I. Mackie: Causes and Conditions

Summary

Humean account:
1) Regularity (C necessary and sufficient for E)
2) Causal priority = temporal priority

Modifications:
1) Regularity = C is at least an INUS condition for E
2) No clear account of causal priority, but not identical to temporal priority

1. Singular causal statements and INUS Conditions

Example: The short-circuit caused the fire.

Neither necessary nor sufficient, but a necessary part of a sufficient condition.

Def. A is an INUS condition for P if for some X and Y, (AX ∨ Y) is a necessary and sufficient condition for P, but A is not sufficient for P and X is not sufficient for P.

Notes:

1) If “X” is missing (so A is sufficient) or “Y” is missing (so A is necessary) or both, then we say A is at least an INUS condition.

2) If A is part of every disjunct that was present, then A is necessary post factum.
(Wicket keeper example)

Causation. A is a cause of P if:

i. A is at least in INUS condition of P: AX ∨ Y, A ∨ Y, AX, or A is a necessary and sufficient condition of P.

ii. A was present.

iii. X (if any) was present.

iv. Every disjunct not containing A (if any) was absent.

Justification:

1. Intuitive fit with examples (e.g., the short circuit)

2. Technique for refuting a causal claim: refute one or more of i) - iv).
2. Difficulties and Refinements

a) Causal fields

A causal field F is the context or set of background conditions against which a singular causal claim is assessed. For a general causal claim, the causal field F is the population or ‘region’ in which causes and effects are assessed.

Examples:

i) General causation. What causes AIDS?
   F = All human beings. Cause is the HIV virus.
   F = Humans who are HIV positive. ??

ii) Particular causation. What caused Mrs. Smith’s nausea?
   F = humans. Cause is pregnancy (morning sickness)
   F = pregnant women. ??

Remarks:

1. Some background field is always assumed (full explicitness is impossible).
2. What counts as a cause in relation to one field may not be a cause in relation to another.
3. The choice of field is arbitrary or pragmatic and often vaguely specified.
   In cases of singular causal claims, the field is often the history of the object, or the relatively permanent features of a thing, but salient parts may be extracted.
   Ex: is my genetic make-up a cause of early heart disease? Or is this a relatively permanent part of my nature and part of the causal field?
4. Modified theory of causation: claims are relative to a causal field. Replace clause (i) with:
   A is a cause of P relative to F, if, given the features that characterize F, A is at least an INUS condition for P.
5. The causal field explains how we can talk about sufficient causes that are less than the total state of the universe. Such causes are defeasible by some unforeseen modification of the causal field, but we take the field for granted.
b) *Indeterminacy of causal claims*

We may assert “A caused P” if we know that X and Y exist, even if we don’t know what X and Y are.

*Examples:* Television causes violence; Smoking causes cancer.

c) *Overdetermination and pre-emption cases.*

*Overdetermination:*

lightning / cigarette both start a fire ⇒ barn burns down
two bullets through the heart at same time ⇒ death

*Pre-emption or overdetermination:*

heart attack at 4:50 ⇒ death at 5:00
stroke determined to occur at 4:55 ⇒ death at 5:00
[pre-emption if stroke is prevented by heart attack]
[overdetermination if stroke occurs anyways]

*Pre-emption:*

Smith and Jones rob a bank ⇒ robbery occurs
If not, others in the syndicate would do it ⇒ robbery occurs

Logical form:

\[ AX \lor \overline{AZ} \text{ is necessary and sufficient for } P, \text{ and both } X, Z \text{ are present.} \]

Mackie’s account solves the pre-emption cases but not the overdetermination cases, but he thinks that is just right.

*Pre-emption cases:* A is not strictly necessary but is an INUS condition and is necessary *post factum*. So A is a cause iff A occurs, and A is a cause iff A occurs.

(Also: X is a cause iff A occurs, and Z is a cause iff A occurs. This handles the desert traveler case.)

*Overdetermination cases:* neither bullet (or: neither the lightning nor the cigarette) is a cause of death. Only the disjunction is necessary and non-redundant.

Such cases are precisely where our ordinary conception of causation breaks down, so it’s appropriate to give no clear answer.
3. **General causal statements**

*Example:* restricting credit causes unemployment.

Neither necessary nor sufficient.

Analysis parallel to singular causal statements:

A causes P relative to a causal field F if, relative to F, A is at least an INUS condition for P, etc.

Benefit: we can ‘measure’ the sophistication of the theory.

