lewis as saying you can, but you will fail in any attempt to kill baby Adolf that you in fact make; time travel does not limit what we can ordinarily do.<sup>3</sup>

Kadri Vihvelin [15] (p. 317), however, argues that, for some actions, in particular retro-suicide, the correct response is ‘cannot’. She writes:

I agree that there are many ways in which time travelers are like the rest of us; there are things which they do not do which they nevertheless can do. But I now think that no time traveler can kill the baby who in fact is her younger self, given what we ordinarily mean by ‘can’.

Why not? Because, given what we ordinarily mean by ‘can’, Vihvelin claims it must be true that, had you tried to kill your younger self, you might have succeeded. But there is no possibility (remotely like ours) in which any time traveler succeeds in killing his or her younger self, so it is false that if you try then you might succeed, and so it is false that you can kill your younger self. Time travel, Vihvelin argues, does limit what people can do; there are some things that we thought time travelers could do that they in fact cannot. (But nothing is such that it both can and cannot be done, so there is still no argument against the possibility of time travel). Call Vihvelin’s response the *Partition Response*: while there are many ordinary things that time travelers can do, like pinch their baby selves, there are also some things time travelers cannot do that others can, such as kill their baby selves.

Vihvelin’s response has in turn been criticized as having not established that a time traveler cannot kill their younger self. Sider [14], for example, accuses her of pre-loading the desired outcome into the antecedents of the relevant counterfactuals; Vranas [20] argues that there are close enough possible worlds in which Suzy kills the baby who in fact grows up to be Suzy; and Kiourti [19] claims that Vihvelin’s argument fails to show that there are any nomologically informative constraints on action. These objections are not my immediate concern. Rather, Vihvelin herself considers (and rejects) an objection that will be my focus. She writes: “But if your argument works, doesn’t it show that time travelers are able to do—can do—only what they in fact do?” [15] (p. 329).

She rejects this claim. She replies:

No... they have plenty of abilities which they do not exercise, but could have exercised. Suzy could have pinched her baby self. She could have gone next door and killed some other baby. There are worlds with our laws at which Suzy tries and succeeds in pinching her baby self or in killing that other baby. So we have no reason to doubt the truth of the relevant counterfactuals: If Suzy had tried to pinch her baby self (kill that other baby), she would have succeeded. [15] (p. 329).

So, the choices in the literature seem to be some response that argues that time travel places no limit on what time travelers can ordinarily do, or that time travel places some restrictions (perhaps just minor) on what time travelers can do. I, however, am going to argue that the correct response is 'cannot' for *all* the things we think time travelers ought to ordinarily be able to do.

#### 4. What Time Travelers (and the Rest of Us) Cannot Do

Your unrestricted time machine is in front of you. You are about to push the button to send you back to Austria in 1889. Can you smother baby Adolf Hitler? Is there a way the universe unfolds from now in which you smother baby Adolf? Well, no, but that is because the ways the universe unfolds from 2024 have to do with what could happen from 2024 forward, and have nothing to do with what can now happen in 1889. At this point, 1889 has already happened the way it happened, and if it includes your arrival in 1889, it also includes your failure to smother baby Adolf. Asking about the ways the universe could unfold from this point on seems to miss the point, and so trivially give us a 'no' answer.

Instead of focusing on how the universe unfolds from 2024, suppose God looks at the ways your personal future unfolds from this point in 2024. If you do not travel in time, then the ways your personal future unfolds are just a subset of the ways the universe unfolds from this point in 2024. But if you travel back in time, your personal future will include arriving in the past. Once you are in the past, your personal future will include what you subsequently do in the past. What you can do in the past, say in 1889, will be a subset of the ways the universe could unfold from some point after your arrival in the past.<sup>4</sup>

So, suppose you push the button to send yourself back to 1889. Suppose your pushing the button takes you back to Austria in 1889. Suppose, once there, you find young Adolf's house and enter his nursery undetected. You are standing in front of sleeping baby Adolf. Is smothering baby Hitler *open* to you? Can you smother baby Adolf? Most defenders of time travel say 'yes, you can—you just will not'. I say 'no, you cannot'. There is no way the universe (and so your personal future) unfolds from that point in which you succeed in killing baby Hitler.

