**Is some backwards time travel inexplicable?**

**Abstract**

It has been suggested that there is something worrisome, puzzling or incomprehensible about the sorts of causal loops sometimes involved in backwards time travel. This paper disentangles two distinct puzzles and evaluates whether they provide us reason to find backwards time travel incomprehensible, inexplicable or otherwise worrisome. The paper argues that they provide no such reason.

**1. Introduction**

Let us suppose, as is now common, (but not ubiquitous) that backwards time travel is logically possible. Even granting its logical possibility various puzzles about certain backwards time travel scenarios arise. In what follows I consider two putative puzzles. The first, due to McCall (2010), I call the incomprehensibility puzzle: it involves the claim that certain time travel scenarios are incomprehensible. The second, due to Lewis (1976) and explored in Hanley (2004) is the uncaused causal loop puzzle: it involves the claim that closed causal loops are uncaused and thus inexplicable. I consider each puzzle in turn.

**2. The Incomprehensibility Puzzle**

Storrs McCall (2010) has recently suggested that certain backwards time-travel scenarios are, to use his word, incomprehensible. Suppose an art critic travels back in time with a copy of an artist’s masterpiece, gives the artist the copy, and the artist copies the copy. The “copy” of the copy is the original masterpiece. The artist comes to paint the masterpiece in virtue of seeing a future-copy of that masterpiece and then copying the copy. Call the masterpiece “original” and the copy, “copy”. Call this time travel scenario ARTWORK.[[1]](#endnote-1) McCall argues that ARTWORK is a paradigm case of an *incomprehensible* time travel scenario. He writes (p 648):

What is incomprehensible is (iii) who or what creates the works that future generations value? Where is the artistic creativity to be found? Unlike the traditional ‘paradoxes of time travel’, this problem has no solution.

As Ulrich Meyer puts it, such loops seem to “permit what looks like creation *ex nihilo* (Meyer 2012 p. 259). Since McCall does not tell us exactly what he means by incomprehensibility to assess this claim we need to know two things. First, what is it for a time travel scenario to be incomprehensible: in virtue of what features does a time travel scenario count as being incomprehensible? Second, is there a class of time travel scenarios that have those features and are thus incomprehensible?

One possibility is that when McCall claims that scenarios such as ARTWORK are incomprehensible he intends nothing more than that closed causal loops are themselves uncaused and that that is puzzling. This would collapse the incomprehensibility puzzle into the uncaused loop puzzle. Let us suppose, however, that McCall sees the incomprehensibility puzzle as distinct from the uncaused loop puzzle. Then what would it take for a time travel scenario to be *incomprehensible*?

Let us say that a phenomenon, P, is incomprehensible *simpliciter*, just in case there is no possible agent that understands P.

It is specific time travel scenarios that will be substituted in for the variable P. Thus a particular time travel scenario, S, is incomprehensible *simpliciter*, just in case there is no possible agent that understands S.

Let us say that a phenomenon, P, is incomprehensible *relative to X*, just in case for all possible agents of type X, no agent of type X understands P.

Thus a particular time travel scenario, S, is incomprehensible *relative to X*, just in case for all possible agents of type X, no agent of type X understands S.

Further, let us use “explanation” as a success term: E is an explanation of P only if E, the explanans, is true (or E obtains). Then there are three senses of “understanding” we could intend in the previous definitions. The first is a factive notion, according to which X understands P just in case (a) X has a certain phenomenology as of understanding P (call it the U-phenomenology) and (b) there is an explanation of P and (c) X’s phenomenology tracks the explanation of P. Call this *veridical understanding*. In contrast, there is a non-factive notion of understanding according to which X understands P just in case (a) X has the U-phenomenology and (b) either (i) there is some explanation for P, but X’s U-phenomenology does not track that explanation or (ii) there is no explanation for P and X’s phenomenology does not track any explanation for P. Call that *non-veridical understanding*. Finally, there is *subjective understanding*, where X subjectively understands P iff X has the U-phenomenology. Every instance of subjective understanding is either an instance of veridical understanding (if it tracks an explanation of P) or non-veridical understanding (if it does not track an explanation of P).

McCall plausibly assumes that his paradigm case of incomprehensibility—ARTWORK—*seems* incomprehensible: there is a failure of subjective understanding. Thus there is no U-phenomenology, and hence neither veridical nor non-veridical understanding.

