

# No Transworld Causation?\*

(Author Name Removed)

In his introduction to the philosophical study of possible worlds, Rod Girle points out that one of the standard things to say about possible worlds is that there is no transworld causation:

It has been argued that one of the key features of possible worlds is that they are utterly and completely distinct from each other from a causal ... point of view across all spatiotemporal dimensions. ... [David] Lewis writes that ... “there isn’t any trans-world causation ... if there is no trans-world causation, there is no trans-world travel. You can’t get into a ‘logical-space’ ship and visit another possible world.” (Girle, 2003, p. 2, quoting Lewis, 1986, p. 80)

Lewis also tells us that the lack of transworld causation essentially amounts to it not being the case that “anything that happens at one world cause[s] anything to happen at another” (Lewis, 1986, p. 2).

The fact that there’s no transworld causation is also commonly used as a premise in metaphysical arguments. For example, in considering different theories of transworld individuals, Weatherson says

The general worry here is determining which stages are part of a particular [transworld individual]. ... There are two ways in which this seems more problematic for [transworld individuals] than for [transtemporal individuals]. First, the various parts of a [transtemporal individual] are held together by a causal dependence of some parts on others. But since worlds are causally isolated, this cannot be the way that [transworld individuals] are held together. ... (Weatherson, 2000, p. 49)

These examples are just a small sample of the literature on possible worlds that rejects transworld causation.

---

\*This paper and I have benefited greatly from comments by my colleagues and professors, especially (Names Removed for Blind Consideration).

The claim that there is no transworld causation is often conflated with the slightly stronger claim that worlds are *causally isolated* or *causally independent*. The claim that there is no transworld causation is something like the claim that nothing that happens at one possible world causally affects what happens at another world. The stronger claim, that worlds are causally isolated or independent, is that no world is affected by or in another world's causal influence. Actualists, such as Lewis's ersatz (1986, ch. 3), Robert Stalnaker's moderate realist (1976), Peter van Inwagen's abstractionist (1986), or anyone who holds that "for each possible world, there actually exists some entity to which that world is identical" (Divers, 2002, p. 169), may deny that worlds are causally isolated since they exist at the actual world and are in the 'causal sphere' of the actual world. But, the Actualist will not deny that there is no transworld causation. In this essay, I will assume that it is generally accepted that there is no transworld causation.

Though less commonly accepted than the lack of transworld causation, many theorists also believe that some objects exist in at least two distinct worlds. This position is motivated by Kripke:

[On Lewis's view, if] we say "Humphrey might have won the election (if only he had done such-and-such)" we are not talking about something that might have happened to *Humphrey*, but to someone else, a "counterpart". Probably however, Humphrey could not care less whether someone *else*, no matter how much resembling him, would have been victorious in another possible world. (1980, p. 45, n. 13)

Kripke concludes that it must be *Humphrey*, the same guy as the actual Humphrey, that we're talking about when we say that Humphrey might have won. Hence, Humphrey must exist in the possible world in which he did win. To allow for the natural interpretation of *de re* modal statements, we must allow transworld identity of individuals, the argument holds.

A similar argument can be made for *de re* modal statements about events. It's true that the Cold War might have resulted in nuclear annihilation of the planet. In the traditional possible worlds framework, the most natural way to say in virtue of what this fact is true is to say that there is some possible world in which the Cold War causes the annihilation of the planet. The one and the same event, the Cold War, exists in both worlds. I will call this claim, that there's an event that exists in two distinct possible worlds, the *transworld identity of events*.

If we assume that events are the relata of causation and that some events exist in distinct worlds, understanding the claim that there's no transworld causation becomes more

difficult. In this paper, I will explore this issue. In the first section, I will show that the natural ways one might formulate the claim that there's no transworld causation do not make much sense after assuming that there are transworld events. Then, in the second section, I will explore how the claim can be fleshed out on two different views about the nature of transworld events. We'll see that one view must work out some complicated metaphysical notions before it can give a satisfactory account of the claim, while the other view can give a moderately satisfying answer, though it's not free from problems either.

There is a vast literature on the nature of events and causation. I will attempt to avoid most of that discussion here by making some simplifying assumptions and using neutral language. First, I will assume the standard view that the relata of causation are events (Schaffer, 2007, section 1). Second, I will assume that events are individuated such that we can naturally allow that they exist in different worlds and play different roles within them. This is incompatible with many views of the nature of events, such as Davidson's view that events are individuated by their token causes and effects, see Davidson (1969). If this view were right, then there would be no transworld events in the way required by the motivating argument since it would not be true that something that caused the annihilation the planet could be the Cold War. Here I will assume that there are many properly transworld events, as suggested by the argument above.