Why not? Because time travelers take their personal past-oriented properties back with them when they travel back in time. For example, just because you travel back to 1889 does not mean you lose the scar you got when you were five or the ability to speak the German you learned in high school. That your parents got married when they did, or your grandparents, etc., does not stop being true of you. But if you are in the past with those past-oriented properties and you are doing things, then you cannot do other than what all those past-oriented properties say happened in your personal past.

Suppose it is true that you were born into a universe in which Hitler survived past the age of three years. Then, it is still true of you, the time traveler in 1889, that you were born into a universe in which Hitler survived past the age of three years. If it were open for you to smother baby Adolf in 1889 at the age of three months, then there would be a way the universe unfolds from the point of you standing in front of his crib such that you, the killer who was born into a universe in which Hitler survived past the age of three, successfully smother and kill baby Adolf. But then the universe would be such that you were born into a universe in which Hitler survived past that age of three years and was killed at the age of three months. But that entails a contradiction<sup>5</sup>, and, at the very least, all unfoldings must be logically consistent. Hence, there is no way the universe consistently unfolds with you, having the properties you have, smothering baby Hitler. Hence, it is not open to you to smother baby Hitler. Hence, you cannot smother baby Hitler.



When we ask what you can do at a particular moment, we hold your personal past fixed. With no time travel, this is the same as holding the past of the universe fixed and looking at the ways the universe unfolds from that time. But with backward time travel, once you arrive in the past, your personal past is now the universe's future, so we might reasonably ask what we should hold fixed. As Lewis noted, "We must decide, if we can, whether to treat these personally past and externally future facts as if they were straightforwardly past or as if they were straightforwardly future." [13] (p. 151). Lewis himself does not make the decision, though his subsequent paragraphs on the fatalist trick of disguising irrelevant future facts as relevant past facts have led many to interpret Lewis as implying that the externally future facts, even if they are in the time traveler's personal past, are straightforwardly future (and so not relevant to determining how the universe could unfold).<sup>6</sup>

But how could your personal past facts not be relevant? How else are we to explain your ability to ask for directions to the Hitler's house in your halting German, except that you learned German when you were in high school? As Kiourti writes in her criticism of Sider's challenge to Vihvelin: "As long as backward causation holds, external future facts which belong to my personal past are relevant in the counterfactual evaluation of my abilities" [19] (p. 349).

We do not get to pick and choose which personal past-oriented properties are relevant (no more than you get to pick and choose which of the ones you have right now are relevant to what you can and cannot do right now). I see no good way to distinguish the fact that Baby Suzy is the earlier stage of Suzy from the fact that Suzy's personal past never includes being pinched as a baby, or the fact that your past does not include baby Adolf being smothered by anyone.

More generally, you have the past-oriented property of being part of a universe that has a Z-like past up to time  $t$ , where Z is a complete description of the universe up to  $t$ . When you travel to the past, you take this property with you. Hence, any way the universe unfolds from your arrival in the past needs to be consistent with your having the property of being part of a universe that has a Z-like past up to time  $t$ . But there is exactly one way the universe unfolds that is consistent with a Z-like past, namely whatever Z describes. Hence, you can only do what Z describes, for otherwise there would be a way the universe unfolds that contains you being part of a Z-like universe that is not Z-like, which is not logically possible.<sup>7</sup>

The time traveler is not special in this regard. Everyone is such that during the time travel zone, the period from the point of the time traveler's arrival in the past to the point of departure in the future, there are no genuine alternative unfoldings. Suppose you are hiding behind the armoire in baby Adolf's room because Frau Hitler is in the room. Can Frau Hitler smother baby Adolf? Is there any way the universe unfolds from this point in which Frau Hitler smothers baby Adolf? No. You grew up in a universe in which Hitler survives past the age of three months old. Travelling back in time did not make you lose that property. If the universe were to unfold with Frau Hitler smothering baby Adolf, then you would have the property of being born in a universe in which Hitler survives past the age of three in a universe in which Hitler does not survive past the age of three—but that is impossible.<sup>8</sup> Hence, Frau Hitler cannot smother baby Hitler—at least once you, with whatever past-oriented properties you in fact have, have arrived in the past. Those past-oriented properties will concern, at least, everyone's actions from your arrival in the past until your pushing of the button in the future. Hence, there is no way the universe unfolds from the point of your arrival without generating contradictory properties in the time traveler, except the Z-like way the universe does unfold.

