Time Travel
February 14, 2001

1. **The temporal parts theorist's analysis of change**

    If you hold the doctrine of temporal parts, you will find the following analysis of what it is for something to *change* very appealing:

    > '*x* changes [between *t* and *t*]' means that *x* has dissimilar temporal parts [at *t* and *t*].

    Similarly you can give a very natural analysis of *temporally relativised predication*:

    > '*x* is *F* at *t*' means that *x*'s temporal part at *t* is *F*.

    It follows from the temporal parts theorist's analysis of change that only something that exists at at least two times can change. It would make no sense to claim that an instantaneous thing has changed or will change. In fact this is an extremely plausible claim in its own right, quite apart from the doctrine of temporal parts!

    Instants of time are instantaneous, so they cannot change. So you can't literally *change* what happens at any instant of time, past, present or future. (You can, however, cause things to happen at an instant of time.)

2. **Inconsistent time travel stories**

    It's easy to tell an inconsistent story. Here's a short one: 'Throughout 1984, Dad was not rich. Throughout 1984, Dad was rich.' I could make a film of this inconsistent story; the first half would show one set of events happening in 1984, the second half would show a second set of events happening in 1984.

    Many time travel stories seem to be like that. The film 'Back to the Future', for example, seems to represent both that the protagonist's father is not rich throughout 1984, and that he is.

    It doesn't make say to say: *first*, throughout 1984 [i.e. at every instant of 1984] Dad was not rich; *afterwards* throughout 1984 he was rich. What pair of times might 'first' and 'afterwards' refer to?

    The only way to make such stories consistent is to suppose that they take place in some sort of "branching universe". But that's boring!

3. **Personal time and external time**

    Time travel = discrepancy between one's personal time—"time as measured by one's wristwatch"—and external time.

4. **Lewis's theory of personal identity**

   People are certain fusions of person-stages. Which ones?

   The ones whose stages can be assigned 'personal time co-ordinates' in such a way that relative to those co-ordinates, there is mental and physical continuity among the stages. That is, stages that are close in personal time are quite similar, mentally and perhaps physically; "later" stages have apparent memories of the things that happened to "earlier" stages, and so forth. Also, there must be **causal continuity**: the way one stage is must make a big difference to the way the immediately next stages are.

5. **Backwards causation and causal loops**

   When there is time travel into the past, there is backwards causation. Backwards causation is very strange. It generates causal loops. Typically, everything that happens in a causal loop can be explained by something else that happens in the loop; but the whole loop cannot be explained.

6. **The 'could have done' objection**

   There are no consistent time-travel stories in which people kill their own grandfathers before they have had any children. By definition, a person who never has any children is not anyone's grandfather. Therefore, in any consistent time-travel story in which someone tries to kill his grandfather, the attempt fails for some reason or other.

   Lewis considers the objection that this leads to a contradiction. If you have a good weapon, good aim, revenge in your heart etc. then you *can* kill whoever you please. But it would be inconsistent for you to kill your grandfather; so you *cannot* kill him.

   There is a parallel objection to the consistency of backwards causation even without time travel. (E.g. sending messages into the past by radio.)

   Lewis's solution: 'can' means different things in different contexts. 'x can do such-and-such' always means 'x's doing such-and-such is consistent ['compossible'] with certain background propositions'—but which propositions we take to be the background propositions varies from case to case.

7. **The counterfactual objection**