It should be clear by the end of this paper that my assumption that the relata of causation are events is nonessential to my main point. This discussion can be reformulated to bring out analogous issues for any view that holds that there is proper transworld identity of the relata of causation, whatever those may be, including facts, individuals, and states of affairs.

The particulars of possible worlds are also widely debated in the literature, and many of those disputes can be put aside for the purposes of this paper. As I suggested above, the genuine modal realist (e.g. Lewis and Kris McDaniel) and the actualist (e.g. Plantinga and van Inwagen) may disagree over whether worlds are causally isolated or rather there is merely no transworld causation, but I will set aside that issue here. I will also remain neutral on whether possible worlds are abstract or concrete, and except where I explicitly diverge, I will interchangeably say that something is *true in a world*, *true at a world* or *true according to a world*.

## 1 Some Natural Attempts

The question that is the focus of this paper is this: What does it mean to say that there is no transworld causation when there is transworld event identity? At first glance, it seems like

figuring out the meaning of the claim should be straight forward. That there's no transworld causation appears to be a fact about events (conceived here as potentially existing in many worlds), which events are in which worlds, and which events cause which. So, it's plausible to think that the claim can be analyzed in terms of these notions. In this section, we'll look at some natural attempts along these lines.

### 1.1 A First Shot

In saying what it means for there to be no transworld causation, Lewis says that nothing that “happens at one world cause[s] anything to happen at another” (1986, p. 2). Lewis's idea corresponds with the intuitive way of formalizing the claim that there's no transworld causation. That is, if there are two events in two distinct worlds, then neither event causes the other.

Using a formal language with quantifiers ranging over events and worlds and the binary relations  $\in$  such that  $x \in w$  iff event  $x$  is in world  $w$  and  $C$  such that  $Cxy$  iff event  $x$  causes event  $y$ , this claim becomes

$$\text{NTC1 } \forall w, w', x, y \{ (x \in w \wedge y \in w' \wedge w \neq w') \supset \neg Cxy \}$$

Notice that this expresses exactly the intuitive account of the meaning of the claim that there's no transworld causation, that if two events are in distinct worlds, then neither causes the other.

While this claim may suffice for saying what it means for there to be no transworld causation in an account of possible worlds in which events are world-bound, it will not suffice for accounts that admit transworld event identity. This formulation disallows apparently non-controversial instances of causation. Consider this example: We'd like to say that it's possible that the cyanide ingested by Rasputin could have killed him even though the drowning actually killed him. If we accept the transworld identity of events, then there must be some possible world according to which Rasputin is killed by ingesting the cyanide (and not by the drowning). There isn't any apparent transworld causation going on in this example, but NTC1 rules out its possibility: If we let DEATH be the event of Rasputin's death and let DROWNING be the event of his drowning, then DROWNING caused DEATH since Rasputin was actually killed by the drowning. But, DEATH is identical to an event in some merely possible world  $w'$ , and DROWNING is in this world  $@$ . So, there is an event in this world that caused an event in another world, that is  $\text{DROWNING} \in @ \wedge \text{DEATH} \in w' \wedge @ \neq w' \wedge C\text{DROWNING}\text{DEATH}$ , a counterexample to NTC1. NTC1 is too strong to properly express what it meant by the claim that there's

no transworld causation. It disallows that there is any instance of causation at a world whose effect exists in more than one world, thereby discounting the most plausible cases of transworld identity of events.

Notice that if we disallow the transworld identity of events (contrary to our assumptions) and instead use a counterpart relation to handle *de re* claims about world-bound events, this problem does not occur. According to this account, there is no event in another possible world that is *identical* to DEATH; rather, there is some counterpart of DEATH that stands in for DEATH in claims about it, and DEATH only exists in this world. Both events only really exist in this world (though counterparts of them exist elsewhere) and the causation only really occurs between them here, so NTC1 may properly express what is meant by the claim that there's no transworld causation on this account. The issues presented in the rest of this essay only apply to accounts of possible worlds and events that admit of some proper transworld event identity, and accounts that reject that can, in general, avoid these issues.