Given F, AX ∨ Y is necessary and sufficient for P

where F, X and Y can be existentially quantified (unsophisticated) to precisely specified (sophisticated theories).

Mackie thinks that causal laws have this form too.
*4. Necessity and sufficiency (crucial section)

a) Initial thesis: just use 1st order generalizations.

S is a necessary condition of T $\iff$ All T are S
S is a sufficient condition of T $\iff$ All S are T

or

S is a necessary condition of T in the field F $\iff$ All FT are S
S is a sufficient condition of T in the field F $\iff$ All FS are T

b) Singular causal claims: not adequate, since generalizations would be trivially true.

Alternative: use counterfactual and factual claims:

S is a necessary condition of P $\iff$ If S had not occurred, P would not have occurred.
S is a sufficient condition of P $\iff$ Since S occurred, P occurred.

Account of counterfactual and factual conditionals:

Telescoped arguments involving additional sustaining premises; these are all universal generalizations or singular propositions.

Ex: Suppose a short-circuit did not occur. Then (using other premises) it is entailed that a fire did not occur.

So we still have an analysis in terms of simple universal statements.

We *can* infer the universal

“All cases of a short circuit are cases of this house’s catching fire”;

it is not trivially true, but derived from wider context.

[Compare: Lewis-Stalnaker “closest world” semantics. In those worlds, you keep the laws constant and as many particular facts as possible. But there is no claim of entailment.]

c) Gappiness.

We can make these assertions without being able to give the complete argument.
8. Direction of Causation

No resolution, but some useful programmatic reflections.

i) The relation of causal priority is part of causal claims, and is asymmetric.

ii) It is not identical a priori with temporal priority: even if invariable, the connection is synthetic.

iii) No need to include this relation in analysis of necessity and sufficiency.

iv) Need to supplement “at least an INUS condition” with this causal priority relation, since under relatively light constraints, “at least an INUS condition” is symmetric.

v) Analysis in terms of controllability is somewhat helpful, but ultimately unsuccessful.

   If we can control A without making use of B, then A is causally prior to B.
   But “control” is a causal notion, so this will not give a non-circular analysis of causal priority

Best hope:

Popper’s suggestion (ripple analogy): if A and B are causally related, A is a single event and B is an occurrence which involves “coherence” of many separated items, then A is causally prior to B and not the reverse. (cf. Reichenbach and prevalent direction of conjunctive forks)

9. Conclusions

a) Still a regularity theory (setting aside causal priority):

   The ‘primitives’ of the analysis are still universal propositions.
   [Depends on success of analysis of counterfactual and factual conditionals.]

b) Unites singular and general causation.

   Analysis of singular causal claims is in terms of complex and elliptical universal claims.
II. Critique/assessment of Mackie

1. Scriven

a) Regularity accounts purport to eliminate the concept of cause as fundamental to our world.

Such accounts fail: any regularity approach inevitably involves conceptual or ostensive circularity.

Conclusion: cause is a fundamental concept.

Basic cases: experiment and observation

Experiment: whenever, and only when, C produced, E occurs. Then C is the cause of E.

Observation: C just occurs on occasions, and is always accompanied by E; and E never occurs except after C. Then C is the cause of E if we can conclude that C would always be accompanied by E, no matter how produced. (Problem: spurious causation.)

Complex cases

i) Compound causes: C and D needed to bring about E. Both are causal factors.

ii) Multiple causes: C, D each sufficient to bring about E, and nothing else is. Whichever occurs alone is the cause; if both occur, we test whether one of them had no effect by following intermediate links.

In cases of independent over-determination (= pre-emption), there is only one cause.

In cases of simultaneous over-determination (= overdetermination), neither is the cause.

In cases of multiple causes, you can’t infer that C is a necessary condition for E, but we try to save it as “necessary in the circumstances” (Mackie: necessary post factum).

Ex: political revolution over-determined by multiple factors.
**Fragile event strategy:** We try to save necessity *post factum* by describing the effect in very explicit terms – in particular, bring its *time of occurrence* into the description.

This solution fails because of *linked over-determination*: cases where the different causal factors are not independent, and one will be actuated if the other is prevented.

Ex: military will overthrow the government if the political coup fails. Here you can’t say: “if the coup had not happened, the government would not have fallen at such and such a time” – but it might even have fallen earlier!

**Variant:** The cause is necessary for *the way* in which the effect arose.

But not all the particulars about the way in which the effect arose require the cause as a necessary condition, and how do we determine which details are historically relevant? The answer is to look at the consequences of occurrence or non-occurrence of these details for the occurrence of the main event (effect) being explained – but “consequence” is a causal notion!