Time travelers really are like the rest of us—not only can they only do what they will do in a time travel zone, everyone else can only do what they will do within that zone as well. Backward time travel does not just apparently put restrictions on what time travelers can do, it puts restrictions on what *everyone* can do. Given this radical conclusion, I anticipate screams of mysterious forces or fatalism or the impossibility of time travel after

all, etc. I shall respond to these worries in Section 6, but first a detour into looking at the issue of what time travelers (and the rest of us) can do from a different angle to diagnose why it is so easy to think that time travelers can do so much more than they actually can.

### 5. Killing Baby Adolf Again

Let us try this again. In July 1889, Adolf Hitler is three months old. How could the universe unfold from that point? Well, there are presumably many, many ways, but I will focus on just three:

No Time Traveler (NTT): No time traveler ever arrives or departs, and history proceeds exactly like ours up to 2024.

Time Traveler Failure (TTF): A time traveler from 2024 arrives in Hitler's nursery in 1889. The time traveler attempts to kill baby Hitler, but manages to stumble over a chair in the room, knock his head and fall unconscious. Ten minutes later, the automatic recall takes the time traveler back to his home time. This way (presuming that our history has just this singular time traveler) could also have a history of events almost exactly like ours up to 2024.

Time Traveler Success (TTS): A time traveler from 2024 arrives and successfully suffocates baby Hitler in a manner consistent with 'crib death'.<sup>9</sup> Presuming our understanding of history is at all accurate, this way the universe unfolds would not have a history of events like ours.

All of these, let us suppose, are ways the universe could unfold from July 1889.

But wait—if all of these are ways the universe could unfold from 1889, is it not true that one of us might be that time traveler in TTS who succeeds in killing baby Adolf? And if one of us might be the time traveler who succeeds, is it not true of that individual that he or she can smother baby Adolf?

Suppose, for the moment, that our understanding of Adolf Hitler's life is accurate. For all of us, our Z-like past does not include the smothering of Hitler. Hence, there is no way the universe unfolds from now that includes any of us travelling back in time and smothering baby Hitler. None of us are such that any of our future options include the smothering of baby Adolf (even if we get access to a time machine.). Hence, smothering baby Hitler is not open to any of us. Hence, none of us can smother baby Hitler.

What may be true is that one of us could have smothered baby Adolf, i.e., that one of us *could have been* the time traveler who succeeds. If our history had been different, i.e., like the one in TTS, then one of us might have been the successful smotherer.<sup>10</sup> But that one of us *could have* smothered baby Adolf in no way vindicates that any of us *can* now smother baby Adolf.

But suppose our understanding of Hitler's life is not accurate. Suppose we are all seriously deluded about historical events—might one of us be the time traveler who smothers baby Adolf then? Yes, in which case it will be true of that time traveler that he or she can smother baby Adolf.<sup>11</sup> But this possibility does not change my argument. Of course, what we can do depends upon what our history was in fact like. If we are mistaken about our history, then we may be mistaken about what we can and cannot do. Regardless of whether we have accurate knowledge of the events within a time travel zone or not, within that zone, there are no genuine alternatives to what people in fact do. Since there are no genuine alternatives, agents in the time travel zone can only do what they in fact do. If we are mistaken about our history of Hitler and one of us will get access to a time machine, and, as a result of the mistaken belief in the way history occurred, use the machine to travel back in time and smother baby Hitler, then we are in a time travel zone and cannot do other than what we will do in that zone. Whichever one of you is the time traveler who smothers baby Adolf cannot fail.

I grant this consequence is unsettling. But it seems to be a consequence of three straightforward principles:

1. P can do x only if there is a consistent way P's future unfolds in which P does x.

2. P's personal past is held constant in determining what P can do at t.
3. The ways the universe unfold from any t must be logically consistent with the universe prior to t.

Given the case of backward time travel for P, P's personal past is the external future. Hence, P's personal past being held constant will require holding P's (and everyone else's) future up to P's departure constant. Hence, there are no genuine alternatives between the point of P's arrival in the past and P's departure from the future. No one can do other than what they in fact do in a time travel zone.

Why then the apparently wide held intuition that, in the case of time travel, we can kill baby Hitler or that Frau Hitler could have smothered baby Adolf or that, as Vihvelin says, Suzy could have pinched Baby Suzy even if she could not have killed her? Because, say I, there are multiple ways to easily get sidetracked into thinking about the wrong unfoldings when asking what we can do.

