CAUSATION (Part II), Lecture II

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1. Counterfactual theory. In part because he thinks regularity theories of causation don't work, Lewis proposes to think of causation in terms of causal dependence, where dependence is a modal concept. We can define causal dependence (a relation between events) in terms of counterfactual dependence (a relation between propositions). Event e_2 causally depends on e_1 iff the following counterfactuals about the occurrence ('Ox') of these events are true: 'Oe_1 $\Box\!\!\rightarrow$ Oe_2' and '$\neg$Oe_1 $\Box\!\!\rightarrow$ $\neg$Oe_2'. Causal dependence is sufficient for causation. Simple cases of pre-emption show however that it is not necessary. So Lewis suggests that causation is the ancestral of the relation of causal dependence (a chain of causal dependencies running between e_1, e_{1^*}, $e_{1'}$, ... and e_2 .

2. Semantics for counterfactuals. Lewis assumes that causation is more mysterious than counterfactuals. This is controversial, and so gives us a first (superficial) reason to object to the account. He relies on his general semantics of counterfactuals: 'If A were the case, then B would be the case' is true iff there is a possible world in which A and B are true that is more *similar* (or *closer*) to the actual world than any possible world in which A is true and B is false. Applied to causation, we should take 'Oe_1 $\Box\!\!\rightarrow$ Oe_2' to be true iff there is a possible world in which both e_1 and e_2 occur that is more similar to the actual world than any possible world in which only e_1 occurs. This requires a measure of similarity of worlds. Lewis suggests that the most similar worlds are those in which the laws of nature conform closest to our actual laws of nature, and of those worlds the most similar are those in which history conforms closest to actual history.

3. Symmetry and causal dependence. Lewis ('Counterfactual Dependence and Time's Arrow', 1979) maintains that the asymmetries of causation can be explained in terms of the asymmetry of counterfactual dependence: (Oe_1 $\Box\!\!\rightarrow$ Oe_2) $\rightarrow$ $\neg$ (Oe_2 $\Box\!\!\rightarrow$ Oe_1). This asymmetry is not obvious. Consider my ordering a book on Amazon yesterday (e_1), and its being delivered at noon today (e_2). If I hadn't ordered the book yesterday, it would not have been delivered at noon. True. But it also seems true that, if it hadn't arrived in my pigeonhole today, it would have to be that I didn't order it. Consider, Amazon has a superb track-record delivering whatever I order! So, it seems that we can make sense of a symmetrical causal dependence between e_1 and e_2. But the delivery didn't cause my order.

4. No backtracking. Lewis rules out such *backtracking* interpretations. Backtracking counterfactuals are those where the fact described in the consequent obtains *before* the fact described in the antecedent (i.e. where we consider a counterfactual dependence of the past on the present or future). They are disqualified. Our ordinary intuitions about counterfactuals presuppose that the past is counterfactually independent of the present. When we evaluate what would have happened if some event did or did not occur, we imagine worlds that have the same past as the actual world, up until the moment of the event we are interested in (a small miracle can cause a *divergence*, and make the event occur or fail to occur). When considering the alternative—i.e. a world in which an entirely different past leads to the absence of the book in my pigeonhole—we seem to have little ground to think that such a world would be representative of the actual world.

5. Asymmetry of miracles. If Lewis is right, then the relevant kind of counterfactual dependence is asymmetric, and moreover time-asymmetric: only the earlier events can be causes of later ones. But why does the past have this special status in our judgments of similarity? Consider, a miracle could make a world with a different past *converge* with our actual world, so that the future of that world exactly matches our actual future. In both cases we could have significant overlap in the course of events. Another way of putting this question: Why should we believe in an asymmetry of miracles? The idea that this is simply a convention we express in our intuitive judgements seems as unhelpful as Hume's conventionalism about the temporal precedence of causes.

6. Asymmetry of overdetermination. Lewis's answer points to a contingent fact about determination relations between earlier and later events. If we assume determinism, every fact has at least one *determinant*: a minimal set of conditions that is jointly sufficient for the fact to obtain, given the actual laws of nature. The short-circuit together with the presence of oxygen, etc., was a determinant of the fire's occurrence (i.e. the 'US' in INUS). But that condition was a determinant for many more facts or 'traces': a puff of smoke, a rise in temperature, a flash of light, etc. Lewis observes that these traces individually are not massively overdetermined by earlier sets of minimal conditions: only the short-circuit was their determinant. However, each of these many traces is itself a determinant of the the short-circuit, and so the short-circuit seems massively overdetermined by later facts. Hence, overdetermination seems to be asymmetric. This asymmetry explains the asymmetry of miracles, which in turn explains the asymmetry of counterfactual dependence, which in turn explains the asymmetry of causation.

7. Psychological Implausibility? One possible objection focuses on the fact that Lewis purports to capture our everyday, intuitive judgments about causation. Our everyday judgments indeed reflect the asymmetries, but it would seem to over-intellectualise our everyday notion to build in a tacit grasp of the asymmetry of miracles and overdetermination. Moreover, our intuitive grasp of similarity of worlds often needs to be corrected by Lewis' procedure of assessing relative similarity. For example, in comparing *w1*, in which Nixon did press the button and in which there was a nuclear war, and *w2*, in which Nixon did press the button yet in which there was no nuclear war, many intuitively judge that *w2* is closer to the actual world. But Lewis would have to correct this intuition, given that 'if Nixon had pressed it, there would've been a nuclear war' is intuitively true.

8**. Empirical worries?** Some have objected that the actual world doesn't seem to conform to (i) the asymmetry of miracles or (ii) the asymmetry of overdetermination. On (i): Adam Elga (2000) points out that the laws of thermodynamics allow a sequence of everyday events (e.g. cooking an egg) to unfold in the opposite direction—it is just extremely rare, because it would take a highly specific and weird microphysical event for a cooked egg suddenly to contract, leap upwards, and being enclosed in an egg shell. But as a convergence miracle, such a micro-intervention would be exactly what we need. So in a very close-by world in which the egg hadn't been cooked, Greta would not have broken it, and vice versa. On (ii): Another worry is that the time-symmetry of the laws of (at least) classical mechanics implies that direction really doesn't matter. So the future is determined by the past in just the way the past is determined by the future. Hence, for every later determinant of an event *e* at *t*, we can identify an earlier determinant. Overdetermination is not asymmetric.