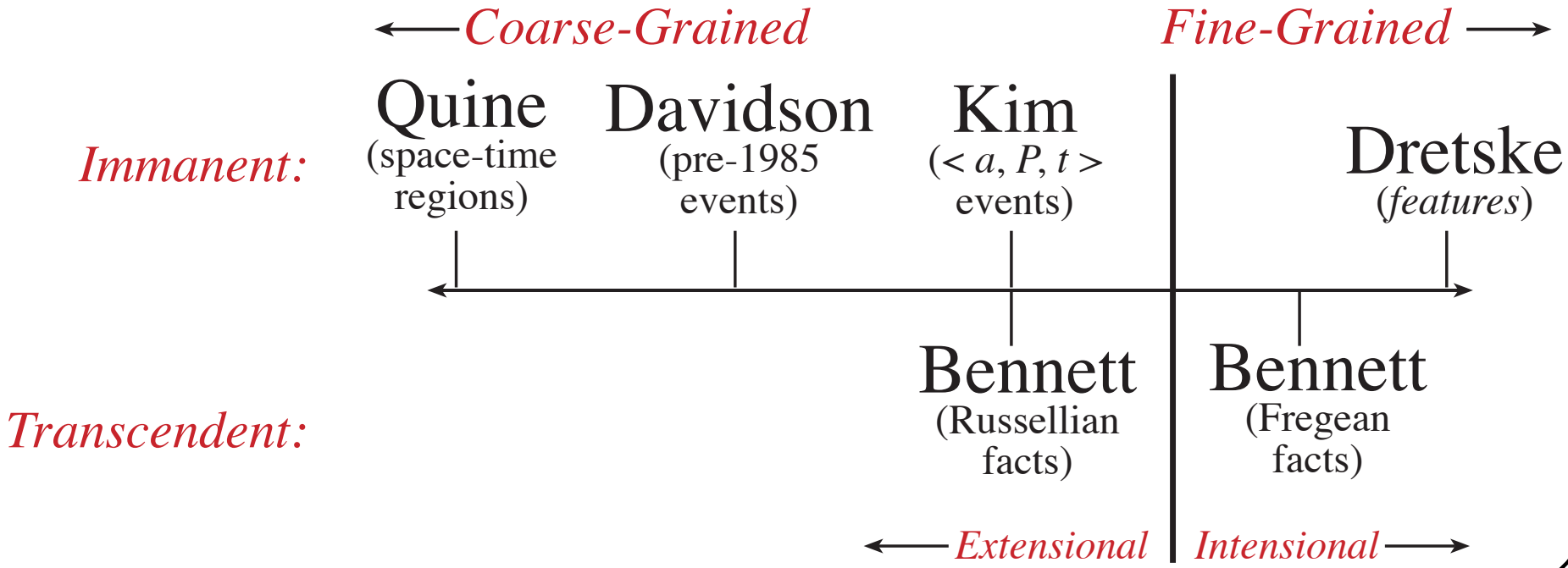
Philosophy 125 — Day 24: Overview

- Extra Office Hour Tomorrow (Branden): 2–3 F
- Colloquium Today @ 4pm in 305 Moses (Howison Library)
  - "How to Win Friends and Influence Truth-Value Without Really Being"
    - Steve Yablo (MIT: Linguistics & Philosophy)
    - A new account of claims with empty definite descriptions . . .
- Agenda: Introduction to Causation (Schaffer, Cont'd)
  - Six questions about the causal relation (everyone agrees it is a *relation*!)
    - What are its *relata* (category)? (done – brief review)
    - How finely grained are the *relata* (individuation)? (done – brief review)
    - How many *relata* are there (adicity)? (today)
    - What distinguishes causal from non-causal sequences (connection)? (today)
    - What distinguishes causes from effects in causal sequences (direction)? (. . .)
    - What distinguishes causes from conditions in causal sequences (selection)? (. . .)
  - After the 6 key questions, we'll compare a few particular theories of causation (. . .)