Way 1: We are conflating the can of general ability with the can of what someone can do at a particular moment.

On the one hand, we have the general ability to pinch or smother babies, and mere travel from one temporal location to another should not remove those general abilities. And since baby Adolf is a baby and I have the general ability to pinch or smother babies, and that ability to pinch or smother babies does not go away because of time travel, I can (general ability-wise) pinch or smother baby Hitler. Granted.

But even if Way 1 is part of the explanation for why we have the strong intuition that time travelers can smother baby Adolf even if they will not, it cannot be the full explanation. Defenders of 'can' (even if partial) acknowledge that the relevant sense of can concerns more than mere general ability [15] (p. 318), [18] (p. 529 n. 3). After all, I can have the general ability to make basketball free-throws and yet still be unable to make any because a clear plexiglass shield has been put across the top of the basket. Time travel may not remove any of my general abilities. Yet the question remains whether it limits what I can do in more particular circumstances. I say it does. Most defenders of time travel say it does not.

Way 2: We are conflating our could-haves with our cans.

As I have already admitted, there exist unfoldings that describe the time travelers and agents just like the time travelers actually doing the sorts of things the defenders of can say can be done. The problem is that these unfoldings are descriptions of what we could have done had the universe been different, and not unfoldings from the time relevant to the question: What can we do now in these circumstances, i.e., what options are open to us right now?

Take, for example, the unfolding in which there is no time travel. Frau Hitler is standing in front of Adolf's crib. Can she smother baby Adolf? Yes. There are ways the universe unfolds from that point in which Frau Hitler does smother baby Adolf. Now consider the way the universe unfolds in which the time traveler stumbles and disappears. After that occurrence, Frau Hitler enters the nursery and stands in front of Adolf's crib. Can she smother baby Adolf? No. There are, given the personal past of the time traveler who appeared in the nursery just moments before, no consistent unfoldings of the universe other than what the time traveler's personal past says happened. But given that there is an unfolding of the universe in which Frau Hitler is in extremely similar circumstances and has available options, it is natural to think that the Frau Hitler in the time travel case has the exact same options. But she does not; the options in the non-time travel case are options for what Frau Hitler in the time travel case *could have* done—in particular, what she could have done had there been no time travel.

The same is true of the time traveler. Suppose Suzy did not pinch herself as a baby. Is there a way in which the universe unfolds in which Suzy pinches her baby self? Yes, but it does not unfold from the point in time in which Suzy is standing in front of her baby self, contemplating pinching her baby self. It unfolds from, at best, the time right before Suzy



actually arrived in the past. Before Suzy arrived in the past, how could the universe unfold? It could unfold with a Suzy arriving from the future who proceeds to pinch her baby self. It could also unfold as it actually did, with a Suzy arriving from the future who does not pinch her baby self. Both Suzys, being in time travel zones, have no options other than what they in fact do, yet both Suzys could have done otherwise than they in fact do—they just needed to have different pasts than they in fact did.

Non-time-travel Frau Hitler can smother baby Adolf, but time-travel-zone Frau Hitler (in a universe in which baby Adolf was not smothered) cannot, even though she could have (either before the time traveler arrives, or if the time traveler's past had been different). Neither version of Suzy can do other than what she did, but both could have done otherwise. It is the taking of the 'can' option or options in one unfolding as 'can' options in another, when they are merely 'could have' options, that generates the ease with which we think backwards time travelers can do more than they actually can.

Way 3: Not all could-haves support the truth of prior can-but-won'ts.

Recall that even though you now cannot have failed to read any of this article, you could have failed to read any of this article for roughly two different sorts of reasons. You could have decided differently in the same circumstances, or you could have been faced with different circumstances. The former sort of could-haves can be arrived at by tracing back from now to the actual circumstances you were in earlier and seeing what was open to you at each of those times.

We can suppose that at some time earlier, you had three articles on your list that interested you, and that you could have chosen any of them. You chose this one, but could have chosen either of the other two. At that very time, God knows what you will choose, but also knows it is open for you to choose either of the other two articles. God knows you can refrain from choosing this one, but just will not. These prior decision could-haves support the truth of prior can-but-won'ts.