So no *reductive* analysis of causation in terms of regularity is possible.

2. **Kim**

Focus on ontological framework (*events* plus other categories).

Main criticism:

- What replaces event variables A, B, … are *singular terms* referring to unique individual events
- But Mackie compounds or negates these using logical connectives like ‘not’ and ‘and’, and represents the necessary and sufficient condition for an effect using d.n.f.

**Question:** The connectives can’t have their usual meaning, since they are being applied (non-standardly) to singular terms. What do they mean? How are AB, A ∨ B, A related to the simple events A and B?

Need to bring in event-types, etc. Hausman does this in any case.
III. Hausman

3.1 Hume’s theory

Covered last week. Of note:

1) Distinction between *causation* and our *concept of causation*. The idea of necessary connection is a feature of our concept, but not of causation itself. (37, 39)

2) Treatment of ‘similar’ events in terms of laws of nature. (38)

3) A commitment to a deterministic theory of *causation* is not a commitment to universal determinism. (38)

3.2 Constant Conjunction: critique of Mackie

Mackie’s INUS condition:

All F(AX ∨ Y) are P and all F(P) are AX ∨ Y → A is an INUS condition.

“Causal field” F: constituted by causes that are relegated to the background for pragmatic reasons.

i) Logical/ontological clarification

Do the variables A, X, etc. stand for particular events, propositions, or properties?

- not particular (token) events: can’t be conjuncts, disjuncts, etc.

- not propositions, because if A and P are both true, then “A ≡ B” is trivially true so that anything true is nec. and suff. for anything else that’s true

- leaves properties or event types

“Necessary and sufficient in the circumstances”

Re-formulation of Mackie’s INUS condition: there exist X and Y such that

\[(x)[Fx \rightarrow (((Ax \& Xx) \lor Yx) \leftrightarrow Px)]\]

where we are quantifying over particular events.

Then a is a cause of b if such a regularity holds, and Fa, Pa, Aa, Xa but not Ya. Also, we need to know that A is not redundant.
ii) Some Problems

a) Asymmetry.

Flagpole/angle of sun: The most one can say is that \( a \) being at least an INUS condition for \( b \) is a necessary condition for the existence of a necessary connection between \( a \) and \( b \).

[Note: Mackie himself acknowledges need to bring in a relation of causal priority.]

b) Lawlikeness.

The INUS condition might reflect an accidental regularity.

Ex: coin tossed twice (heads), then destroyed.
Better example: Nobody in this room has $10,000 in his/her pocket.

Tossing this coin is at least an INUS condition for the coin to land heads. But there is no constant conjunction here.
Being in this room is not a cause of having less than $10,000 in your pocket.

Amended condition DC (43).

Regularity condition becomes: \( a \) is nomically necessary and sufficient in the circumstances for \( b \).

The asymmetry is built in through temporal priority of the causal event.

Amended view of constant conjunction:

Token events are linked by laws.
If it were possible to recreate the circumstances, a regularity would appear.

We still have the problem of lawlikeness, but that plagues every account of causation.
3.3 Neo-Humean theory of causation

Def. \(a\) is a direct cause of \(b\) iff

\begin{itemize}
\item i) \(a, b\) are distinct and contiguous
\item ii) \(A\) is necessary and sufficient in the circumstances for \(B\)
\item iii) \(a\) precedes \(b\).
\end{itemize}

*Indirect cause*: unidirectional chain of direct causation from \(a\) to \(b\)

Remarks (still unsatisfactory):

a) would rule out remote causation not involving any chain.
b) clause iii identifies *causal priority* with *temporal priority*.

The priority issue:

- Objection: if temporal priority constitutes causal priority, we need evidence of this
- Horwich makes temporal priority constitutive of causal priority on weak evidence, and even undermines it with his defense of simultaneous causation

**Simultaneous causation:**

- board example and the ensuing debate
- even without an example, must we build current physics into our theory of causation?
- constitutive accounts make it impossible to explain the coincidence of the direction of time and of causation

**Amended Humean accounts:**

- Relax temporal priority

Ex. 1: Reichenbach. Define basic causal priority temporally, then extend to causal priority using “causal betweenness”. But the latter is undefined.

Ex. 2: Horwich. Define basic causal priority as temporal priority, then extend to causal chains by maximizing “causal continuity”.

Problem: Causal continuity does not prescribe a unique direction in complex cases. SO the direction is really pre-supposed by the direction of the overall change, rather than determined by it.