Introduction to Causation II: What *are* the *relata* of the causal relation? 4

- How are the causal relata *individuated*? Specifically, how *fine-grained* are they? These questions are directly related to the Category question.

	Coarse-Grained	Fine-Grained
Immanent	Quine, Davidson	Kim, Lewis, Dretske, Armstrong
Transcendent	[unoccupied]	Bennett, Mellor



Introduction to Causation II: What *are* the *relata* of the causal relation? 5

- **Adicity**: How many relata are there in the (singular) causal relation?
- I will discuss arguments for 2 and 4. Some have proposed 3 as the right adicity. But, as Schaffer explains, there seems to be good reason to reject 3.

  > Three relata views preclude *causal chains*. In a causal chain the effect at the first link serves as the cause at the second. For this to be possible, cause and effect must be formally exchangeable: the same structure must flank both sides of the relation. Suppose the first domino knocks over the second, which then knocks over the third. The binary theorist can say that *c*: the toppling of the first domino, causes *d*: the toppling of the second; and that *d* in turn causes *e*: the toppling of the third domino. The quaternary theorist can say that *c* rather than $c*$: the first domino's remaining upright, causes *d* rather than $d*$: the second domino's remaining upright; and that *d* rather than $d*$ causes *e* rather than $e*$: the third domino's remaining upright. But if there were contrasts on only one side of the relation, then no such chains could be constructed.

- I'll discuss one argument for 2-adicity, then three arguments for 4-adicity.

- **Surface Form**: The surface form of causal claims is *binary* (2-ary).

Causal claims like "the short circuit caused the fire" make no explicit reference to any contrasts. Such claims can be felicitously uttered out of the blue (in discourse initial position), and so do not require any antecedent contrast setting or presupposition fixing. Davidson sought the logical form of such surface-binary utterances. He rejected the notion of causal relevance, because "There is no room for a concept of 'cause as' which would make causality a relation among three or four entities rather than between two."

- *Contrastive Surface Forms*: "Pam's throwing the rock rather than the pebble caused the window to shatter," "Pam's throwing the rock caused the window to shatter rather than crack," *etc.* Surface form doesn't seem decisive.
- *Hidden Contrasts*: "Ann prefers chocolate" may be used as a reduced expression of the proposition that Ann prefers chocolate *over vanilla*. Here the contrast does not need to be explicitly articulated, or even noted earlier in the conversation. Preference claims *do* have a contrastive form beneath their binary surface, and causal claims might also have such hidden structure.
- *Revisionism*: The *logical form* of causal *statements* should not have the last word in *metaphysics* — we may have theoretical reasons to reject 2-arity.

- **Determinacy**: Binary causal claims are *indeterminate* (relation *ill-defined*).

Suppose Jane smokes moderately, and develops lung cancer. Does Jane's moderate smoking cause her lung cancer? Perhaps there is no determinate answer unless one fixes the *causal alternative*: "Relative to heavy smoking, moderate smoking . . . prevents lung cancer; relative to abstaining, moderate smoking . . . causes lung cancer". And, suppose Pablo is choosing between blue, red, and green paint for his canvas. Does Pablo's choosing blue paint rather than red cause the canvas to be blue? Perhaps there is no determinate answer. Pablo's choosing blue paint rather than red causes the canvas to be blue rather than red, but does not cause the canvas to be blue rather than green. Perhaps, then, *contrasts* are required for *both cause and effect*, in order for causal claims to have determinate truth-values.

- *Biting the Binary Bullet*: The main reply is that binary causal relations *are* well defined. This reply applies a binary account of causation to problem cases such as the smoking and painting cases, and simply reads off a truth-value, whatever it may be. *E.g.*, one might think that a counterfactual account of causation, on which we check whether *e* would still have occurred had *c* not occurred, simply rules that Jane's smoking causes her lung cancer, and that Pablo's choosing blue paint causes the canvas to be blue, full stop.

- **Immanence Revisited**: 2-ary can't reconcile immanence/absence causation.