Similarly, one might be inclined to attempt to escape this problem by holding that events are *fragile*, that they necessarily occur in the manner that they do. So then DEATH in the two worlds must be distinct events. To me, it looks like this response must amount to one of two unacceptable claims: First, it might be a rejection of the claim that there is transworld identity of events, i.e. that the death of Rasputin caused by the cyanide in the merely possible world is not identical to his drowning here. This option is contrary to the assumptions of the discussion here, so I will disregard it. Secondly, it might be the claim that though these events are identical, they are somehow distinct. This claim doesn't make sense to me. We can make sense of two things being distinct yet *qualitatively* identical or *functionally* identical, for instance, but these types of 'identity' are not really identity. It is nonsensical to hold that there are two distinct and identical things; to say that one thing is distinct from another is to say that they are not the same thing, that is, that they are not identical. So, holding that events are fragile does not save this approach or any other in this essay.

## 1.2 A Second Shot

The problem with the previous approach is that it disallowed instances of causation even when the causation didn't reach over world boundaries. The counterexample to NTC1 did not have any event in one world causing an event in another in the way that the claim that there's no transworld causation intends to prevent. Rather, the claim only means to prevent

causation from reaching out of world boundaries. In this vein, another attempt to give the meaning of the claim might say that if event  $x$  causes event  $y$  then both the cause and the effect are in the same world:

$$\text{NTC2 } \forall x, y \{ Cxy \supset \exists w (x \in w \wedge y \in w) \}$$

This is equivalent to its prenex normal form version,  $(\forall x, y)(\exists w)\{Cxy \supset (x \in w \wedge y \in w)\}$ , and can be read as saying that if event  $x$  causes event  $y$  then there is a world that they're both in.

Whereas NTC1 was too strong in that it ruled out too much, NTC2 is too weak as it fails to rule out some clear cases of transworld causation. Consider this example of transworld causation: When Sue presses a button in this world at time  $t$ , it causes a dog Fido to go into heat in another world  $w'$  at  $t'$  and Fido to go into heat in this world at  $t''$ . This is a clear instance of transworld causation; the only effect of the event in this world of Sue pushing the button is Fido's going into heat in  $w'$ . But NTC2 does not rule out this case! In this scenario, there is only causation between the button pushing and Fido's going into heat. So, to satisfy NTC2, there just has to be a world that both events are in, and there is a world as such, the actual world.<sup>1</sup> Therefore, NTC2 does not express what is meant by the claim that there's no transworld causation, either.

### 1.3 The Problem with the Intuitive Attempts

The problem with the above attempts to flesh out the meaning of the claim that there's no transworld causation, NTC1 and NTC2, stems from foundation of the project of trying to give the meaning of the claim in terms of a language that treats causation as a two-place relation between events, conceived as transworld objects. Using the first-order language with the relations  $\in$  and  $C$ , one cannot give a fully satisfying account of the meaning of the claim.<sup>2</sup> In the notes, I show that the language thus defined is not sufficiently expressive to capture the difference between a standard, transworld-causation-free model of possible worlds and a model with obvious transworld causation.

So, the intuitively plausible project of fleshing out the meaning of the claim that there's no transworld causation just in terms of causation between transworld events and the world membership of events is doomed. This does not show that the meaning of the claim cannot be analyzed – only that if it can be explicated, it must be done in a more expressive language. Since the failure of the above attempts is due to the coarseness of the discrimination power of treating causation as a relationship between transworld events, maybe the claim can be explicated in terms of causation among *parts of events*, for instance, the parts

of an event in some particular world, or maybe, it would be best to talk of causation *at a world*, thereby treating causation as a three-place relation. In the next sections, I'll turn my attention to more complex attempts to flesh out this claim such as these.

## 2 More Involved Accounts

Above, I showed that the intuitively plausible attempts fail when they try to reify the claim that there's no transworld causation in terms of a language that could only talk of an event (a transworld thing) causing another. But, in describing the counterexamples to the proposals, I helped myself to talking about the yet unanalyzed notions of an event causing another event *at a world* or events causing *at a world*. Intuitively, these notions are similar to the notion of the properties of an individuals *at a world*, and when we view it like that, it's not surprising that the above attempts fail. In the case of transworld individuals, it is well-noted that in order to give an account of the nonessential properties of individuals, it cannot simply be that transworld individual Humphrey lost the election, for example. Really, it's that Humphrey lost the election *in the actual world*, since there is a world in which Humphrey won the election. Similarly, with events, it looks like we'll have to speak of events causing *at a world*. It's not true that the drowning caused Rasputin's death simpliciter, since there is a world in which the ingesting of the cyanide caused Rasputin's death and not the drowning. Rather, *in the actual world* the drowning caused Rasputin's death. Since this discussion assumes that not all events are world-bound (in particular, the events in the counterexamples are not world-bound) and the gist of the claim that there's no transworld causation is that nothing happens *at a world* that causally affects what happens *at another world*, it seems plausible that we could flesh out the claim about transworld causation in terms of the notions of *events at a world* or of *causation at a world*.