Call S\* the set of time travel scenarios that are supposed to count as incomprehensible and call any arbitrary member of S\*, S. Then either (1) there is an explanation of each of the members of S\*, but that explanation does not engender the U-phenomenology or (2) there is no explanation of the members of S\* and thus there is nothing to engender the U-phenomenology. Consider (1) first. To be an epistemologically interesting claim it cannot just be that, as it turns out, a lot of us don’t understand the explanations for the members of S\*. It must either be that the explanations for the members of S\* do not engender the U-phenomenology in any agents relevantly cognitively similar to actual agents or that they do not engender that phenomenology in any possible agent.

Suppose that actual agents, and those relevantly similar to them, fail to experience phenomenology U when faced with an explanation of S (for each S in S\*). Then there is something about each S such that agents like us are unable to appreciate the explanation of S. Then the interesting question is *why* agents like us cannot appreciate the explanation of each S and which other phenomena are also ones whose explanation we are unable to appreciate. It would be an interesting finding in epistemology and cognitive science to discover that a certain class of time travel scenarios are like this, but it would hardly be surprising that *some* phenomena are of this kind. But it is unclear that such a discovery would be philosophically significant. Moreover, it seems unlikely that this is what McCall intends when he says that certain time travel scenarios are incomprehensible.

Suppose, then, there is an explanation for each S in S\*, but each explanation fails to engender the U-phenomenology in every possible agent. Thus no possible agent understands any of the explanations in question. On some psychologistic accounts of explanation it makes no sense to say that there is an explanation for phenomenon, P, even though no possible agent understands it, since explanation just consists in the understanding of some appropriate set of agents. Let us assume that that is not the notion of explanation at play. Nevertheless, one might reject psychologism whilst holding that if there is an explanation for P then *some* possible agent is such that that explanation engenders the U-phenomenology in that agent. But suppose one grants that there are explanations that, necessarily, fail to engender the U-phenomenology. Still, McCall has given us no reason to think that time travel scenarios are like *this*. Indeed, it is difficult to see how one would argue for such a strong conclusion.

Consider, then (2): there is no explanation for the members of S\* and thus there is nothing to engender the U-phenomenology. If this is true, then the contention that such scenarios are incomprehensible turns into the claim that they are inexplicable (i.e. lacking an explanation). Why think that? To answer that question we need to know what it would be to provide an explanation for an S.

Suppose that explanation consists in providing information about the causal history of the explanandum. On the face of it there is a perfectly good explanation of ARTWORK, since we can provide a full causal history of original and copy.[[2]](#endnote-2) Why does copy have the properties that it does? Because original has the properties it does, and copy is a copy of original. Had original been different, copy would have been different. Had copy been different, then original would have been different. If we want to know why each is an oil painting, say, we have an answer: they are both oil paintings because copy is a copy of original, which is an oil painting, and original is a copy of copy, which is an oil painting. But suppose we want to know why both are oil paintings rather than, say water-based paintings. Certainly we can say that they are both oils because given that original is oil, then copy will be oil, and given that copy is oil, then original will be oil. We have a story about why they are relevantly similar in these respects. But perhaps it is less clear that we have a story about why they are *both* oils rather than water-colours. The fact that each is a copy of the other explains why they are both similar in certain respects, but, arguably, it does not tell us why they are both oils rather than water-colours.

Thus one might suggest that the inexplicability at issue is not to be found by appealing to any particular link in the causal chain, but, instead, by attending to the entire causal loop. For the loop itself is uncaused and thus (perhaps) lacks an explanation. But if this is McCall’s contention then the incomprehensibility puzzle collapses into the uncaused loop puzzle. If the incomprehensibility puzzle is distinct from the other two there must be some further, separate, reason to think that closed causal loops are inexplicable. Yet it is difficult to see what such a reason might be. Certainly McCall gives us no clue. So we have, as yet, no reason to think that any incomprehensibility puzzle exists if we understand that puzzle to be distinct from the other two puzzles.

**2. The Uncaused Loop Puzzle**

Suppose the ARTWORK causal loop is a *closed* loop: that is, every event on the loop is both a cause and effect of some other event in the loop, and no event on the loop is either a cause or effect of any event that is not in the loop. Lewis (1976 p. 148) writes:

As I said at the outset, the time traveler’s world would be a most strange one. Stranger still, if there are local—but only local—causal reversals, then there may also be causal loops: closed causal chains in which some of the causal links are normal in direction and others are reversed. (Perhaps there must be loops if there is reversal: I am not sure.) Each event on the loop has a causal explanation, being caused by events elsewhere on the loop. That is not to say that the loop as a whole is caused or explicable. It may not be. Its inexplicability is especially remarkable if it is made up of the sort of causal processes that transmit information.