Additional argument places reconcile immanence with absence causation (which a binary account cannot do). The reconciliation is attempted through treating absence-claims as setting the contrast to the associated occurrence. For instance, "the gardener's failing to water the flowers caused the flowers' wilting" is to be interpreted as: what the gardener actually did (*viz.*, the actual event of his watching television) rather than watering the flowers (the non-actual event that is the associated occurrence) caused the flowers to wilt rather than blossom. And this claim may well be true. In this way, all four of the relata may be treated as immanent entities, and absence causal claims may still come out true. Indeed, in this way absence causation requires no special provisions at all (and, as Phil Dowe has explained, this is not the case on virtually any binary theory of causation).

- *No Reconciliation is Needed*: Immanence needs no revisiting. No reconciliation of absences and immanence is needed, and so no additional argument places are needed. This reply may take the form of denying immanence (that is, embracing facts), denying that absences are causal, or maintaining that there are immanent absences. We discussed these above.

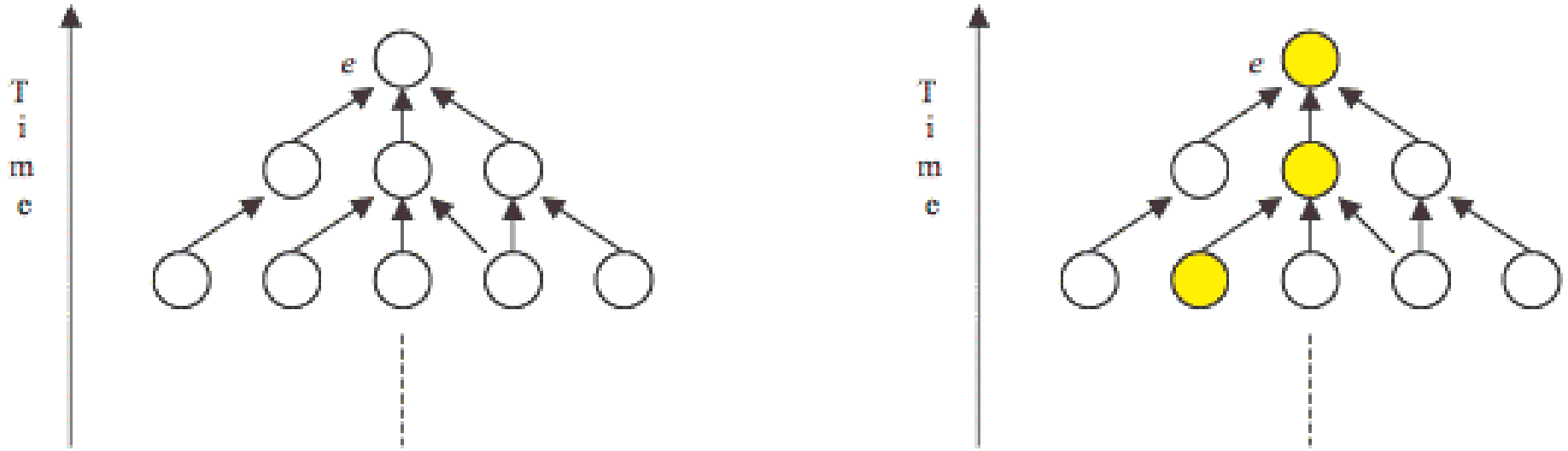
- **Individuation Revisited**: 2-ary can't sticky the slope to Dretskian causation.

The third main argument for 4-arity revisits individuation, and maintains that additional argument places tame the causal differences argument. Recall our concern that the causal differences argument *overextends*, in requiring that Socrates' *drinking hemlock* at dusk, and Socrates' drinking hemlock *at dusk*, differ as causal relata. A 4-arity theorist can treat focal differences as *contrastive differences*. Thus "Socrates' *drinking hemlock* at dusk" is to be interpreted as c: Socrates' drinking Hemlock at dusk, rather than $c*$: Socrates' drinking wine at dusk (or some other contextually salient alternative to drinking hemlock); while "Socrates' drinking hemlock *at dusk*" is to be interpreted as c: Socrates' drinking Hemlock at dusk, rather than $c*$: Socrates' drinking hemlock at dawn (or some other contextually salient alternative to occurring at dusk). And these different contrasts may induce different effects. So, focal differences may be allowed to yield causal differences, without having any implications for individuation, much less the extreme fineness of the Dretskean view.