Like in the case of transworld individuals (and analogous to individuals over time), there are two non-equivalent ways to construe what it is for an event to exist at a world (according to a world) on an account of transworld event: for any properly transworld event, the event could be such that (1) the whole event exists in (according to) each world at which it is present, or (2) there is some world in which only a proper part of the event exists in (according to) that world.<sup>3</sup> The most plausible versions of the second type say that distinct parts of the same event exist in different worlds. One could hold that some parts of the event exist in this world-bound way and also that some parts of the event overlap worlds like in the first option. I will ignore this hybrid option as it appears to have the downfalls of both views and the upshots of neither (and I know of no one who holds it).

Following Lewis and Kris McDaniel, I will call the first view of transworld events, where events wholly exist in each world where they are present, the *Overlap View*.<sup>4</sup> Examples of this view can be found in McDaniel (2004) and Alvin Plantinga (1973) and (1974). On the overlap view, it doesn't make sense to talk about the part of an event at a world as distinct from the part of the event at another world, since the same 'part' is present in both. Consequently, the advocate of this view should avoid analyzing the claim that there's no transworld causation in terms of the notion of an *event at a world* causing, at least if this is to be taken to refer to the part of the event present in some world. This would land him in the same boat at the advocate of the intuitive attempts above. Instead, the advocate of the overlap view should attempt to analyze the transworld causation claim in terms of event causation *at a world*, where the modifier "at a world" modifies "causation," not "event." The next subsection looks at approaches along these lines.

Following Brian Weatherson, I will call the second view of transworld events, where events are the mereological sum of their distinct parts in different worlds, the *Lump View* (Weatherson, 2000, p. 2).<sup>5</sup> Unlike the overlap theorists, the advocate of the lump view of transworld events can make sense of the notion of an *event at a world* naturally as the part of the event in the world. Consequently, they could analyze the claim that there's no transworld causation in terms of this notion. I look at these options after considering the overlap view's options in the next section.

## 2.1 The Overlapper: Causation According to a World

The overlap view cannot make sense of a part of an event at one world as distinct from a part of an event at another world, since on the overlap view, these are the same parts. Consequently, the overlap theorist cannot take what appears to be one natural approach to explicating the notion of event causation *at a world*, that is, holding that event parts stand in causal relationships, not whole events. This will be an option open to the lump theorist, and it will be discussed below.

The picture from the overlap theory (with transworld event identity) will be something like this: There's an event in two distinct worlds. *According to one world*, it causes one event. *According to the other world*, it causes another event.<sup>6</sup> E.g. according to some other world, the ingesting of cyanide caused Rasputin's death, but according to this world, the drowning caused his death. The idea here is to index the relation of causation. As opposed to the naïve picture, there's more than just a single thing *causation*, which exists in many worlds. Also, there is causation *according to this world* and causation *according to that*



world.

There are many ways to flesh out this framework. The overlapper might go on to say that each world is accompanied by its own type of causation, distinct from the causation of the other worlds. Or he might go on to say that causation according to a world is really just causation as represented by that world, so he can hold that there is just one type of causation. I will gloss these details here.

Another way the overlapper might flesh out the idea of event causation at a world is by saying that the role of a possible world is to represent that some real instance of causation holds between two events. The idea is that there is a collection of *real events* and *real causal instances*, and a possible world says of some real causal instance that it holds between two real events. This view may be unpopular for the concretist as it leaves possible worlds looking a lot more like abstract representations than concrete objects, but *prima facie*, this does not pose a problem for the abstratist overlappers.

I will not explicitly consider this idea since one can easily translate between this second account of event causation at a world and the first. If the role of a possible world is to represent that some causal instance stands between two events, then *according to that world*, the one event causes the other. Likewise, if *according to some world* one event causes another, then on this account, there is a world which represents that there is an instance of causation that stands between the two events. Hence, it's not clear that this second approach of the overlapper to explicate the notion of event causation *at a world* is any more productive than the first.