Then the loop itself has no causal history outside of the loop: it is completely causally disconnected from all events that are not in the loop, and while there are relations of counterfactual dependence between events on the loop, no such relations hold between any events on the loop and events outside the loop. Then if we ask what explains the existence of the loop itself, we find no answer.

It is worth briefly noting that nothing about the ARTWORK scenario suggests that it involves a closed rather than an open causal loop. A causal loop is open just in case every event on the loop is both a cause and effect of some other event on the loop, and some events are also causes of, or effects of, events that are not in the loop. Since, plausibly, the existence and properties of copy, artist, and time traveller at their various locations in the loop are in part caused by events outside the loop it is plausible that ARTWORK is an open loop. But let us set that aside, since we can surely come up with a similar example in which the loop is closed.

Notice that if the loop is a closed one, the problem of explaining it appears to remain even if we reject the idea that explanation consists of providing a causal history of the explanandum. Suppose explanation consists in subsuming the explanandum under a general law or law-like generalisation by, very roughly, a process of deduction from the laws plus matters of particular fact at a time. Assuming deterministic laws, what explains the existence of an object, O, at t, is the laws plus the distribution of particulars at a time prior to t (or after t, given symmetric laws).

The problem is that on many accounts of the causal relation worlds with closed causal loops are ones in which there are regions for which determinism fails. That is, there are regions such that from knowledge of the laws plus the totality of matters of fact at some temporal slice, S, it is not possible to predict the matters of fact at certain other slices, S1…Sn, that intersect the causal loop. If explanation consists in deducing the explanandum from deterministic laws plus certain matters of fact, then there is no explanation for the existence of any closed loop, *or* for the events on the loop. For no such deduction is possible.

Two responses to the uncaused loop puzzle will be considered. The first is to deny that the existence of macro level closed causal loops is incompatible with determinism. The second is a sort of “good company” response according to which uncaused loops are no more puzzling than certain other phenomenon that we do not find puzzling.

**2.1 Determinism and Closed Causal Loops**

One could endorse a view according to which the existence of closed causal loops at the macro level is consistent with determinism at the micro level. Suppose world, *w,* is one in which determinism is true at the micro level. That is consistent with *w* being a world in which, at the macro level, something that looks like a closed causal loop exists: at *t*+ some object, *O* vanishes, and at *t-* an object, *O*\*, qualitatively just like *O* at *t*+, appears, and the appearance of *O\** at *t*- is the cause of *O* at *t*+. What is left unspecified, so far, is whether the disappearance of *O* at *t*+ is the cause of the appearance of *O*\* at *t*-. Yet once we specify that *O*\* is a temporal stage of *O* and that the latter is the cause of the former we get into difficulties: for it is hard to reconcile how this set of causal claims could be true, consistent with *w* being deterministic. In what follows I consider three strategies that attempt this reconciliation.

The first is the most deflationary. Suppose, for simplicity, that *w* is the actual world. One might hold that there is only really causation at the microphysical level. There is, of course, an appearance of macro causation that is the result of certain patterns obtaining in our world. On this *interpretationist* view of macro causation no macro causal claims are strictly speaking true, but some such claims are assertible. And they are assertible just in case, roughly, they are the sort of claims that we are all inclined to make given the macro patterns that we find. On this view, if, given the actual patterns, we are inclined to claim that there are macro level closed causal loops, then it is assertible that there are such loops. And that claim is as assertible as any claim about macro level causation. But the assertibility of such a claim is entirely consistent with our world being one in which determinism true and thus being one in which at the micro level there exist no closed causal loops.

