Philosophy 125 — Day 25: Overview

- No Office Hours W (Branden). But, today (4–6), and Next Week: Monday (2–4), Tuesday (4–6), and Wednesday (2–4). V&J's hours to be posted.
- Final Exam Questions: TBA before 12/01/03 (stay tuned to email/web)
- Plan: Two more lectures on causation (including today), then a final review
- Agenda: Introduction to Causation, Cont'd
  - Some hints on Study Questions #2 and #3 (next slide)
  - Then, back to our Six Questions about the causal relation
    - What are its *relata* (category)? (done)
    - How finely grained are the *relata* (individuation)? (done)
    - How many *relata* are there (adicity)? (done)
    - What distinguishes causal from non-causal sequences (connection)? (today)
    - What distinguishes causes from effects in causal sequences (direction)? (next)
    - What distinguishes causes from conditions in causal seqs (selection)? (next)
  - After the 6 Questions, we'll look at two specific theories (time permitting)

Some Hints on Study Questions #2 and #3 from Assignment #2

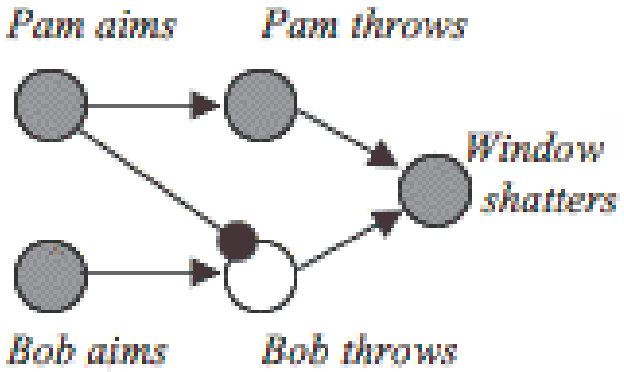
- **Study Question #2**. In lecture, I gave precise definitions of "intensional operator", and "opaque sentence", with several examples (including examples involving modal operators). These appear in *Lecture #18, slides #9 – 12*.
- **Study Question #3**. Loux and Van Cleve make a big deal out of the fact that "sets have their members necessarily". They use this to undergird criticisms of trope-theoretic accounts of abstract reference and bundle-particulars:
  - There couldn't have been more or fewer courageous people than there actually are, if "Courage" is taken to be the set of courage tropes.
  - Socrates couldn't have had any properties other than those he actually has (no *de re* contingencies), if Socrates is taken to be a set (bundle) of tropes.
- In S.Q. #3, I am asking whether similar complaints could be made about Lewis' theories of properties *&* propositions, which take them to be *sets*. Or, would such complaints be based on misunderstandings of Lewis' accounts? **Hint**: read carefully pages 92–3 of Loux (especially, note 28 on page 95).

Introduction to Causation III: What *is* the causal *relation*? 2

- **Connection**: *Many* proposals for the nature of the relation. But, a few *kinds*:
  - Probability change proposals (all these *entail* that $\Pr(e|c) > \Pr(e|\neg c)$):
    - nomological subsumption (Davidson, Kim)
    - statistical correlation (Good, Suppes, Eells, Pearl)
    - counterfactual dependence (Lewis, Menzies, Yablo)
    - agential manipulability (Gasking, von Wright, Price, Woodward)
  - Process proposals (these all involve some process "connecting" *c* and *e*):
    - contiguous change (Ducasse)
    - energy flow (Castaneda)
    - physical processes (Russell, Salmon, Dowe)
    - property transference (Aronson, Ehring, Kistler).
  - Hybrid proposals: (Fair, Dowe, Paul, Schaffer, Hall)
  - Primitivist proposals: (Anscombe, Tooley, Carroll, Menzies)
  - Eliminativist proposals: (Russell, Quine, more recently Norton)
- Both probability and process views have encountered troublesome cases . . .