So then, I'll take overlapper to view causation as an indexed relation:  $x$  causes  $y$  *according to world  $w$* . The overlapper would then say that sentences such as "The drowning caused Rasputin's death" are true *according to some worlds*, in the natural way. The drowning caused Rasputin's death because *according to the actual world*, the drowning caused Rasputin's death.

Using this scheme, the overlapper could respond to the question of the meaning of the claim that there's no transworld causation like this: The claim that there's no transworld causation is a claim about the properties of the indexed causation relation. Simply put, there's no world according to which something happens in it that causes something else in another world. Hence, that's not the case simpliciter. But, this claim turns out to be hard to understand, too. To start to figure that out, the overlapper can use a first-order language of causation like the above attempts, but this time, he'll treat causation as a ternary relation. At first, let's assume a natural interpretation of  $Cxyw$ , an atom in the language that takes causation to be a ternary relation, such that  $Cxyw$  iff according to  $w$ ,  $x$  causes  $y$ .

The hard question remains: What exactly can the overlapper say about his ternary relation of causation that expresses that there's no transworld causation?

For starters, we'll want to say that if  $x$  causes  $y$  according to world  $w$ , then both  $x$  and  $y$  are in  $w$ , that is, that causation only occurs in worlds when the cause and effect are in the world:

**NTC.O1**  $\forall x, y, w \{ Cxyw \supset (x \in w \wedge y \in w) \}$

This is not sufficient though. This restriction doesn't stop all cases of transworld causation. For instance, there could be a situation where two events exist in two different worlds and the first event in the first world causes the second event in the second world, but no other causation occurs. This looks like a clear case of transworld causation, and this restriction does not block it. Regardless of how the language is interpreted (and hence the assignment of truthvalues to the atoms of the language),<sup>7</sup> this restriction will not block this model of transworld causation since the consequent is true in both of the relevant worlds.

The overlap theorist may respond by saying that my proposed counterexample is nonsensical. They might claim that they've already conceded that causation is a ternary relation that holds between two events *and a world* according to which the causation occurs. My counterexample supposes that there can be causation across worlds. But then there is no world at which the causation occurs. So, the counterexample I presented is nonsense.

This response misses the force of my point. So far, the overlapper has only claimed that causation is a ternary relation such that " $x$  causes  $y$ " is true only if according to the relevant world,  $x$  causes  $y$ . Now the hard question still remains: when is it true that according to some world,  $x$  causes  $y$ . The account, as put so far, is sufficiently flexible that it can even be reduced to the defunct system considered in the previous section by allowing that if event  $x$  causes event  $y$ , then according to every world,  $x$  causes  $y$ . So, we see that in order for it to fall out of this system of using world-indexed causation that there's no transworld causation, the tough part is saying exactly when it is true that according to some world, one event causes another. My counterexample to NTC.O1 shows that this principle is not strong enough to restrict the world-indexed relation of causation enough to prevent transworld causation.

Another natural attempt to give the restrictions of the world-indexed causation could say that  $x$  causes  $y$  according to some world only if all of the effects of  $x$  and all of the causes of  $y$  are in the world. But, this approach would be subject to the same problems as the previous approach. Finally, another natural approach would be to say that  $Cxyw$  only if  $x$  and  $y$  are not outside of  $w$ . But, this approach would end would end up entailing that

only events that are only in a single world are caused or are causes, which would rule out most obviously acceptable cases of causation given our assumption that many events exist in more than one world.

What these failed attempts to give the meaning of the no transworld causation claim bring out is that it looks implausible to give the meaning of the claim just in terms of the locations of the events in question and the world according to which the causation takes place. Intuitively, what the overlapper would like to do here is restrict their account such that event  $x$  causes event  $y$  according to  $w$  iff the instance of causation between  $x$  and  $y$  is wholly contained in  $w$ . That is to say that all causation is wholly contained in some world. On the concretist's view, it is easier to understand what this might mean: there, if we assume that instances of causation can be pinned down to a specific spatiotemporal location and casual instances must be spatiotemporally near their causes and effects, then we could say that  $Cxyw$  only if the instance of causation between  $x$  and  $y$  is only located in  $w$ .

Unfortunately, it's not as easy to see what this intuition is for the abstractist. If possible worlds are abstract representations, then certainly the intuition, that the causation should be "wholly contained" in the world according to which it exists, cannot be taken literally. Rather, for the abstractist, this means something more like that the possible world represents that the causation is wholly contained in the possible situation it represents, that is, that the causation is wholly contained in what would be the case if the possible world were actual. Clearly, there's still work to be done by the abstractist in making philosophically rigorous the notion of being "wholly contained," which is a project beyond the scope of this essay.

