Lecture 3 – Lewis, Part I: Counterfactual and Causal Dependence

1. "Necessary under the circumstances"

On Mackie's regularity theory, for *X* to be a cause of *Y*, *X* must be necessary for *Y under the circumstances*. And, for *X* to be necessary for *Y* under the circumstances, it must be an *INUS condition* for *Y*.

Lewis shares Mackie's position to the extent that he too takes a cause to be necessary under the circumstances. However, Lewis characterises this in a very different way—he does so **modally**. He defines causation in terms of **causal dependence**, and defines causal dependence in terms of **counterfactual dependence**.

2. Counterfactual Conditionals

Counterfactual conditionals (hereon 'counterfactuals') are conditionals of the form:

If it were the case that *X*, it would be the case that *Y*

These are not the same as standard 'if… then' conditionals (called "indicative conditionals"). Thus, we do not formalise these in the same way. We will follow Lewis in formalising counterfactuals as follows (to be read exactly as the natural language is rendered):

$$X \mathrel{\Box\!\!\rightarrow} Y$$

Lewis sets out the truth conditions for counterfactuals in terms of **possible worlds**. Possible worlds are *ways things might have been*. There is a vast array of these worlds, and they all stand in a **similarity** relation to one another. That is, they can all be compared and ranked on the basis of relative similarity, where (perhaps counterintuitively) **each world is most similar to itself**. And all other worlds are ranked according to **'distance'** from that world, where distance is measured in relative similarity.

Using these possible worlds, and the notion of similarity, we say a counterfactual of the form '$X \mathrel{\Box\!\!\rightarrow} Y$' is true if and only if **at all the closest possible worlds where *X* is true, *Y* is also true**. Or, expressed more succinctly, all the closest possible *X*-worlds are *Y*-worlds.

There are three different ways that this counterfactual can be satisfied:

(a) There are no *X*-worlds
(b) The actual world is an *X*-world, and a *Y*-world
(c) There are some possible worlds distinct from the actual world at which both *X* and *Y* obtain

If BOTH '$X \mathrel{\Box\!\!\rightarrow} Y$' and '$Y \mathrel{\Box\!\!\rightarrow} X$' are true, then ***Y* counterfactually depends on *X*.**

3. Causal Dependence

Lewis defines causal dependence in terms of counterfactual dependence. On this theory, *X* is *causally dependent* on *Y* if and only if BOTH of the following are true:

(1) $X \mathrel{\square\!\!\rightarrow} Y$

(2) $\neg X \mathrel{\square\!\!\rightarrow} \neg Y$

Importantly causal dependence **is not the same as causation**. We'll get into the details next week. For now it is enough to know that if *Y* is causally dependent on *X*, then *X* is a cause of *Y*; **but the converse does not hold**.

Let's apply the definition of causal dependence to an example. Take the short circuit again: a short circuit occurs and some time later a house fire occurs. Was the house fire causally dependent on the short circuit? To determine this, we need to determine the truth of the following two counterfactuals:

(1a) **Short Circuit** $\mathrel{\square\!\!\rightarrow}$ **Fire**

(2a) **¬Short Circuit** $\mathrel{\square\!\!\rightarrow}$ **¬Fire**

In the example, the short circuit and the house fire *actually* occur. Thus, since the actual world is closest to itself, it's true that the closest possible Short-Circuit-World is also a Fire-world. Therefore, **(1a) is true**.

Now we need to determine whether (2a) is true. To do this, imagine the closest possible worlds (i.e. the worlds as similar to ours as possible) where the short circuit does not occur. At those worlds, all of the other conditions (e.g. presence of oxygen, failure of sprinkler system, room temperature, the absence of arsonists, etc) are the same as at the actual world. In this case, without a short circuit, would the fire have occurred? No. Thus, **(2a) is also true**. Therefore, **the occurrence of the fire is causally dependent on the occurrence of the short circuit**.

4. Potential Objection?

Consider the following case: I draw a figure with three sides (S), that is, I draw a triangle (T). Both of the following are true:

(1b) $S \mathrel{\square\!\!\rightarrow} T$

(2b) $\neg S \mathrel{\square\!\!\rightarrow} \neg T$

But it follows from this that my drawing a triangle was causally dependent on my drawing a figure with three sides. And since causal dependence suffices for causation, it further follows that my drawing a figure with three sides *caused* my drawing a triangle. Lewis argues what's gone wrong here is that the events are not distinct, whereas, for causal dependence (and causation) **events must be distinct**.

Next week: Causation from causal dependence; counterexamples to the counterfactual theory