- **Preemption** (probability raising is not necessary for causation):

  Suppose that Pam and Bob each aim a brick at a window. Pam throws and shatters the window, while Bob holds his throw on seeing Pam in action (*i.e.*, because she aims). It seems Pam's throw caused the window to shatter — her brick is what crashes through the glass. But it does not need to be the case that Pam's throw raised the probability of the shattering — if Bob is a more reliable vandal, then Pam's throw might even have made the shattering *less* likely.



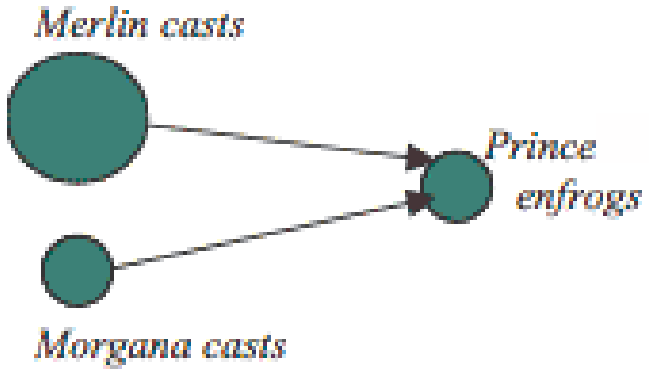
• The filling of a circle (not to be confused with the *highlighting* of a circle) represents the event occurring.

• The ——● link represents a *prevention*.

- Responses: (1) Hold fixed *intermediary causal factors* (Lewis, Eells, Yablo). If one *holds fixed* the fact that Bob holds his throw, then Pam's throwing *does* raise the probability of the window shattering. (2) Require *precision* in the effect (Lewis, Paul). Then, Pam's throwing will be the cause of the window shattering *in a precise way* (different from the *precise* effect of *Fred's* throw).

- **Trumping Preemption** (preemption *&* no intermediaries or precisifications):

  Suppose that the laws of magic say that the first spell cast on a given day matches the enchantment that midnight. Merlin casts a spell (the first that day) to turn the prince into a frog, Morgana casts a spell (the second that day) to turn the prince into a frog, and at midnight the prince turns into a frog. It seems that Merlin's spell caused the prince to turn into a frog – his spell was the first cast that day, and that's what the laws of magic identify as the relevant feature. And, if Morgana is the more reliable wizard, then the chance of the enfrogging would have been greater had Merlin left the job to Morgana. It does not need to be the case that there are any intermediary events at all in the story – the magic might as well work directly. And it need not be the case that there would have been any differences (no matter how precise) in what befalls the prince had Merlin left it to Morgana.

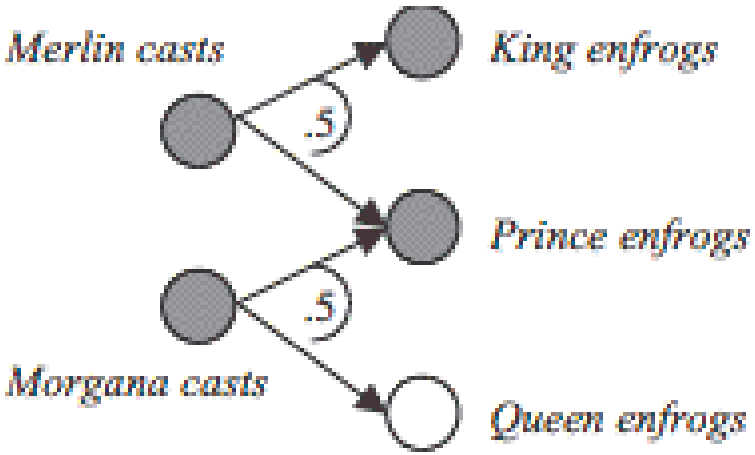


• We suppose that neurons can fire in various colors (representing various possible spells), and that by law, when a neuron receives multiple stimulations, it fires in the color matching that of the biggest neuron (representing the first spell that day) stimulating it.

