

§1 Overview

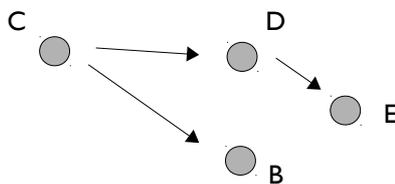
Three serious candidates for an analysis of causation:

1. Transference accounts
2. Varieties of counterfactual accounts
3. Minimal sufficiency account

- Strategy: Compare these three accounts by testing them against tricky cases.
- Redundant causation = cases where there are more than one event that are, in some sense, enough for the effect.

§2 Joint Effects

Example. The earlier air pressure causes both the barometer reading and the storm, which are thus joint effects of a common cause.



An account of causation needs to explain why B is not a cause of E.

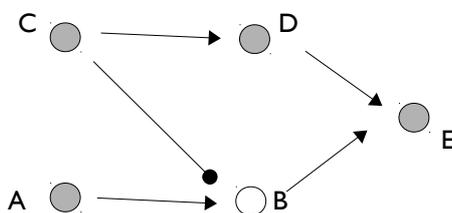
Joint effects pose no special problem for any of the three accounts of causation:

- Transference accounts: no significant momentum (etc.) is transferred from B to E.
- Counterfactual account: E does not counterfactually depend (in a non-backtracking way) on B.
- Minimal sufficiency account: B is not part of a minimally sufficient set for E since {D} is by itself sufficient for E and {B} is not sufficient for E.

§3 Early Preemption

Preemption = a cause C of some event E is accompanied by backups, poised to bring about E in C's absence.
 → comes in two varieties: *early* preemption and *late* preemption

Example of early preemption. Suzy and Billy are about to throw rocks at a bottle. Suzy throws first and so Billy does not throw at all. Suzy's rock hits and shatters the bottle. If Suzy had not thrown, Billy would have thrown and his rock would have shattered the bottle.



In this case C is a cause of E, while A (the preempted backup cause) is not.

- No special problem for transference accounts
- Counterfactual accounts are in danger of mistakenly *not* counting C as a cause of E because if C had not occurred, then E still would have occurred.
- Minimal sufficiency accounts are in danger of mistakenly counting A as a cause of E because {A} is minimally sufficient for E (if A by itself had occurred, then E would have occurred).

What should counterfactual and minimal sufficiency accounts say about cases of early preemption?

§4 Options for Counterfactual Accounts

§4.1 Appealing to transitivity

C causes E, iff: there is a chain of counterfactual dependence leading from C to E.

- Correctly predicts that C is a cause of E but A is not.
- However, it would make causation transitive by definition (that is, such that whenever C causes D and D causes E, then C also causes E.). There are reasons for thinking that causation is not always transitive.
- Does not work if there is “causation across a temporal distance.”

§4.2 Appealing to influence

- You might think that C “influences” E in the sense that small counterfactuals variations in the timing or circumstances of C entail corresponding variations in the timing or circumstances of E.
- But there are cases where one event is a cause of another event without influencing the time and circumstances of its occurrence (example: delayed light sensor).

§4.3 Gap strategy

- Basic intuition: the process leading to E that is initiated by C leads to completion, while the process initiated by A is cut short.
- Way of filling-in this idea: “[A] set of events S is a minimal dependence set (M-set) for E (where E is not a member of S) just in case, had none of the [actual or possible] events in S occurred, E would not have occurred, whereas the same is not true of any proper subset of S.”
- C is a cause of E iff there is some M-set for E of which C is the sole actually occurring member.

§4.4 De Facto Dependence

Basic idea: C causes E iff for some suitable fact F: if C had not occurred, and F had still obtained, then E would not have occurred.

Two components:

- story of what makes a fact F suitable
- account of how to evaluate complex counterfactuals where we hold certain facts fixed

Hitchcock's account:

- Make a causal model of the situation.
- C is a cause of E just in case there is at least one path from the C-variable to the E-variable, such that, given some fact about the values of off-path variables, E de facto depends on C, holding that fact fixed.
- Explains why C is a cause of E: there is path C-D-E, and holding fixed the fact that B does not fire, E counterfactually depends on C.
- Explains why A is not a cause of E: there is a path A-B-E, but there is no true fact to hold fixed such that E depends on A.

Yablo's account

- Hitchcock's account makes the wrong prediction about “short circuit” cases (Figure 11 in Paul & Hall).
- C is a cause of E just in case (i) there is some good F such that E F-depends on C; and (ii) this F is more natural than any bad G.
- An F (that is, a fact such that if we hold it fixed, E depends on C) is “good” just in case the events that E depends on if C had not occurred (holding nothing fixed) are not a subset of the events on which E depends holding F fixed; and “bad” otherwise.

§5 Minimal Sufficiency Accounts

The account can deal with early preemption if we build transitivity into it:

- C is a cause of E if (but not only if) C belongs to a unique set of contemporaneous events that is minimally sufficient for E.
- C is a cause of E just in case there is step-wise unique minimal sufficiency from C to E.