Now, one might find such a proposal objectionably deflationary. The second, less deflationary, strategy, agrees with the interpretationist that really there exists causation only at the micro level. But she holds that we can do better than merely claim that macro causal claims are assertible if they are the sorts of claims we are inclined to make. Instead, she supposes, there are paradigm instances of certain macro level patterns wherein we are inclined to say that there is macro causation. From these paradigm cases we can extrapolate to offer an account of under what conditions—that is, in virtue of which kinds of macro patterns—it is permissible to make macro casual claims. Unlike on the interpretationist picture, then, there are circumstances in which we would all be wrong to assert that causal relations obtain between macro events even if we were all inclined to make such assertions. We will be wrong if the right account of the sorts of patterns that ground assertible claims of macro causation fail to obtain. But if such patterns do obtain where we are inclined to say that there exist closed causal loops, then talk of such loops will be permissible in the way that talk of macro causes more generally will be permissible. And, once more, that is consistent with determinism.

The final strategy is less deflationary still. It accepts that genuine causation obtains only at the micro level and then supposes that to the extent that we talk about macro causation the truth of this talk is grounded in macro level patterns that supervene on the microphysical. Thus, on this view, macro level causal claims are true just in case certain counterfactuals come out as true. So suppose, once more, that ours is a deterministic world. We want to say that *O* at *t*+ is the cause of *O*\* at *t*-. That will come out as true just in case, given a simple view of the semantics of such claims, had *O* at *t*+ not occurred, then *O*\* at *t*- would not have occurred. How are we to evaluate that counterfactual? Not in the usual Lewisian fashion since that involves going to (the closest) world, *w*\*, that is just like our world up until just before t+ and which has laws of nature very similar to ours except that what seems like a little miracle, from the perspective of our world, occurs just before *t+* in *w*\* so that *O* fails to obtain. Then we let events unfold in *w*\* and see whether *O\** occurs. But of course *O\** will have occurred in *w*\*, since it will be amongst the events earlier than *t*+ which are the same in *w*\* as in the actual world. Lewisian semantics will not help us evaluate causal claims involving backwards causation.

Another option would be to adopt a backtracking counterfactual. We can imagine that the laws are such that had *O* at *t*+ not obtained the initial conditions would have been such that *O\** at *t-* would not have obtained. That alone is not sufficient to vindicate the existence of a macro level closed causal loop. For there are plenty of sets of laws such that had *O*+ not occurred the initial conditions would have been different and all other events in the world would have been radically different. Then it is plausible that the non-occurrence of many other events will be counterfactually linked to the occurrence of *O*\* at *t*-. In that case although *O*+ will be a cause of *O*\*, it will not be the *only* cause and the loop will not be a closed one. It is rare that everyday counterfactuals take the truth-value we expect when we evaluate them as backtracking counterfactuals. But it is certainly possible that there is a world in which the laws are such that there is a robust counterfactual connection between *O\** and *O*+, and not between *O*\* and any other macro events. These laws are such that when we go to the relevant closest world we find a world that looks very much like ours (rather than looking radically different as most backtracking counterfactuals would require) such that if *O*+ had not occurred, *O\** would not have occurred, but it is not true that had, say, *O*^ at *t+*+ not occurred, *O\** would not have occurred. This world is possible, and is one in which there are closed macro loops despite the world being deterministic.

Although throughout this section we have supposed that the world in question is the actual world, it is most unlikely that our world has laws like these. So all we have shown is that there is some world in which closed causal loops would be entirely explicable since there would be a causal explanation of them at the micro level. The problem with this approach is that in most worlds it will turn out that what appear to be closed causal loops at the macro level are not causal loops at all (or at not closed loops) given the use of a backtracking counterfactual to evaluate macro causal claims. Given this, one might simply reject the idea that backtracking counterfactuals are the right way to evaluate counterfactuals. One might, instead, suggest that one ought to go to a world, *w*^, that is like ours up until just before the time of the effect in the putative loop, in this case just before *t-*, and where the laws in *w*^ are such that there is (what is by the lights of the actual world) a small miracle just before *t*+ in *w*^ such that *O* fails to occur in *w*^. Then we see what happens in *w*^ at *t*-. If *O*\* at *t*- fails to occur, then there is a robust counterfactual connection between *O* and *O*\*, and we say that *O* causes *O*\*. If not, not. If this is the right way to evaluate this counterfactual then a world in which determinism is true will be one in which that counterfactual comes out as false. For *w*^ will be a world in which *O\** at *t*- obtains even though *O* fails to obtain at *t*+. Thus determinism will turn out to be incompatible with macro closed loops since the later event (*O* at *t*+) will not be the cause of *O*\* at *t*-.

Nevertheless, there are three strategies for attempting to reconcile determinism with macro level closed loops, which, if one is prepared to accept certain further assumptions, succeed in their reconciliation.

