Causation

Regularity Theories of Causation

> "*The cause, then, philosophically speaking, is the sum total of all the conditions, positive and negative taken together, the whole of the contingencies of every description, which being realized, the [effect] invariably follows.*"
>
> —J.S. Mill

David Hume

- When David Hume was writing, many philosophers thought that causes *necessitated* their effects. That is, they thought that, nomologically, the occurrence of the cause was *sufficient* for the occurrence of the effect.
- So, if we're sitting around the camp fire and there is smoke coming off of the fire, and I poke the fire with my stick, the *fire* causes there to be smoke, but my poking with a stick *didn't* cause there to be smoke. That's because my stick isn't sufficient for the existence of smoke, but the fire *is*. The fire *necessitates* the existence of the smoke, but the stick *doesn't*.
  - Hume saw fire, and he saw smoke, but he didn't see the *necessity* with which the fire brought about the smoke. And, Hume thought, if you can't see it, then you can't have any idea of the *necessity* with which the cause brings about the effect.
  - Hume's diagnosis was this: there's nothing *out in the world* between the fire and the smoke—some *necessary connection* between the fire and the smoke. Rather, the only thing out in the world is the *constant conjunction* of fire and smoke. Whenever there's fire, there's smoke. When we're exposed to constant conjunctions of this kind, and we see some fire, we form the *expectation* that smoke will follow. This *expectation* is what we mistake for the *necessity* between the fire and the smoke.
- Hume's Account of causation, then, is (roughly) this: an event c caused another event e iff c is of type C and e is of type E, and events of type C are invariably followed by events of type E.

Types and Tokens

- *Tokens* are particular people, objects, events, *etc*. *Tokens* can be grouped together into *types*. A *type* of a token is the *kind* of token that it is.
  - So, for instance, here are several token events: my 15th birthday, my 28th birthday, Daniel's 17th birthday, Barack Obama's 37th birthday.

    * All of these token events are of the *type* BIRTHDAY.
    * There are many *token* shoes which are all of the same *type*. You and a friend can share the same *type* of shoe without sharing the same *token* shoes (you don't have to take turns wearing them).
    * A single token can belong to several different types. A single thing can be a token of the type COMPUTER and a token of the type MACBOOK and a token of the type MACBOOK PRO.
    * Question: how many words are in the line from the Gertrude Stein poem below?

      Rose is a rose is a rose is a rose.

      · Answer: it depends upon whether we're talking about word *types* (WORDS) or word *tokens*. There are 3 WORDS, and there are 10 words.

Type and Token Causation

- There are causal claims that relate *token* events. For instance: the Weimar Republic's printing money caused its hyperinflation; Chris's smoking caused his contraction of cancer; and Bob's drinking acid caused him to die.
    * These are sometimes called (as in the Mackie article) *singular* causal relations.
- There are also, however, causal claims that relate event *types*. For instance: PRINTING MONEY CAUSES HYPERINFLATION; SMOKING CAUSES CANCER; and DRINKING ACID CAUSES DEATH.
    * These are sometimes called (as in the Mackie article) *general* causal relations.
- It seems as though there has to be some kind of relation between the token causal claims and the type causal claims. Some people think that the type causal claims are more basic, and the the token causal claims hold in virtue of them. These people are usually called *generalists*. Others think that the token causal claims are more basic, and the type causal claims are just generalizations of the token causal claims (like we can say that 'Mammals feed their young with milk' is a true generalization about the behavior of *token* mammals). These people are called *singularists*.
- Regularity theorists like Hume and Mackie are *generalists*. They think that type causal claims hold in virtue of certain regularities, and that token causal claims are true in virtue of these type causal claims.

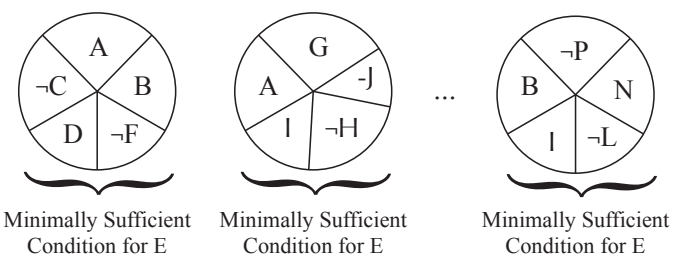
- Here's another way of putting Hume's theory: c caused e iff c is of a type C and e is of a type E, and, throughout the entire actual history of the world, the occurrence of an event of type C is *sufficient* for the occurrence of an event of type E shortly thereafter.
    - It never happens that an event of type C occurs *without* an event of type E occurring shortly thereafter.
- So, on Hume's theory, *this* fire caused *this* smoke if FIRE is sufficient for SMOKE.