Now suppose this article never even got produced. At that earlier time, you still had three articles on your list to choose from, but this one was not one of them, since it did not exist. In any of the unfoldings resulting from whichever article you chose, it is true now that you could have refrained from reading any of this article. But is not true that you can refrain but will not, since you will in fact never read a non-existent article. Hence, at least in some different circumstances, could-haves do not support the desired can-but-won't.

The true could-haves in time travel cases require different circumstances. We cannot just trace back through the actual decision points the time traveler faced and see what their available options were at that point, since, in a given time travel zone, there are no alternative options. The could-haves all require options branching from prior to the arrival of the time traveler, i.e., different circumstances for the time traveler to arrive into (and leave from). Suzy could have pinched baby Suzy if her past had been different than it was. But given the past she has, it is never true of Suzy that at some point she can pinch baby Suzy but does not or will not.

Similarly, since all the unfoldings that might vindicate any of us being such that we could have smothered baby Hitler unfold from sometime during or before 1889, none of those unfoldings are, or even were, available to us, given the past we in fact have. Even if we gain access to a time machine, there are no unfoldings available to us in which we can or do smother baby Hitler. More generally, not all could-haves imply a previous can, so we cannot jump from the fact that you could have smothered baby Adolf to the claim that you can smother baby Adolf, or that once in the past it will be true that you can smother baby Adolf.

Summary: Given the ambiguity of 'can', and given the presence of could-have unfoldings that involve us doing what we think we can do, it is easy to think we can do something that is in fact unavailable to us; it is easy to conflate the can of someone just like us with our could-haves, or conflate the could-haves that support prior can-but-won'ts with the could-haves that do not. But if we keep focused on what we can do, in the sense of whether our doing x is a way our future could unfold, and insist that unfoldings be

logically consistent, then backwards time travel zones are such that there is one, and only one, consistent unfolding. Hence, time travelers (and everyone else in the time travel zone) can only do what they in fact do.

## 6. Objections and Replies

*Fatalism Revisited:* Granted you are not inferring cannot from will not, and granted that the could-haves of time travel do not support time travelers having a relevant can-but-won't available to them. But what of Lewis' articulation of the fatalist mistake in terms of smuggling in illegitimate future facts to restrict the available options? For example, at time  $t$ , God's foreknowledge of the future at time  $t$  is not a legitimate fact about time  $t$ , and so cannot be used to restrict unfoldings. You presupposed this very illegitimacy in your discussion of Way 3 above. So why are facts about the future the time traveler arrived from legitimate facts, but facts about God's foreknowledge of the future not?

Reply: The simple reply is that, unlike God's foreknowledge, the future the time traveler arrived from is the time traveler's past, and when it comes to determining what individuals can do at a given point in time, we hold their past constant up to that time. Time travelers into the past take their pasts with them. Hence, when they arrive in the past, there is one and only one consistent way the universe unfolds from that point.

But perhaps one might argue that, just as we cannot include the currently held property of 'having an A-like future', we cannot hold constant the time traveler's property of 'having a Z-like past'. I am not convinced this is a legitimate worry, since when determining what we can do or what is open to us, we normally hold constant our pasts but not our futures. Regardless, here is another way to get the same result without appealing to a Z-like past.

Suppose the only legitimate properties are those that are intrinsic to the time at which they are had. Call these the I-at- $t$  properties. In determining what is open to me at a time, I cannot appeal to my having a Z-like past or my having an A-like future, since both of those properties are extrinsic to  $t$ . But we still need a way to account for the fact that my learning German in high school explains why I can speak at least some German now. The solution is to hold constant all the I-at- $t$ 's for any  $t$  prior to now. The only legitimate properties are ones that are intrinsic to a time, but we hold fixed only prior I-at- $t$ 's, and not future I-at- $t$ 's.

The time traveler arrives in 1889. What is open to them? Well, since we are concerned with what they can do, hold all their prior I-at- $t$ 's fixed. Their prior I-at- $t$ 's include everything prior from their departure in 2025, say. Hence, there remains one, and only one, consistent way for the universe to unfold in 1889 with the time traveler in it—the only way consistent with his or her prior I-at- $t$ 's.