One might think that there's another approach that the overlapper could take in trying to flesh out this claim about transworld causation: I started out this section by pointing out that the overlapper could not make literal sense of the idea of the proper part of an event in a particular world. If he could do this, then he could work out the transworld causation claim by saying that causation holds only between parts in the same world. (We'll see the lumpers do this relatively successfully in the next section.) While the overlapper cannot individuate parts of events as such, he can get a similar notion: *the event description*. An event description is essentially a description of a role that is played by an event at a world. By allowing these event descriptions to be sufficiently complex, they can be uniquely identifying of a world and a particular role played by an event at that world.<sup>8</sup> Using event descriptions, theoretically, the overlapper could make sense of the claim that there's no transworld causation by saying that what it means is that there's only causation between event descriptions at the same world.

Notice though, that on this approach, the overlapper is forced to say that the causation occurs between event descriptions themselves, not between the events they pick out. If he were to say that causation occurs between the events, he'd be right back at the beginning of the project. But, because of the *prima facie* unacceptability of holding that causation occurs between linguistic entities, this approach should be abandoned.

So, we see that what appears to be the most plausible strategy for the advocate of overlap account of transworld identity of events involves indexing the causation relation by holding that events cause *according to worlds*. Just doing that does not get the overlapper an easy account of what it means for there to be no transworld causation. As I showed above, the intuitive attempts to flesh out causation according to worlds in terms of the location of causes and effects are not very productive in getting the overlapper the sought after account. Instead, the overlapper should look towards settling questions about the nature of causation and possible worlds so he can try to clarify the most promising notion on which to base the claim about transworld causation, causation being 'wholly contained' in worlds.

In the next section, I'll discuss the other side of the coin, the lump view of transworld identity of events. There, we'll see that the lumpers have an easier time explicating the claim about transworld causation but also that their account is only moderately satisfying.

## **2.2 The Lumper: Causation between Parts**

Recall the intuition from Lewis that to say that there's no transworld causation is to say that it's not the case that "anything that happens at one world cause[s] anything to happen at another" (1986, p. 2). Strictly speaking, the overlapper couldn't make sense of something 'happening at a world.' This is because we're taking him to allow that things that happen at one world may be identical to things happening at another, and the overlapper cannot easily flesh out the idea of the part of an event at a particular world. The lumper will not have this problem.

The lump view of events, as I am conceiving of it here, holds that some events exist in distinct worlds by having distinct parts at each world in which it is present. The event is the mereological sum of its distinct modal parts. This is analogous to the perdurantist account of individual persistence.

Using modal parts, lumpers can easily make sense of something happening at a world; it is just the part of the event that occurs in that world. So then on the lump view, the Lewisian intuition about the meaning of the claim that there's no transworld causation amounts to saying that no part of event in one world causes any part of an event in a different world.

Notice that this account of the meaning of the claim is required to employ *causation between parts of events* rather than the standard notion of event causation. As long as the lumpers are willing to admit that, in general, a world is naturally specified by conversational context and that there's no transworld causation, then allowing only causation between parts of events is unproblematic for the semantics of everyday sentences that appear to talk about event causation: given some sentence such as "The drowning caused Rasputin's death," the sentence is true (or false) in virtue of the part of the drowning in the relevant world causing (or not) the part of Rasputin's death in the relevant world.<sup>9</sup> Of course, the full story would be more complicated than this (to account for embedded modal operators, for example), but it appears feasible that a satisfactory account could work out naturally as such.

If we interpret  $Cx_wy_v$  as the part of event  $x$  in world  $w$  causes the part of event  $y$  in world  $v$ , then the claim that there's no transworld causation on the lump view can be put as follows:

**NTC.L**  $\forall x, y, w, v \{Cx_wy_v \supset (w = v)\}$

As far as I can tell, this succeeds in blocking all of the obvious cases of transworld causation. If we say that causation is a relation between parts of events, then this restriction requires that causation only holds between parts of events at the same world, thereby preventing something that happens at one world from causing anything at another world.

### 2.2.1 Is Everything Sunny in Lumpland?

So, it looks like the lumpers can answer the question of what it means for there to be no transworld causation. But, there are three reasons to be only moderately satisfied with this account.