**2.2 In Good Company**

Lewis writes:

Why did the whole affair happen? There is simply no answer. The parts of the loop are explicable, the whole of it is not. Strange! But not impossible, and not too different from inexplicabilities we are already inured to. Almost everyone agrees that God, or the Big Bang, or the entire infinite past of the universe, or the decay of a tritium atom, is uncaused and inexplicable. Then if these are possible, why not also the inexplicable causal loops that arise in time travel? (Lewis 1976 p. 148).

Lewis seems to be pointing to a “good company” response: closed causal loops lack an explanation for their existence in the same manner in which other phenomenon—chancy events, boundary conditions, the laws of nature or the existence of our universe—lack an explanation.[[3]](#endnote-3) Since there is nothing epistemically worrisome about these latter phenomena, likewise there is nothing epistemically worrisome about closed causal loops. The intuition is that explanations bottom out somewhere, and they bottom out in each of these cases.

In fact, it is not clear that chancy events deserve to be included in the list of phenomena that are in “good company” with closed loops. Suppose world, *w*, is indeterministic and suppose *w* contains a closed loop, *C*, and a genuinely chance event, *E*. There is a perspective from which the explanation for the existence of *C* and the explanation of the occurrence of *E* look similar. Neither the occurrence of *E* nor the existence of *C* will not be deducible from the laws of nature plus matters of fact at some time, *t*.[[4]](#endnote-4) Thus chance events are “good company” to closed causal loops, since neither can be explained given a D-N account of explanation. But chance events are not in the same company as closed loops when we consider alternative accounts of explanation. Suppose one adopted a causal notion of explanation, but took causation to consist in probability-raising. Then chance events would have (at least partial) causal explanations on the plausible assumption that they are not probabilistically independent of earlier events. The existence of closed loops, however, would not have even partial causal explanations since in virtue of being causally isolated from the rest of the world they would also be probabilistically independent of the rest of the world.[[5]](#endnote-5) Thus while there are commonalities between chance events and closed loops, we need not suppose the former to be inexplicable, and as such we cannot suggest that they are inexplicable in the same way in which causal loops are inexplicable.

Nevertheless, the good company response can still succeed if there are other phenomena that are in good company with closed causal loops: the existence of the universe, its basic laws, and its boundary conditions, all seem like *prima facie* good candidates to be said good company. No appeal to subsumption under laws or to causal histories *could* provide an explanation for any of these phenomena. Moreover, just we can explain events *internal* to the universe in terms of other events internal to the universe we can explain events in a closed loop in terms of other events internal to the loop.

Does the good company response succeed? Only if closed causal loops are relevantly analogous to the phenomena with which they are supposed to be in good company. In what follows I consider reasons to suppose that the analogy fails. I focus, in particular, on the existence of our universe rather than its basic laws or its boundary conditions. But similar reasons to suspect a disanalogy can, *mutatis mutandis*, be offered with respect to the universe’s basic laws and its boundary conditions.

With this in mind, there are two places where one might try to show that the existence of our universe and the existence of closed loops are not in good company. First, one might suggest that the manner in which closed causal loops lack explanation is different to the manner in which the existence of the universe lacks explanation. Second, one might suggest that there is an explanation for the existence of our universe, but no explanation for causal loops. Let us consider each in turn.

One reason to think that the existence of the universe lacks an explanation is that there is nothing and could be nothing *outside* the universe to do the explaining. The only appropriate explanandum for the existence of the universe must be one that is spatiotemporally connected to the universe, but any such explanandum will necessarily be part of the universe and therefore part of the explanans. Thus, necessarily, the universe lacks an explanation. *Prima facie*, the same is not true of closed loops. There are events outside any closed loop that bear spatio-temporal relations to events in the loop, and which are such that those events *could* *have* explained the set of events in the loop. That is, the sequence of events in closed causal loop, L, in the actual world, @, has a close counterpart sequence of events, L\*, in w\* that are explained by events in w\* (E1…En) that occur outside of the events in L\*, where those events E1…En are counterparts of events in @ that occur outside of L. Thus there are events outside of loop L that *could* explain it. The absence of an explanation for a closed loop is, then, merely a contingent one.