If we refuse to hold even one's prior I-at- $t$ 's fixed, then we lose the ability to explain one's current abilities in terms of what one did in one's past. Yet, no defender of our past cans, at least who I am aware of, has ever suggested that our current options or abilities are untethered in this way from our pasts. And if our options and abilities are at least minimally tethered to our I-at- $t$  pasts, then once one travels back in time, there is one, and only one, consistent way for the zone between the time traveler's arrival in the past and their departure from the future to unfold. Time travelers (and everyone else) in a time travel zone cannot do otherwise.

*Mysterious Forces:* Some philosophers worry that, if we cannot smother baby Adolf, we need an explanation why we cannot, and if we can but fail, we need an explanation for why we fail. The worry is that the explanation will have to appeal to strange or mysterious forces. For example, Samuel Gorowitz writes: "we are faced with the problem of explaining why it is that I cannot fire the gun or, if I can, why it is that I can fire only in certain directions. Either the gun is not behaving as the normal physical object we take it to be, or the notion of voluntary action does not apply in the usual way" [16] (p. 367). Those who say we can smother baby Adolf argue that an explanation for the failure or repeated failure is easy to provide. Sider writes:

But these possible time travelers who do not kill their earlier selves: some have the desire as well as the means. What stops them?

No one thing. Some have a sudden change of heart. Some fear awful forces they think would be unleashed by a violation of the laws of logic. Some attempt the deed but fail for various reasons: non-lethal wounds, slips on banana peels, and the like [14] (p. 116).<sup>12</sup>

But if, as you say, time travelers cannot do other than what they in fact do, do you not have to appeal to mysterious forces to explain why they cannot?

Reply: I say the reply that works for explaining the repeated failures works even in the case of explaining why we cannot smother baby Adolf in my model. Why do you do what you do when you fail to smother baby Adolf? Because you trip and fall over the chair, or decide you cannot smother the defenseless babe no matter what he will become, or... Whatever explanation the defender of “can, but will not” gives for your actual actions can be given for your actions in the case of “cannot do otherwise”.

To see this, consider a very strange (though at least logically possible) way the world could unfold from 1889. In this unfolding, a molecule-for-molecule duplicate of you appears in Austria in 1889. This duplicate, however, is not you—it was created on the spot by God to be exactly like the you in a different unfolding, an unfolding in which you push the button on your time machine in 2025 and subsequently appear in 1889. This duplicate of you has the same intrinsic abilities as you do (though it lacks some of your extrinsic abilities). If we ask how the universe could unfold given this duplicate, the answer is just what we expect. The duplicate can smother baby Adolf. There is no contradiction in his smothering baby Adolf, since the duplicate in fact has no past-oriented properties that conflict with his smothering baby Adolf. Nor does their very limited I-at-*t*’s conflict with smothering baby Adolf. The duplicate does not have the property of being born into a universe in which Hitler has survived past the age of three months, even though the duplicate may think they have that property.

Even though the duplicate can smother baby Adolf, we can suppose the duplicate does not, and for the exact same reasons why you fail in the actual unfolding. Indeed, we can also suppose that the duplicate’s universe unfolds exactly as the time travel universe unfolds. He trips where you trip, he changes his mind where you change your mind, etc. Everything that happens in the duplicate’s unfolding happens for the exact same reason as it happens in your unfolding. Since no appeal to mysterious forces needs to be made to explain the happenings in the duplicate’s unfolding, no forces need to be appealed to in your unfolding. The only difference between the two unfoldings is that the duplicate’s unfolding has genuine alternatives throughout the period from 1889 to 2025, whereas yours does not. But the reasons why you do what you do or fail to do what you do are exactly the same as the reasons the duplicate does what he or she does or fails to do.

Perhaps the worry, however, is that I need to explain not the actions within each unfolding, but rather explain why the duplicate’s unfolding has genuine alternatives while yours does not, even though they are qualitatively indistinguishable. Do I need to explain that? I am not sure, but suppose I do. I certainly do not think I need to appeal to mysterious forces. The time travel unfolding lacks genuine alternatives because, given the time traveler’s arrival in 1889, there is one and only one consistent unfolding—there is one and only one way the universe can unfold from *t*, given that an object with a Z-like past is in the universe at time *t*. But the duplicate’s unfolding does not contain an object with a Z-like past in it at time *t*—it merely contains a molecule-for-molecule duplicate of an object with a Z-like past. But having a Z-like past is not a property that molecule-for-molecule duplicates necessarily share. Since the duplicate was created at time *t* by God, it is not an object with a Z-like past. Hence, there are multiple consistent unfoldings of the universe from time *t* in the duplicate’s unfolding. We can run the exact same argument substituting ‘prior I-at-*t*’s’ for ‘Z-like past’. Either way, no mysterious forces are required. I am merely mapping out the possibility structure of the universe, given the constraint that all unfoldings are logically consistent. That constraint, combined with the backwards time travel, implies that time travel zones have no genuine alternatives.<sup>13</sup>