First, though the concession to causation being a relation between parts of events instead of events simpliciter is natural given the type of theory that we're dealing with, it's quite an unnatural and counterintuitive result to live with. Our natural intuition is that Hitler's invasion of Poland caused the Second World War, not merely parts thereof. Of course, as pointed out above, the lumpers do have a strategy to account for these intuitions; he can either count them as paraphrases of the part-talk or count the semantic value of such sentences as containing only the parts of the relevant events. But upon hearing this reformulation, I imagine that the first response of a competent speaker would be that what they meant is that the events cause, not proper parts thereof. They would say, "No, I didn't mean the this-wordly part of Hitler's invasion of Poland. I just meant the invasion of Poland – the whole thing." "Whatever it is that does the causing of the Second World War,

that's the event that is the invasion of Poland," they would say. Of course, the lumpers who accept transworld event identity are going to claim that there's no way to save this intuition, but even though they have a response to take care of the intuition, the counterintuitiveness of this reformulation is reason to be only moderately satisfied with the lumpers' account.

Secondly, at least the way I have presented here, it looks like the lumpers' solution to the meaning problem of the claim that there's no transworld causation is ad hoc. The lumper is forced to posit new ontology, causation between proper parts of events, in order to save the intuition that there's no transworld causation. It's unclear that proper part causation would have been needed if we didn't have this intuition that the meaning of the claim about transworld causation should be easily and clearly explainable in a theory of possible worlds. While I do share this intuition, maybe the lumper could save himself some ad hoc ontology by simply denying that the claim about transworld causation is literally true or easily analyzable.

Lastly, we'd like the claim that there's no transworld causation to carry with it some explanatory gusto. As I mentioned above, it's common in the literature for authors to use the fact that there's no transworld causation to prove a point or explain some other fact. (See, for example, the excerpt from Weatherston in the introduction to this essay.) But, it's not apparent that the claim about transworld causation really follows from any important aspect of any particular lumper account. Rather, at least the way I've put it here, it looks like the fact that there's only causation among parts of events rather than whole events seems to be explained by the fact that there's no transworld causation. This looks like it has the ideal order of explanation backwards. That is, it would be best for a lumper theorist to independently motivate the claim that there's only causation between parts and use that to explain that there's no transworld causation. As an example of the type of account that would be ideal see Lewis (1986, p. 78-80), where he shows that on his account, that there's no transworld causation falls out of his theories of causation and counterfactuals.

I said that these problems with the lumpers' account of the meaning of the transworld causation claim give reason to be only moderately satisfied. Here's what I mean by that: I set out in this essay to look for an account of the meaning of the claim that there's no transworld causation. The lumper succeeds in giving us such an account. Two of the remaining issues with the account are that it appears to entail an ad hoc ontology of causation between parts of events and it doesn't provide the ideal explanatory structure for the claims at hand. Both of these issues are potentially resolvable by a fully worked out lumper account. On the other hand, I doubt that the counterintuitiveness of the proposed nature of causation on the lumper account can be overcome. These issues together with the elegance of the ac-

count (once we overlook the part causation issue) result in a moderately satisfying account of the claim that there's no transworld causation on the lump view: no part of event in a world causes any part of an event in a distinct world.

We started out with the common assumption that any acceptable account of possible worlds will not admit of transworld causation. This essay showed that the common assumption, for those who believe that some events exist in more than one possible world, is more murky than it may appear on the surface. That there's no transworld causation seems to be a rather simple statement about event causation and the locations of events. But, if we assume the transworld identity of events, no account of the meaning of the claim will be satisfactory in just those terms. Instead, we must delve into the particular accounts of transworld event identity. One account, the lump account, seems to be able to give us a moderately satisfying account of the claim's meaning, but it only does so in terms of some potentially objectionable ontology. Another account, the overlap account, will have to work out some more complicated notions in order to give a satisfactory account, if it can give such an account at all. On both sides of the transworld-event-identity coin, there is much more to be done to give the meaning of the non-obviously subtle claim that there's no transworld causation.

## Notes

<sup>1</sup>NTC2 admits of even weirder cases: For example, there could be three worlds  $w$ ,  $w'$ , and  $w''$ . Events  $A$  and  $B$  exist in  $w$ . Only  $A$  is in  $w'$ , and only  $B$  is in  $w''$ . NTC2 would not prevent the occurrence of  $A$  at  $w'$  to cause  $B$  at  $w''$ , a clear case of what the claim that there's no transworld causation is meant to rule out.