- *No Slippery Slope Needs Stickying*: No taming of the causal differences argument is required. This reply may (*i*) maintain the Davidsonian distinction between causation and explanation, (*ii*) allow that causation is an intensional relation, or (*iii*) accept the extremely fine-grained Dretskean view of the relata.

Introduction to Causation III: What *is* the causal *relation*? 1

- There are four main metaphysical questions about the causal relation:
  - **Connection**: What distinguishes causal *vs* non-causal relations?
  - **Direction**: What distinguishes causes *vs* effects in causal sequences?
  - **Selection**: What distinguishes causes *vs* conditions in a causal nexus?
  - **Other**: What other properties does the causal relation have?
- We will address the first three questions explicitly, and the fourth implicitly.
- First, we will introduce a theory-neutral, diagrammatic way of representing a causal nexus (*i.e.*, a network of causal sequences): *network diagrams.*
- The nodes "◯" of a network diagram represent causal *relata*. The arrows "⟶" represent causal *connections*. The causal history of an effect *e* (top node) is a network, which branches into the "causal past" of *e*. Selection of the *causes* (*vs conditions*) in a network is done by *highlighting* a *causal path.*
- Theories of relata are theories of "◯", theories of connection/direction are theories of "⟶", and theories of selection are theories about *highlighting*.



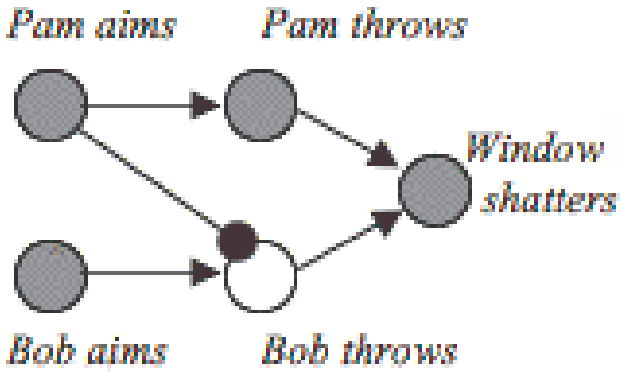
- Example #1 (without selection): *neuron diagrams* used by Lewis. In neuron diagrams, "◯"s doubly represent neurons that fire and events that occur, and "⟶"s doubly represent synapses that stimulate and causation that obtains.
- Example #2 (without selection): also implemented in the *directed acyclic graphs* (DAGs) used in causal modeling (*e.g.*, Reichenbach, Good, Pearl).
- In directed acyclic graphs, nodes doubly represent *variables* (*types*) with a range of values and occurrences with a range of possibilities, and links doubly represent structural equations and causal parenthood (*not actual* causation).

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:
    - nomological subsumption (Davidson, Kim)
    - statistical correlation (Good, Suppes, Eells, Pearl)
    - counterfactual dependence (Lewis, Menzies, Yablo)
    - agential manipulability (Gasking, von Wright, Price, Woodward)
  - Process proposals:
    - 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)
- 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.



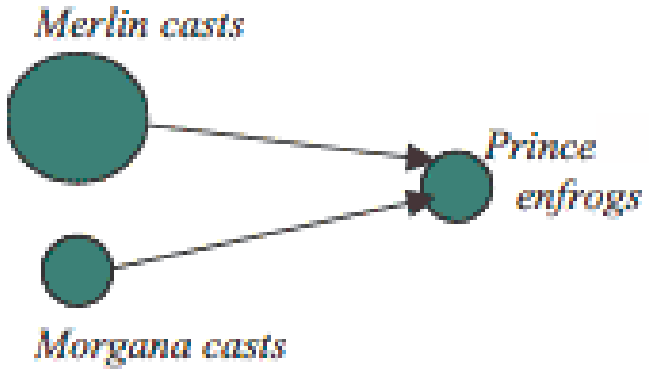
• The filling of a circle (not to be confused with the *highlighting* of a circle) represents the event occurring.