*The Free Will Objection:* Backwards time travel seems very powerful. It robs time travelers (and everyone else caught within the period covered by the time travel) of their free will. As Grey puts it: “it leads to intolerable restrictions on the range of possibility, and the range of efficacious choice available to an agent” [21] (p. 70).

Reply: I am agnostic about whether backwards time travel has any implications for our free will. I do claim that there are no genuine alternatives for the universe (and so for any agents within the universe) in a time travel zone. Hence, within backwards time travel zones what one does do and what one can do are one and the same. But whether you do what you do freely or unfreely, I do not propose to try to answer. Whether the lack of genuine alternatives is sufficient to remove our free will is a highly controversial issue. On the one hand, someone could argue as follows: However your doppelgänger performs his actions in the God-manipulation world is how you perform your actions in this world, so if he does his actions freely, you do your actions freely.<sup>14</sup> But if, like Michael Rea [26], you insist that alternative possibilities are required for free action, then despite the fact that you perform the actions in the same way internally, since you are and your doppelgänger are externally related to your unfoldings in different ways—he has alternatives and you do not—you do not act freely, while he does.

I do not here propose to resolve this issue. Whether the time travelers (or anyone else in a time travel zone) do anything freely or not (or whether those who have genuine possibilities open to them do anything freely) is not my concern. I am merely interested in what time travelers can and cannot do. If I am right, then no one in a time travel zone can do otherwise than they in fact do, though had they not been in such a zone at that time they could have.

The fact that they cannot do otherwise is a consequence of a very minimal consistency constraint. Hence, I do not find it intolerable, but rather necessary. At the same time, I grant that it may be exceedingly unlucky for agents to be within backward time travel zones—they are quite likely to think they have more available options than they in fact do. I remain agnostic about whether what such agents do is done freely or not.

*The Unrestricted Time Machine Objection:* You started by assuming an unrestricted time machine, i.e., one that could travel to anytime/place you chose. But is such a machine possible in your model? Once the machine is built in a universe in which it shows up in 1889, then there is no way the universe unfolds in which you set it to show up in 1888 instead.

Reply: Suppose it is 2025 and it is true in the past that you arrive in 1889 in a machine set to arrive in 1889. Now we ask what can you do right now in setting the machine—can you set it to arrive in 1888? I say no you cannot—there is no way the universe unfolds from that point (i.e., with exactly the past it has) in which you set it to arrive in 1888. But there are also plenty of ways in which you could have set the machine to arrive in 1888. In one such way, the branching from the actual universe happens in 1888. In that branch, the machine arrives in 1888 because the you (if it is you) in that branch sets the machine for 1888. In another, the branching happens in 1889. In that branch, you arrive in 1889, even though you set the machine to 1888—it just malfunctioned in some way. In yet another branch from 1889, no time traveler arrives at all before 2025, so in 2024 there are plenty of ways the universe unfolds with you setting the machine to 1888 or 1889 or 1709 or whatever, but your time machine never functions. So, the time machine is unrestricted, in the sense that it could have been set for anytime/place in spacetime. But, given successful time travel by that machine into the past, what it can be set for will be limited to what it will be set for.

## 7. Conclusions

Even with access to an unrestricted time machine, no time traveler who shares our past can kill baby Hitler or do anything (within the time travel zone) other than what he or she does. But the restriction does not make time travelers different from anyone else in a time travel zone. No one in a time travel zone can do other than what he or she in fact does. This result does not commit us to a general fatalist view—nor is it arrived at by making the

fatalist mistake of deriving cannot from will not (or known will not). Instead, the result is derived from the claims that assessments of what we can do hold our personal pasts fixed, and unfoldings from a particular time must be logically consistent. Combine these two principles with backward causation, and the result is that time travel zones are bereft of alternative unfoldings. Hence, time travelers to the past cannot do otherwise.

