Counterfactual Theory of Causation
Counterfactual Conditional

- $A \rightarrow B$: if it were the case $A$, it would be the case $B$.

- Non-monotonic: $A \rightarrow B$ does not imply $A \& C \rightarrow B$.

- Non-transitive: $A \rightarrow B$, $B \rightarrow C$ do not imply $A \rightarrow C$.

- Non-contrapositive: $A \rightarrow B$ does not imply $\sim B \rightarrow \sim A$. 
Lewisian Semantics

- Basic idea: $A \rightarrow B$ is true iff. in any possible state of affairs (possible world) in which $A$ is true, and which resembles our actual state of affairs (actual world) as much as the truth of $A$ permits, $B$ is true.

- Suppose possible worlds can be ordered by their similarity to the actual world, and the order is a weak order (i.e., transitivity holds and any two possible worlds are comparable). $A \rightarrow B$ is true iff. (1) there is no $A$-world (possible world in which $A$ is true); or (2) there is an $A$-world in which $B$ is true, and which is more similar to the actual world than any $A$-world in which $B$ is not true.

* Lewis is famous for his modal realism: possible worlds are real.
Vague, but rightly so, as our judgments of counterfactuals are often vague.

Priority rules:
(1) It is of the first importance to avoid big, widespread, diverse violations of law;
(2) It is of the second importance to maximize the spatio-temporal region throughout which *perfect* match of particular fact prevails;
(3) It is of the third importance to avoid even small, localized, simple violations of law;
(4) It is of little or no importance to secure approximate similarity of particular fact, even in matters that concern us greatly.
An event $E$ counterfactually depends on another event $C$ if $O(C) \implies O(E)$, and $\sim O(C) \implies \sim O(E)$.

When $C$ and $E$ actually occur, $O(C) \implies O(E)$ is automatically true in Lewisian semantics, so counterfactual dependence reduces to the condition $\sim O(C) \implies \sim O(E)$.

Hume again, “… Or in other words where, if the first object had not been, the second never had existed.”
Causal Dependence

- An actual event $E$ causally depends on another (distinct) actual event $C$ if $E$ counterfactually depends on $C$.

- It is tempting to define “$C$ causes $E$” simply as “$E$ causally depends on $C$”.

- But that won’t do in view of preemptive causation.
Preemption

Two (or more) potential causes, one preempting the other, but the effect counterfactually depends on neither.

- Early preemption: the actual cause cuts the potential causal process before the actual causal process runs to completion. e.g. backup assassin.

- Late preemption: the actual cause cuts the potential causal process only after the actual process completes. e.g. two assassins (but one of them hits the victim first).

- Trumping preemption: both causal processes run to completion, but one trumps the other. e.g. two commanders for assassination (one order trumps the other).
Lewis’ Attempted Solutions

- Early proposal: define “causation” in terms of a chain of causal dependence. This works for early preemption, but doesn’t seem to work for other cases.

- To deal with late preemption, Lewis appeals to the idea of “fragility” of effect and “quasi-dependence”.

- More recently, Lewis proposes causation as influence to deal with trumping causation.
Cases of prevention challenge the necessity of counterfactual dependence for causation.

There are also challenges to the sufficiency of counterfactual dependence, most notably, cases that involve omission and prevention.