If one could know, independently of the causal chain, that the beginning event caused the end event, then one can use this criterion to define the direction for simultaneous links.

Hausman ends up giving up on simultaneous causation and formulates the theory in terms of temporal priority: \(a\) begins before \(b\) begins.
3.4 Spurious causation

**Problem:** Hume’s theory falsely implies that when \(a\) and \(b\) have a common cause, then the earlier event causes the later event.
- certainly implies this if \(a\) and \(b\) are contiguous events, so he focuses on this special case (lightning/thunder)

**Diagnosis:** “direct causal connection” is symmetrical, and direct causation is just direct causal connection plus temporal priority.

The only way to avoid this implication is a) to deny that effects of a common cause are (directly) causally connected, or b) to find a better account of causal priority that is not just temporal priority.

Hausman has already (for now) abandoned b), but looks at a).

i) Not truly contiguous. Hopeless – e.g., relations between mirror images of cause and effect.

ii) Stronger requirement for direct causal connection, e.g., “basic law” (Horwich).

*Objection:* will also rule out clear cases of causal connection.

iii) Explicit condition added to Humean account: if \(a\) and \(b\) are effects of a common cause, then not directly connected.

*Objection:* \(a\) and \(b\) might still be directly connected (e.g., two metal plates in contact, each heated from the same source, will also heat each other).

iv) Same idea: \(a\) causes \(b\) if the usual Humean conditions are met, and also when one ‘controls’ for common causes, \(A\) is still necessary and sufficient in the circumstances for \(B\). (Including the common cause should make \(a\) redundant, if that common cause is all that brings about \(b\).)

But then it seems that \(A\) is NOT ‘at least an INUS condition’ for \(B\) anyways, so we don’t need to amend our account.

*Objection:* the same argument would show that \(C\) is not ‘at least an INUS condition for \(B’\), if one includes \(A\) among the circumstances. NO way to rule out the bad cases without also taking along some of the good cases.

If we try to appeal to the causal priority of \(c\) (rather than \(a\)), we risk ruling out \(a\) as a cause if the chain runs \(c \rightarrow a \rightarrow b\).

Humeans have no other resource: there is more to causation among particulars than regularity, contiguity and temporal priority.
3.5 Redundant causation

i) *Overdetermination.*

Ex: firing squad. None of the shots is necessary in the circumstances for the effect, so none counts as a cause for the Humean account.

But such cases cause trouble for any theory of causation.

ii) *Preemption.*

Ex: desert traveler

Correct theory: the preempting cause causes the death, not the preempted cause.
Humean theory: neither is necessary in the circumstances (which include the presence of the other potential cause), so neither is a cause.

1st response: appeal to causal chains.

Only direct causes need be nec. and suff. for effects.
Work backwards from the effect, and we see that only the preempting cause is an indirect cause; the other has its causal chain cut.

This solution works quite well, though it depends upon causal intermediaries between the preempting cause and the effect, with these intermediaries cutting the other ‘backup’ causal chain.

This is the basic response Hausman wants to endorse.

2nd response: fragile event.

When the effect is described in suitably narrow terms, the preempting cause (but not the preempted cause) becomes necessary in the circumstances.

**Objection 1:** This commits one to counting everything that affects any detail of an event as a cause. One *can* ask for causal explanations at different levels of detail (granularity), as in the Boddie example. But then one can seek explanation at a general enough level that neither factor is necessary in the circumstances.

**Objection 2:** Cases where the ‘fragile event’ approach makes no sense.
Ex: second murderer refills the canteen with poisoned liquid. Victim would have died in the same way and at the same time had the second murderer not acted.

**Upshot:** Hume has trouble with overdetermination, but so does everybody. Hume can do fine with preemption cases, using causal chain approach.
3.6 Problems of causation

Summarizing, Humean account faces three problems.

1. **Laws.** No theory of laws and of relations between laws and specific nomic INUS conditions.

2. **Spurious causation.** Must either falsely imply that successive and contiguous effects of a common cause are related as cause and effect, or deny that causal intermediaries are causes.

3. **Causal priority.** Rules out *a priori* backwards causation and remote causation (**not the Enquiry**).

Many virtues:

1. **Intuitive fit.** Apart from the above problems, fits our intuitions and explains away the one it does not fit (necessary connection).

2. **Empirical adequacy.** Apart from spurious causation, fits common and scientific usage.

3. **Epistemic access.** Problem of identifying causal relations is just the problem of identifying nomic regularities – and this will be a problem faced by any theory of causation (and explanation).