This argument attempts to show that there is a disanalogy between the universe and a closed loop (like L) and thus that the good company response fails. Even if the argument succeeds, however, one might wonder whether what it gains by proffering a disanalogy between loops and the universe, it loses by asserting that the universe necessarily lacks an explanation while loops merely contingently lack an explanation. Sure enough it turns out that the two cases are not in good company, but loops turn out to be the *least* inexplicable of the two, since being necessarily inexplicable is worse than being contingently inexplicable. The objector might deny that being necessarily inexplicable is worse than being contingently inexplicable. I won’t rehearse those arguments here, however, since the alleged disanalogy between the two cases is merely apparent.

For notice that it matters how we phrase the counterfactuals. We cannot say that it is possible that the existence of a closed causal loop (picked out *de dicto*) is explained by events outside of the loop. No possible closed causal loop *qua* closed causal loop is explained by events outside of the loop. Rather, the totality of events in an actual causal loop, L—where this set of events is picked out *de re*—is explained in some close world by counterparts of actual events outside L. But the same is true of the explanation for the existence of the universe. If “the universe” is used *de dicto* to pick out the most maximally inclusive concrete object in a particular world, (ie to pick out the whole world) then there is no universe whose existence can be explained since that would require appeal to something outside of the universe. But suppose the actual universe, U1, consists of spatio-temporal region R. There is a possible world, w\*, in which R is a sub-region of w\*, and in w\* R’s existence can be explained, let us suppose, by appealing to an explanandum that exists in w\* but which does not overlap any part of R. Picked out *de re* as a particular chunk of space-time, our universe’s existence has the modal property that it could have been explained by further events and objects—namely those in w\*that do not overlap R. But picked out *de dicto* as the maximal concrete object in a world—as the totality of the world—our universe lacks even the modal property of it being possible that its existence is explained by some set of events and objects. In this respect the explanation of the existence of the universe and a causal loop are of a piece. Thus the first objection to the good company response fails.

The second objection to the good company response is to argue that there is an explanation for the existence of our universe, but not for the existence of closed loops. To see how this might go, let us draw a distinction between a universe and a possible world. A universe is a maximally spatiotemporally connected region. A possible world is one or more maximally spatiotemporally connected regions (or a representation thereof). Thus a possible world can contain multiple disconnected universes.[[6]](#endnote-6) In a world with a single universe we only have one question to ask: (A) why does this universe exist? In a world with multiple universes we have two questions we might ask: (A) why does this particular universe exist? and (B) why does this set of universes (ie the whole world) exist?

Quentin Smith (1990) has argued that we can explain the existence of our universe. Smith begins with the assumption that ours is a world with multiple universes. Suppose we are trying to explain the existence of our universe, U(a). Suppose that singularities exist at the boundaries of U(a) and neighbouring universe U(b) where these singularities are not spatio-temporally related to either universe, but instead form a boundary between the two. Now consider a particular singularity, S, which we are to suppose it not merely a singularity at the boundary of U(a) and U(b), but also has the property of being a big bang singularity that is the past boundary of U(b). On the assumption that there are, say, 10 billion black hole singularities that bound our two universes, but only 1 billion are also singularities that have the property of being big bang singularities that are the past boundaries of U(b), then only 1 out of the 10 billion singularities are, as it were, singularities that have given rise to the birth of another universe. Thus Smith argues that the existence of our universe can be explained by appealing to the fact that 10% of black hole singularities that bound our universe are singularities that are black holes that are the past boundaries of U(b).

In order to stipulate that U(a) and U(b) (or indeed any pair of universes within a world) share a boundary but are spatio-temporally disconnected, (so are separate universes) a number of assumptions is required. Importantly, these assumptions entail that any universe has a space-time with a past and future direction. Thus time travel and causal loops are, for Smith, impossible. Let us broaden out possibility space and introduce into this picture the notion of a universe\*, which is to be defined just as Smith defines a universe, except that we drop Smith’s constraint according to which space-time has a unique direction. Then all *Smithian* universes are universes\*, but not all universes\* are universes—only those universes\* that do not have causal loops or time travel are also universes.

The existence of any universe\* within a world, w*,* will be explicable if and only if there are no causal loops in *w* (i.e. iff the universe\* is not also a universe). If there are causal loops in the universes\*, then neither the universes\* *nor* those loops are explicable. There is, then, a peculiar and unexpected way in which the presence of causal loops in a universe\* co-varies with whether the universe\* itself is explicable.