- If you don't like magic, replace the two wizards with a major and a sergeant (say, identical twins) who simultaneously yell "Advance!" to their soldiers. The soldiers hear both, and march *because* the *major* yells, *not* the sergeant (the non-magical laws of the military ensure that!). It also seems that there are no intermediaries to hold fixed (the orders are yelled simultaneously, neither causes the other), and no precisifications of the effect seem to help either. The soldiers would have marched in exactly the same way on either of the orders.

- **Fizzling** (probability raising is not sufficient for causation): In the above preemption example, it seems that Fred's aiming did not cause the window to shatter – Fred's brick never touches the glass. But it might be the case that Fred's aiming *raised the probability of* the shattering. If there was some non-zero chance that Fred would succeed, and some non-one chance that Pam would succeed, then Fred's aiming did place the window in greater danger.
- As in the case of preemption, the responses to fizzling examples are either to (1) *hold fixed some causal intermediary* (like Fred's holding his throw), or (2) *go precise* with the specification of the effect (time/manner of its occurrence).

- **Overlapping** (fizzling & no intermediaries or precisifications):
  Merlin casts a spell with a .5 chance of turning the king and prince into frogs; Morgana casts a spell with an independent .5 chance of turning the prince and queen into frogs; and the king and prince, but not the queen, then turn into frogs. It seems that Morgana's spell did not cause the prince to turn into a frog – the fact that the queen was unaffected shows that Morgana's spell fizzled. Nonetheless, Morgana's spell raised the probability of the enfrogging. As before, it need not be the case that there are any causal intermediaries, and it need not be the case that there would have been any differences in the effect (no matter how precise).

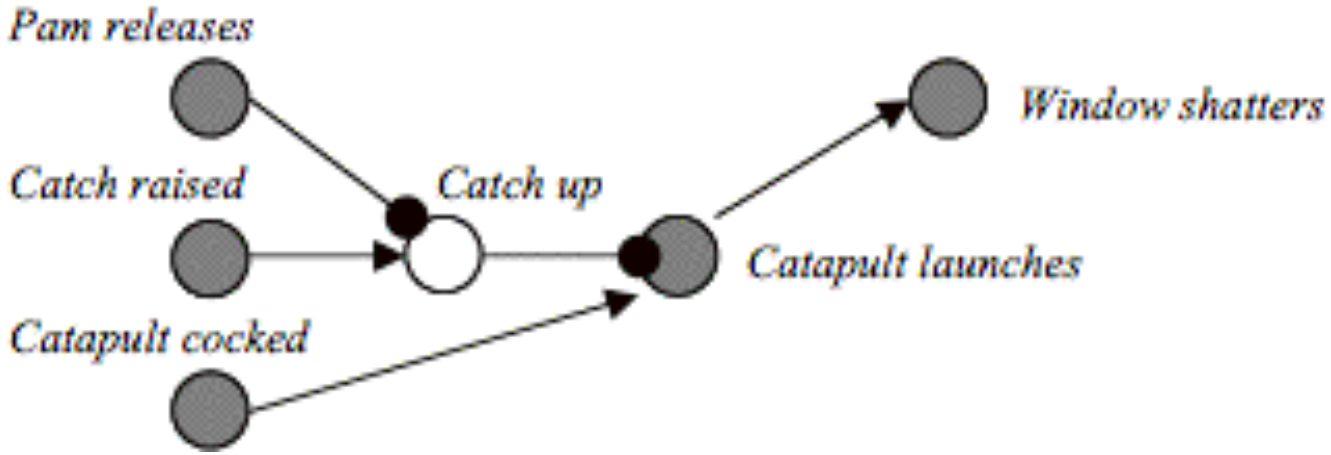


- Here, an arc with a number represents a conjunctive effect with a certain probability.

- Pr(Prince enfrogs | Merlin & Morgana) > Pr(Prince enfrogs | Merlin & ~Morgana)

- Here, one is tempted to require a *physical process connecting cause and effect*. That is, some sort of *transmission of energy or momentum, etc. But* . . .