4. **Competitors.**

5. **Metaphysical coherence and fecundity.** Coherence depends upon how we fill out the account with a story about laws of nature. Fecundity is obvious: heavily used and widely adopted.

*Main problems for theories of causation:*

1. Regularity and necessity: singular vs. general causation, laws, necessity, probabilistic causes
2. Contiguity
3. Priority: causal priority and temporal priority
4. Spurious causation
5. Redundancy: preemption and overdetermination
IV. Eells, Introduction

Main ideas:
- nature of and problems associated with probabilistic causality
- discussion of type and token causation

1. Characterization of probabilistic causality

Motivation:
1. Indeterministic physical theories
2. Scientific explanation and probabilistic laws (whether or not determinism is true)
3. Rational decision (Newcomb-type problems)

Rough characterization: “Causes raise the probabilities of their effects.”

Two initial difficulties:

1. Choosing the appropriate ‘background’ population (or causal context) for causal claims

a) Simpson’s paradox

Presence and direction of correlation can be different in an overall population from how it is in each sub-population.

Example: Graduate admissions

Assume 100 male and 100 female applicants.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>English</th>
<th>Education</th>
<th>OVERALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10 / 20</td>
<td>36 / 60</td>
<td>6 / 20</td>
<td>52 / 100</td>
</tr>
<tr>
<td>Female</td>
<td>20 / 40</td>
<td>6 / 10</td>
<td>15 / 50</td>
<td>41 / 100</td>
</tr>
</tbody>
</table>

- Acceptance rate is the same in each department for M and F (can even set up the example so it’s higher for F than for M)
- But overall acceptance rate for males is much higher (because more males applied to departments with higher acceptance rates)

Do we say that being male was a cause of (or was positively correlated with) acceptance?
No: the ‘right’ place to look is at the department level, where decisions are made.
b) Further sub-population effects.

Smoking and heart disease. 100 smokers, 100 non-smokers.

<table>
<thead>
<tr>
<th></th>
<th>Heart Disease</th>
<th>No heart disease</th>
<th>P(H / S&amp;E) = 0.022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smoke &amp; exercise</strong></td>
<td>2 / 100</td>
<td>88 / 100</td>
<td></td>
</tr>
<tr>
<td><strong>Smoke &amp; don’t exercise</strong></td>
<td>4 / 100</td>
<td>6 / 100</td>
<td>P(H / S&amp;~E) = 0.4</td>
</tr>
<tr>
<td><strong>Don’t smoke &amp; exercise</strong></td>
<td>1 / 100</td>
<td>49 / 100</td>
<td>P(H / ~S&amp;E) = 0.02</td>
</tr>
<tr>
<td><strong>Don’t smoke &amp; don’t exercise</strong></td>
<td>7 / 100</td>
<td>43 / 100</td>
<td>P(H / ~S&amp;~E) = 0.14</td>
</tr>
</tbody>
</table>

- Within the *subpopulations* E and ~E, S raises probability of H
- But overall, P(H / S) = 0.06 which is less than P(H / ~S) = 0.08.

Explanation: smoking positively correlated with exercising, which is a negative factor for heart disease.

In general: the negative factor may *outweigh* (as here), *exactly cancel*, or be *outweighed by* the positive factor.

In both cases a) and b), causes DO raise the probability of their effects once we find the partition of the whole population into appropriate sub-populations.
2. Understanding change in probability: token-level vs. type-level claims

Type-level causal claims:
- causation is a relation between event types, or properties
- involve comparison of conditional probabilities within appropriate sub-populations

Token-level:
- causation is a relation between particular, actually occurring token events
- involve how the probability of exemplifying a factor in an individual varies over time (probability trajectories)

Abstract Example:
P(E) = 0.6 overall.

But:
P(E) becomes low 90 per cent of the time that C is manifested.
P(E) becomes high 10 per cent of the time that C is manifested.

Overall, P(E / C) < P(E), so at the type level, C is causally negative for E. But in the atypical particular cases where P(E) becomes high, C is causally positive for E.

Concrete case:
E is catching influenza during the year.
C is getting a flu shot.

Most don’t get flu shots, so overall 60% catch flu.
90% of the population will respond well to flu shots: probability is greatly lowered.
10% of the population will respond badly to flu shots: probability is greatly increased.