One might contend that this co-variation is reason to find the existence of causal loops more inexplicable than the existence of our universe\*. For the existence of some universes\* is explicable, (namely those *sans* causal loops) while the existence of causal loops is in principle inexplicable since there is no universe\* in which they are explicable. Thus, the thought proceeds, the good company response fails.

Yet this argument remains uncompelling. First, it relies on a fairly contentious view regarding both what it would take to explain the existence of universes(\*) within a world, and what universes\* would need to be like in order for that explanatory strategy to prevail. Second, whatever help Smith’s model might be in explaining the existence of a universe within a multi-universe world, it cannot be of any help in explaining the existence of a world. The question: “why does this world exist?” returns us to a brute truth in just the same way that the question “why does this causal loop exist?” returns us to a brute truth. It is therefore plausible to claim that the existence of causal loops is no more inexplicable than the existence of our world, even if one grants that the existence of causal loops is more inexplicable than the existence of our universe. Finally, on Smith’s view no universe\* in which there is time travel is one in which there is an explanation for the existence of that universe\*. But some time travel occurs along an *open* causal loop rather than a closed one. Universes\* with open causal loops lack an explanation for *their* existence, but the open causal loops in those universes\* do *not* lack an explanation for their existence. Thus it does not follow that inexplicable causal loops engender inexplicable universes\*. Instead, there can be explicable causal loops in inexplicable universes\*, just as there can be explicable universes\* sans causal loops.

**3. Conclusion**

We have found no reason to suppose that certain causal loops, such as ARTWORK are incomprehensible or inexplicable.

Kristie Miller

The Department of Philosophy

The University of Sydney, Australia

Acknowledgements:

Thanks to David Braddon-Mitchell for helpful discussion of these issues, and to funding from the Australian Research Council (DP110100486) and The John Templeton Fund (New Agendas for the Study of Time ID 15538) for supporting this work.

NOTES

**References**

Borghini, Andreas. and Torrengo, Guiliano. 2012. “The metaphysics of the thin red line” in Around the Tree ed. Fabrice Correia and Andrea Lacona. (Springer Verlag, Berlin: Synthese Library), pp. 105-125.

Dummett, Michael. 1964. “Bringing about the Past”. The Philosophical Review, vol. 73 no. 3 pp. 338-359.

Dummett, Michael. 1986. “Causal loops”. In The Nature of Time. ed. Richard Flood and Michael Lockwood. (Oxford, UK: Basil Blackwell), pp. 135–69.

Hanley, Richard. 2004. “No end in sight: causal loops in philosophy, physics and fiction”. Synthese vol. 141 pp. 123-152.

[Lewis, David. 1976. “The Paradoxes of Time Travel.](http://philpapers.org/rec/LEWTPO-8)” American Philosophical Quarterly vol. 13 no. 2. pp. 145-152

Lewis, David. 1986. On the Plurality of Worlds. (Oxford, UK: Basil Blackwell).

McCall, Storrs. 2010. “An Insoluble Problem”. Analysis vol. 70 no. 4 pp. 647-648.

Meyer, Ulrich. 2012. “Explaining Causal Loops” Analysis vol. 72 no. 2 pp. 259-264.

Sider, Theodore. 2002. “Time Travel, Coincidences and Counterfactuals”. Philosophical Studies vol. 110 pp. 115-138.

Smith, Nicholas. 1997. “Bananas enough for time travel” British Journal for the Philosophy of Science*.* vol. 48. no. 3 pp. 363-389.

Smith, Quentin. 1990.”A Natural Explanation of the Existence and Laws of Our Universe”. Australasian Journal of Philosophy. vol. 68 no. 1 pp. 22-43.

1. This scenario is presented in McCall (2010) and owes its origins to Dummett (1986 p. 155). [↑](#endnote-ref-1)
2. Lewis (1976 p. 148) and Meyer (2012 p. 261) also make this point. [↑](#endnote-ref-2)
3. See also Meyer (2012 p. 262) for a similar argument. [↑](#endnote-ref-3)
4. Perhaps this suggests that in indeterministic worlds this is just the wrong account of explanation, since the occurrence of chance events does not seem objectionably inexplicable. [↑](#endnote-ref-4)
5. With thanks to an anonymous referee for making this point. [↑](#endnote-ref-5)
6. Lewis’s (1986) version of concrete modal realism cannot, famously, allow any such thing given his definition of a possible world. But since his modal realism is contentious to say the least, this need not worry us. [↑](#endnote-ref-6)