- **Disconnection** (causation without any "connecting" physical process): Suppose that Pam catapults her brick through the window rather than throwing it. Then it seems that Pam's catapulting the brick causes the window to shatter – can it really matter here whether Pam catapults the brick or throws it? But there need be no process connecting Pam's releasing the lever and the flight of the brick through the window – no relevant energy-momentum flow, track of mark transmission, or persisting trope connects them. Rather what is happening here is that the cocked catapult is prevented from launching by the catch, and Pam's releasing the lever prevents the catch from preventing the launch – the catapult is thus unleashed. The process of launch is purely internal to the catapult.

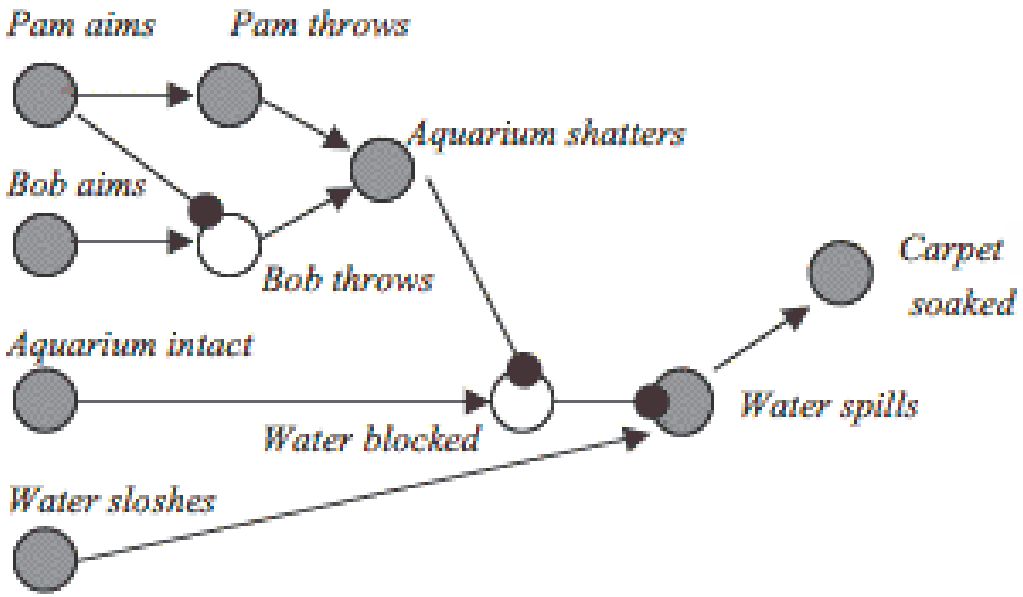


- A simpler example: John removes the safety net which would have prevented the acrobat from plunging to his death, and the acrobat dies as a result.

- Main Reply to disconnections: deny they are genuinely causal. Aronson:
  Consider a weight that is attached to a stretched spring . . . the catch that holds the spring taut is released, and the weight immediately begins to accelerate. One might be tempted to say that the release of the catch was the cause of the weight's acceleration. If so, then what did the release of the catch transfer to the weight? Nothing, of course.
- Since disconnections involve preventions of would-be-preventers, and since prevention involves absences, one might reject causation by disconnection for the general reason that there is no absence causation. *E.g.*, one might deny that a causal connection can run through the absence of a catch. Maybe, *but* . . .
  Misconnection: Suppose that Pam throws her brick the window, while innocent Tom watches in dismay, or throws purple paint at Pam's brick. Then it seems that Tom's watching or paint-throwing does not cause the window shattering. But there is a process connecting Tom's watching or paint-throwing to the shattering. When Tom watches there will be photons connecting him to the shattering. When Tom throws paint at the brick there will be a track of purple paint from Tom's hand to the brick to the window. (Misconnections might be subdivided into micro-connections, which are of the wrong magnitude, and pseudo-connections, which are of the wrong sort.)