J.S. Mill

- Mill also gives an account of causation in terms of sufficient conditions. However, he disagrees with Hume's account, since he thinks that the fire can cause the smoke even if FIRE isn't *always* followed by SMOKE. For another example (one that will show up later in the course): striking the match can cause it to light, even if striking doesn't *always* cause matches to light.
  - However, Mill thinks that the *total cause* is sufficient for the lighting, and that this *total cause* includes the striking as a *part*. This *total cause* will also include the presence of oxygen, the dryness of the match, the lack of a strong breeze, the lack of a nuclear explosion nearby, *etc*.
    - So, throughout the history of the universe, whenever there is oxygen, and the match is dry, and ..., and the match is struck, the match lights.
  - In general, Mill thinks that a causal claim 'c was a cause of e' just says that c was a *part* of the total cause of e.
    - Problem: but then why do we say that 'striking it caused the match to light', but not 'the presence of oxygen caused the match to light'?

J.L. Mackie

- Mackie's account resembles Mill's. He also thinks that claims of the form 'c was a cause of e' says that c was a *part* of a sufficient condition for e.
- Suppose that the effect is of the type E. Then, there will be several combinations of conditions which are all *minimally sufficient* to bring about an event of type E.



  - They are *minimally* sufficient because no proper subset of the conditions would also be sufficient to bring about an event of type E.
  - So, even though in the example above, $A \wedge B \wedge \neg C \wedge D \wedge \neg F$ is a sufficient condition for E, $A \wedge B \wedge \neg C \wedge D$ is *not* a sufficient condition for E.
  - The *disjunction* of all of the minimally sufficient conditions for E will constitute a *necessary* and *sufficient* condition for E.
- If A is a part of one of the minimally sufficient conditions for E, then A is an INUS condition for E.

- An INUS condition for E is an **I**nsufficient but **N**onredundant part of an **U**nnecessary but **S**ufficient condition for E.
  - An INUS condition for E is, roughly, a wedge in one of the circles in the diagram above.

- Mackie thinks that A needn't be an INUS condition for E in order to be called a *cause* of E. However, it must be *at least* an INUS condition for E.
  - A is *at least* in INUS condition for E just in case it is either an INUS condition for E, or an insufficient but nonredundant part of a *necessary* and sufficient condition for E (that is, it is a wedge in the *only* circle which is sufficient for E), or it is itself minimally sufficient for E (that is, it is in a circle all by itself), or it is itself both necessary and sufficient for E (that is, it is a circle all by itself, and it is the only such circle).
  - A more concise way of saying this: A is at least an INUS condition for E iff A is a (possibly improper) part[1] of a minimally sufficient condition for E.

- Mackie's account of causation:
  - c caused e iff c is of type C and e is of type E and C is a part of a minimally sufficient condition for E which actually obtained.

- So, to say that the strike caused the match to light is just to say that it was an essential part of a collection of conditions (including the presence of oxygen, the dryness of the match, *etc.*) which were jointly sufficient to bring about the match's lighting, and all of which actually obtained.

Causal Fields

- Here's some interesting phenomena about the kinds of causal claims we make:
  - Things we in one context treat as causes, we in other contexts are willing to treat as mere background conditions (and *vice versa*).
    - The Indian government fails to stock adequate reserves of food. There is then a flood, and people lose their crops and are unable to feed themselves. The government has no good reserves, and there is a famine.
    - If we take it for granted that the government didn't have food reserves, then it sounds alright to say

      The flood caused the famine.

      and a bit bad to say

      The government caused the famine.

      If, however, we take it for granted that there are natural disasters like floods every few years; and a government can be expected to know that *some* kind of food shortage will come around once every few years, then it sounds alright to say

      The government caused the famine.

[1] Every thing (and nothing else) is an improper part of itself.

– Which words we stress appear to make a difference to the truth of causal claims. Compare:

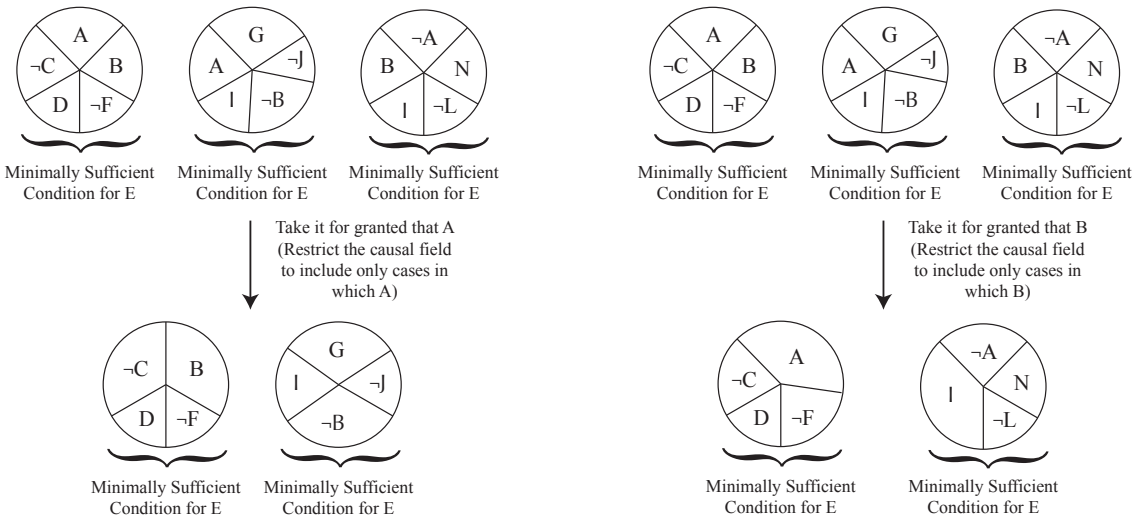
Socrates' drinking *hemlock* at dusk caused him to die.
Socrates' drinking hemlock *at dusk* caused him to die.

- Mackie makes sense of this phenomena with the notion of a *causal field*. He says that, when we are looking for the cause, we take some things for granted. When we do this, we're not asking for something which is a part of a minimally sufficient condition for the effect *in general*. Rather, we are looking for something that is a part of a minimally sufficient condition for the effect *holding fixed the things we're taking for granted*.

- The restricted set of cases within which we're looking for a part of a minimally sufficient condition for the effect is called *the causal field*. Whenever we make a causal claim, we are making it relative to some causal field or other.

- If I ask why somebody got cancer, it can be fine to answer "her exposure to radiation caused her to get cancer." (The causal field here is the set of all people.) If, however, I know that the woman was exposed to cancer, and I want to know why she got it, while others who were exposed to cancer did not, then "her exposure to radiation caused her to get cancer" is *not* a fine causal claim. (The causal field here is the set of all people exposed to radiation.)

- Changes in the causal field can affect which sorts of things it is appropriate to cite as causes.



- Now, we can make sense of the fact that, in one context, it is fine to say that "the government caused the famine" (because it is part of the causal field that there will be a disaster—we want to know why *this* disaster was followed by famine, while others were not) while, in the other context, it is not fine to say "the government caused the famine" (because it is part of the causal field that the government doesn't have food—we want to know why there was a famine *now*, while in other times in which the government didn't store food, there wasn't a famine).

- And we can make sense of the weirdness with emphasis.
  - The stressed sentence "Socrates' drinking *hemlock* at dusk caused him to die" presupposes that Socrates drank *something* at dusk. So the causal field is the set of all people who drink things as dusk. Drinking hemlock is a part of a minimally sufficient condition for death in this causal field. So the causal claim is true.
  - The stressed sentence "Socrates' drinking hemlock *at dusk* caused him to die" presupposes that Socrates drank hemlock. So the causal field is the set of all people who drink hemlock. Drinking hemlock at dusk is *not* part of a minimally sufficient condition for death in *this* causal field. So the causal claim is not true.

Problem Cases for Mackie's Account

Preemption

- A man has all the conditions which are sufficient for a stroke at 4:55, which will guarantee death at 5:00. However, at 4:50, the man suffers an unrelated heart attack which ends up killing him at 5:00.
- It is right to say that the heart attack caused the death, and it is incorrect to say that the any of the conditions for the stroke caused the death. However, all of these conditions were minimally sufficient for the death at 5:00, and all of them actually obtained.
  - Mackie: in this case, the stroke does not occur. Which means that the heart attack or one of its causes or effects removed one of the conditions in the minimally sufficient condition to bring about a stroke. So, as a matter of fact, not all of the conditions sufficient to bring about a stroke were actually present.

Indeterminism

- It seems like it is possible to have causation even when nothing which actually occurs is completely *sufficient* for the effect to occur.
- Suppose that there's an indeterministic bomb which will, if activated, explode if and only if a radium atom decays before its half-life. Suppose that the decay of a radium atom is a genuinely chancy event. No amount of detail about the radium atom or its state would let us know whether it will decay before its half-life. I activate the bomb, and it explodes.
  - It looks like, on Mackie's account, my activating the bomb *isn't* a cause of the explosion, since there's no minimally sufficient condition for the bomb's explosion.