<sup>2</sup>Let  $\mathcal{L}$  be the first-order language with the predicates  $\in$  and  $C$  with the natural interpretation discussed in the body of the text. Let  $\mathcal{M}$  be the model consisting two worlds, both of which contain events  $A$  and  $B$  where  $A$  causes  $B$  in both worlds and there is no other causation. Let  $\mathcal{M}'$  be the model consisting of two worlds both containing events  $A$  and  $B$  where  $A$  in either world causes  $B$  in the other world. In  $\mathcal{M}'$ , there is clear transworld causation, but in  $\mathcal{M}$ , there is none. If we treat  $\mathcal{M}$  and  $\mathcal{M}'$  as  $\mathcal{L}$ -models, though, they are elementarily equivalent since they share a  $\mathcal{L}$ -theory. Notice that NTC1 is false on both of these models. NTC2 is true on both of them. Hence,  $\mathcal{L}$  is not sufficiently expressive to differentiate an acceptable transworld-causation-free collection of possible worlds from a problematic collection.

<sup>3</sup>I believe these options logically exhaust the possibilities since if the whole event does not exist in every world in which it is present, there must be some world in which it is present in which only a proper part of the event exists.

<sup>4</sup>Lewis (1986, section 4.2) and McDaniel (2004) use the term "overlap" to refer to the analog of this view for transworld individuals, that is, the view that individuals wholly exist in every world where they are present. As far as I know, neither use this term to refer to this event-based variant, but I will.

<sup>5</sup>Like Lewis and McDaniel, Weatherson does not use this term to refer to transworld events but rather to transworld individuals, and I will adapt it to my use here. Also, Weatherson contrasts the lumps with slices

where lumps are temporal and modal sums and slices are just modal sums. I will ignore the complications of temporal slices here and assume the views of the second type are lump views per the obvious analog to Weatherson's terminology.

<sup>6</sup>The concretist might prefer the modifier "in the world," but the general picture is the same.

<sup>7</sup>Presumably, under an acceptable interpretation, not every atom of the language will be false on this model since there is an instance of causation. Maybe it will be true according to only one of the worlds that the first event caused the second.

<sup>8</sup>Assuming we have a sufficiently expressive language (one expressive enough to individuate worlds and talk about *de re* identity, at least) we can create a 'sentence' that is true of only one world and one event at that world – essentially a Ramsey sentence. If this were not possible, then there must be two world-event pairs such that nothing can be said to discriminate between them, which would mean that they are the same, since I take it that if everything that's true according to one world (about one event) is true according to another (true about the other) and *visa versa*, then they are the same world (event).

<sup>9</sup>The lumpster should also allow that the conversational context can be overridden by explicit statement of the relevant world. For instance, if I say "Sue pressing a button in the world causes Fido to go into heat in some other world," this sentence comes out as false in virtue of it not being the case that the part of Sue's button pushing in the actual world does not cause the part of Fido's going into heat in any other world, since there's no transworld causation.

## References

- Davidson, D. (1969). The individuation of events. In *Essays in honor of Carl G. Hempel* (pp. 216–234). Boston: D. Reidel.
- Divers, J. (2002). *Possible worlds*. London: Routledge.
- Girle, R. (2003). *Possible worlds*. Montreal: McGill-Queen.
- Kripke, S. (1980). *Naming and necessity*. Cambridge, MA: Harvard University Press.
- Lewis, D. (1986). *On the plurality of worlds*. London: Blackwell.
- McDaniel, K. (2004). Modal realism with overlap. *Australasian Journal of Philosophy*, 82, 137–152.
- Plantinga, A. (1973). Transworld identity or worldbound individuals? In M. Munitz (Ed.), *Logic and ontology*. New York: New York University Press.
- Plantinga, A. (1974). *The nature of necessity*. Oxford: Oxford University Press.
- Schaffer, J. (2007). The metaphysics of causation. In *Stanford encyclopedia of philosophy*. plato.stanford.edu/entries/causation-metaphysics/: CSLI.
- Stalnaker, R. (1976). Possible worlds. *Noûs*, 10, 65–75.
- van Inwagen, P. (1986). Two concepts of possible worlds. In P. T. Howard K. Wettstein (Ed.), *Midwest studies in philosophy* (Vol. 11, pp. 185–213). Minneapolis, MN: University of Minnesota Press.
- Weatherson, B. (2000). *Stages, worms, slices and lumps*. (unpublished manuscript, available online at <http://brian.weatherson.org/swsl.pdf>)