- Two main replies to misconnection:
  - *Bite the bullet*: The connection between Tom and the window shattering *is* causal, but *negligible*. Intuitions to the contrary might be written off – Davidson style – as confusing causation and explanation. Tom's paint throwing doesn't *explain* the shattering, but it is *causally connected* to it.
  - *Fine-grain the processes*: In the case of the paint connection from Tom's throwing to the window shattering, the line of paint persistence and the line of brick flying through window might be regarded as distinct and merely coincident (Dowe). In this way it might be denied that there is a genuine process connecting the misconnecting non-cause and the effect.
- Disconnection and misconnection cases seem to show that process-linkage is unable to provide necessary or sufficient conditions for causation. And, these cases might suggest that connection is a matter of probabilities rather than processes. The disconnecting cause and the effect are linked by probability, while the misconnecting non-cause and the effect are not — revenge for the probability theorist? Maybe probability and process views are *partially* true.
- Perhaps what we need is a *hybrid* theory combining probability and process.

- Schaffer: causes as *probability-raisers of processes*. Hybrid is as hybrid does: Pam throws a brick through the wall of an aquarium, preempting Bob from doing so. The shattering then causes the soaking of the carpet, by preventing the glass from preventing the water from spilling — a preemption case fed into a disconnection case. It seems that Pam's throw caused the soaking of the carpet – her brick is what broke the aquarium. Pam's throw may have lowered the probability of the process producing the soaking (if Bob is a more reliable vandal) by preempting Bob. And Bob's aiming might have raised the chance of the spillage process, by threatening the aquarium.



• Pam's throw *lowers* the probability of the process leading to the soaking.

• Bob's aiming *raises* the probability of the process leading to the soaking.

• But, Pam's throw is the *cause*.

• There are many other more complex hybrid cases in the current literature. No single theory "gets" all examples.

Introduction to Causation III: What *is* the causal *relation*? 3

- The failure to produce an account of causation that gets all the examples "right" has lead some to the view that causation must be taken as *primitive*.
- A more popular reason for taking causation to be primitive: it is *too central* to our understanding of the world, and so must be primitive or basic for us.
  - The notion of a *law of nature* presupposes causation (Armstrong)
  - Determining which background conditions must be held fixed in assessing *statistical correlations* presupposes causation (Cartwright)
  - Determining which background conditions may be held fixed in *counterfactual suppositions* presupposes causation (Kvart)
  - The notion of *agential intervention* presupposes causation (Hausman)
  - Determining which are the "real processes" presupposes causation (Sayre)
  - The very notion of *event* presupposes causation, since *properties themselves* are individuated by their causal roles (Shoemaker). "With regard to our total conceptual apparatus, causation is at the center of the center." (Carroll)

- Two arguments *against* primitivism:
  - *Humean, Epistemic Worries*: All we can observe is sequences of events. We could never come to know any facts about causal connection if it is anything over and above such sequences (*e.g.*, if it is primitive). Note: this is really a worry for most of the modern (modal) accounts anyway!
  - *Primitivist Replies*: (*i*) primitive connections can be directly observed, at least in certain favorable cases such as willing or pressure on the body (Anscombe, Strawson, Armstrong); or (*ii*) primitive connections can be theoretically inferred *via* inference to the best explanation (Tooley).
  - *Garden Path to Eliminativism*: If science provides the criterion for which basic entities one ought recognize, then the question must arise as to whether one could do science without any causal primitive whatsoever. One might conclude that causation must either reduce or face elimination.
- **Eliminativism**. Two Russell Quotes: "The law of causation . . . is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm." "In the motions of mutually gravitating bodies, there is nothing that can be called a cause, and nothing that can be called an effect; there is merely a formula."