We want to claim both of the following things:

1) Flu shots help prevent flu (i.e., are causally negative for influenza). (Type level – look at conditional probabilities)

2) If Fred is disposed to respond badly and in fact gets influenza after the flu shot, then the flu shot caused (or: was causally positive for) his influenza. (Token level – look at probability trajectory)
3. Independence of type-level and token-level causal claims

Two theses:
1) Type-level causal claims have little or no bearing on token-level claims
2) Token-level claims have little or no bearing on type-level claims

**Thesis 1**

“Type A is a probabilistic cause of type B” is consistent with:

a) Not all token A’s are token causes of token B’s.
b) No token A ever causes a token B.
c) No token A ever occurs.
d) Everything in the population is a token A, but not one is a token B.

**Example:** A = smoking; B = lung cancer.

Consider the claim

(*) Smoking causes lung cancer.

a) Harry is a heavy smoker but does not get lung cancer.
   Larry is a heavy smoker but gets lung cancer from some other cause.
b) No smokers actually get lung cancer.
c) Nobody ever smokes.
d) Everyone smokes and nobody gets lung cancer.

**Explanations:**

All of a) - d) are easily seen to be consistent with (*) if we assume indeterminism.
   [Compare: a coin biased for 90% heads that never comes up heads, is never tossed, etc.]

But even assuming determinism, all of a) - d) are consistent with (*).
The key here is the causal field: the physical context against which token (and type) causal claims are made.

a) Causal field for Harry includes factors that counteracted impact of smoking.
   Causal field for Larry includes these factors plus overexposure to asbestos.

For claims b) - d), we need to understand the type-level causal claim as asserting a connection between two properties that holds whether or not it is exemplified.

Intuitive example: Drinking a quart of plutonium causes a quick death. True in virtue of human physiology, chemistry etc. even if never exemplified.
b) Nobody’s field is quite right: all smokers are like Harry, and those who are not happen to be non-smokers.
c) Like plutonium case.
d) Everybody’s causal field happens to deterministically guarantee that they will die from some other cause before lung cancer develops.

Objection to d):
Should we not then say smoking does not cause lung cancer, given these fields?

Response (and further clarification of the proper interpretation of type-level claims):

Parallel example: “This coin is biased to 90% heads.”

- Interpretation 1: Relative frequency of heads in (finite) sequence is .9 (Hopeless)

- Interpretation 2: Limiting frequency in endless (actual) sequence is .9. (Bad: it’s still possible to get a different limit.)

- Interpretation 3: Limiting frequency in a hypothetical infinite sequence is .9. (Propensity view)

**Probability is NOT the same as frequency**
[stopping-times]

Smoking example: “Smoking causes lung cancer.”

- Interpretation 1’: Relative frequency of L / S exceeds that of L in a finite population. (Hopeless)

- Interpretation 2’: (Generalization over instances). Relative frequency of L / S exceeds that of L in the actual (indefinite) human population. (Rejected)
  - makes the connection to token causation
  - but requires actual instantiation (cf. plutonium case)
  - unable to accommodate all of Eell’s examples a) - d)
  - details of the proposal (implications for individual instances) are unclear
Interpretation 3’: Limiting frequency in hypothetical populations of the same kind as the actual population.

Problem:
- kind H (= simply human) or kind Q (= perverse causal fields that lead to death before lung cancer develops)?

Response:
- the relevant population is of both types
- but it’s clear that the claim involves the kind H, not Q which is accidental

In such a population, smoking is “Pareto-positive” with respect to lung cancer for each individual: either neutral or causally positive. So in the hypothetical population, there is the connection between type and token causation.

Upshot: there are so many ways that token-level situation can be consistent with what happens at the type-level that there is no way to link them up.

Qu: Law of large numbers? Isn’t it at least probable that the token-causes will line up with the type-cause, if the fields match?
Thesis 2

What happens at type-level is independent of what is true at token level.

1) Token events are tokens of many types.
   [But this problem is ‘solvable’ for the smoking case!]

2) Some token causes can raise the probability of their token effects, while others can lower it.

Ex: Dretske-Snyder cat.

Common set-up:

State S′: no shot; cat lives

C: place device next to cat

State S: revolver shot; cat dies (E)

Case 1: nice kitty

The cat dies. There is both type causation and token causation from C to E (or from the token c to the token e). For 0.1 is higher than spontaneous probability of death.

Case 2: bad kitty

The cat is already scheduled for death, so the ‘experiment’ lowers the probability to 0.1. Still, the system enters state S and the cat dies. Here we have token causation of e from c, but not type causation of E from C.

The example shows that you can have “probability-decrease token causation.”

Main Objection:

Fragile event (and fragile type) story: choice of reference class