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## Notes

- <sup>1</sup> Finding a detractor who actually makes this argument is more challenging. Samuel Gorowitz comes close. Talking about what a time traveler trying to kill his younger self can and cannot do, he writes: “the puzzles that arise provide a clue to the nature of the logical confusion underlying such notions as that of a closed causal chain” [16] (p. 367).
- <sup>2</sup> Vihvelin [15] (p. 315) calls the Fatalist Mistake Response the standard reply; Vranas [18] (p. 520) calls the Equivocation Response the ‘standard solution’.
- <sup>3</sup> I. Kiourti [19] (p. 343), for example, writes: “David Lewis (1976) famously argued that on our common understanding of ability, there is a sense in which time travelers are able to kill their earlier selves; it’s just that whenever they try, they happen to fail”. See also Sider [14] (p. 116). This interpretation is understandable, since Lewis seems to intertwine both the Fatalist Mistake Response and the Equivocation Response. Vranas argues that the Equivocation Response itself is based on a flawed hidden assumption [18], and suggests that the paradox can be resolved (in favor of ‘can’) in an alternative way [20]).
- <sup>4</sup> See Lewis [13] (p. 146) for the widely adopted distinction between external time and personal time to make sense of older time travelers arriving in the past before they were born. But see also Grey [21] for some doubts about the viability of the distinction.
- <sup>5</sup> Assuming, as is usually done, that there is no resurrection, no magic, no. . .
- <sup>6</sup> See, for example, Kiourti, [19] (p. 349) or Sider, [14] (p. 117). I am not convinced this is the correct interpretation. Given that the bits of fatalist trickery Lewis considers do not in fact address the question of whether your personal past facts are relevant or not, one could easily interpret Lewis as merely defending the view that the fatalist cannot get a version of ‘cannot’ to drop out that in fact contradicts the versions of can he has defended. So, while he further defends the Equivocation Response, he remains neutral on what the correct response is for what we ordinarily mean by ‘can’ (assuming that that is itself not equivocal.)
- <sup>7</sup> One might suggest that it is indeterminate whether I have the property of having a Z-like past. But then many, many straightforward propositions we take to be determinate are in fact not. For more on the issue of indeterminacy (and fatalism), at least within a growing-block universe, see [22].
- <sup>8</sup> Again, assuming no resurrections, miracles, etc. But, says the critic, you cannot assume these things, because your consistency condition on unfoldings is a logical possibility. Indeed, but the general point is that Frau Hitler cannot do otherwise than what Z describes, and if Z describes no resurrections, miracles, etc., then Frau Hitler cannot smother baby Hitler with the time traveler with a Z-like past hiding behind the armoire.
- <sup>9</sup> In Austria in 1889, 59% of sudden unexplained infant deaths occurred between the ages of 2–4 months [23].
- <sup>10</sup> Why do I say may be true? There is an issue of personal identity here. When we talk of alternative ways the universe could have unfolded from when you were ten, say, the ways overlap, and both contain you up to ten years old. Hence, when we look at the different ways the universe could unfold, they all concern you. (So, possible worlds talk about whether Humphrey can win the election not concerning Humphrey seem out of place in these sorts of situations). But if the unfoldings separate in 1889 long before you were born, then it is much less clear that the individual being talked about in the alternative unfolding is you (even if it is the best candidate available in that unfolding).
- <sup>11</sup> This may be the sort of case that Vihvelin points to as potentially vindicating that Suzy can kill baby Hitler [15] (p. 329).
- <sup>12</sup> See also [13] (p. 150); [24] (p. 29).



- <sup>13</sup> I am not suggesting that the backwards time travel *causes* the options to disappear, i.e., that before 2025 the options were there, but as soon as the time traveler pushes the button on the time machine the options disappear. Talking that way would require two temporal markers for each moment—but as soon as you have resorted to two temporal markers, you might as well drop the each-moment-happens-exactly-once model, in which case all the worries about what time travelers can and cannot do disappear anyway. Rather, I am saying that God, looking at the entire possibility structure of the universe, will always see the time travel zones bereft of alternatives—that is just how the possibility structure of the universe is.
- <sup>14</sup> For example, see [25]. Spencer accepts Vivhelin’s few restrictions argument, but argues that one is responsible for those actions regardless. I assume he would take a similar line, even if I am correct that all actions within a time travel zone have no genuine alternatives.

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