- The eliminativist views the causal concept as a naively animistic projection of agency onto the world, to be superseded in a sophisticated scientific scheme.
- Russell's argument is effective against a *primitivist* treatment of causation. But, a *reductivist* will say that causation *reduces to* scientifically respectable entities. On this view, "event," "law," "cause," are nomic concepts that allow a systematic understanding of science; but they don't "appear in the equations."
- *However*: It is one thing to *say that* causation can be *reduced to* more primitive concepts in our best scientific theories, but it's quite another to *show that* this can be done. Norton (2003) argues that this *can't* be done. He

  > . . . explains the prevalence . . . of causal notions in science by arguing that a causal character for many sciences can be recovered, when they are restricted to appropriately hospitable domains. There they conform to loose and varying collections of causal notions that form folk sciences of causation. This recovery of causation exploits the same generative power of reduction relations that allows us to recover gravity as a force from Einstein's general relativity and heat as a conserved fluid, the caloric, from modern thermal physics, when each theory is restricted to appropriate domains. Causes are real in science to the same degree as caloric and gravitational force.

Introduction to Causation III: What *is* the causal *relation*? 4

- Most people think causation is *asymmetric*. But, what distinguishes causes from effects? That is, what determines the *direction* of the causal relation?
- There are six main arguments concerning the direction of causation. Three of these arguments say that causal direction matches temporal direction. Three of these arguments say that causal direction does not match temporal direction.
- **Bilking**: The main argument that causal order matches temporal order is the bilking argument (Black). A drawing made by an alleged clairovoyant on Monday might be caused be a pattern made Tuesday. But, as Mackie explains:

  > On every occasion, after the drawing is made, it is possible that someone or something should intervene so that the corresponding pattern fails to be produced . . . [So] it cannot on any occasion be the pattern that is responsible for the details of the drawing: the precognition hypothesis must be false even for those occasions when the device is not stopped, when the pattern is actually produced and turns out to be just like the drawing.

  ∴ Backwards causation is impossible. There are two main replies to bilking.

- *Intervention Restriction* (Dummett): The bilking argument only applies to cases in which human intervention is possible. What is there to prevent backwards causation when human intervention is ruled out?
- *Determinism/Indeterminism Dilemma*: If the world is deterministic, then the bilking intervention is impossible, as it will already be fixed that the later cause will occur. If the world is indeterministic, then the bilking intervention is possible but no longer problematic, as the case will then be one in which the earlier event (*e.g.*, the clairvoyant's drawing) is an uncaused indeterministic eruption. [Is this second horn right? What about indeterministic causation?]
- **Time Travel**: The first main argument *against* the causal order matching the temporal order is that backwards causation *is* possible in cases of time travel.
- It seems metaphysically possible to enter a time machine at t_1, thus causing oneself to exit the time machine at an earlier time t_0. Gödel found solutions to Einstein's field equations that permit such loops: "By making a round trip on a rocket ship it is possible to travel into any region of the past, present, and future and back again, exactly as it is possible in other worlds to travel into distant parts of space."

- There are three main replies to the time travel argument.
- *Time travel is incoherent.* A variety of incoherencies are alleged, including (*i*) the incoherency of changing what is already fixed (the past), of (*ii*) being both able and unable to kill one's own ancestors, or of (*iii*) generating a causal loop and a reflexive relation of "self-causation". Gödel solutions may be dismissed as mathematical artifacts, not reflecting any possible situation. [If you think time travel is incoherent, read Vranas' paper, which argues that it is not.]
- *Local Direction.* Time travel involves *locally forward* causal steps. In Gödel solutions, spacetime is structured in such a way that a series of locally forward steps produces a globally backwards path. This is compatible with the causal order being the temporal order, at least (locally) at each particular step.
- *Redescription.* Any alleged case of time travel is open to redescription: Instead of the time traveler entering the machine at t_1 and exiting at t_0, this may be redescribed in terms of the spontaneous creation at t_0 of one individual, and the spontaneous disappearance at t_1 of another, with coincidental correlations between them (different people, so no paradoxes).