• 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.

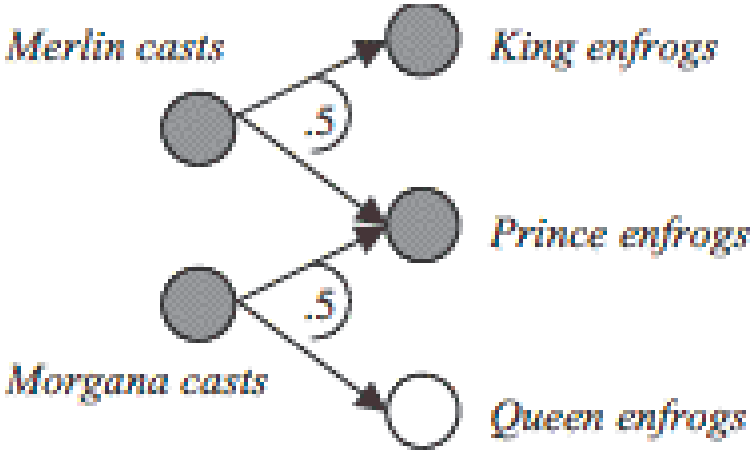


• We suppose that neurons can fire in various colors (representing various possible spells), and that by law, when a neuron receives multiple stimulations, it fires in the color matching that of the biggest neuron (representing the first spell that day) stimulating it.

- 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).

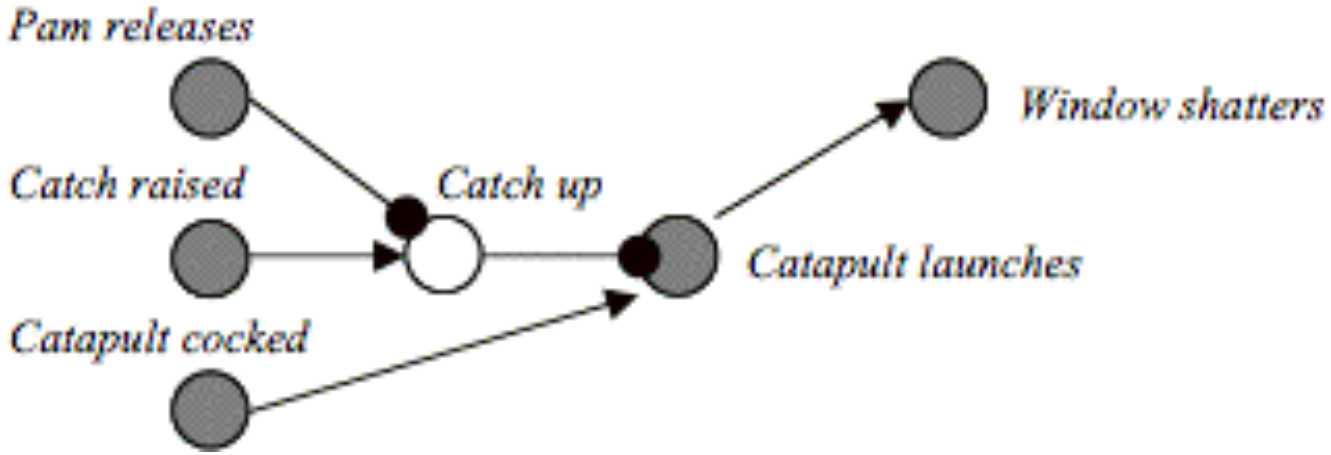


- Here, an arc with a number represents a conjunctive effect with a certain probability.

- 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.

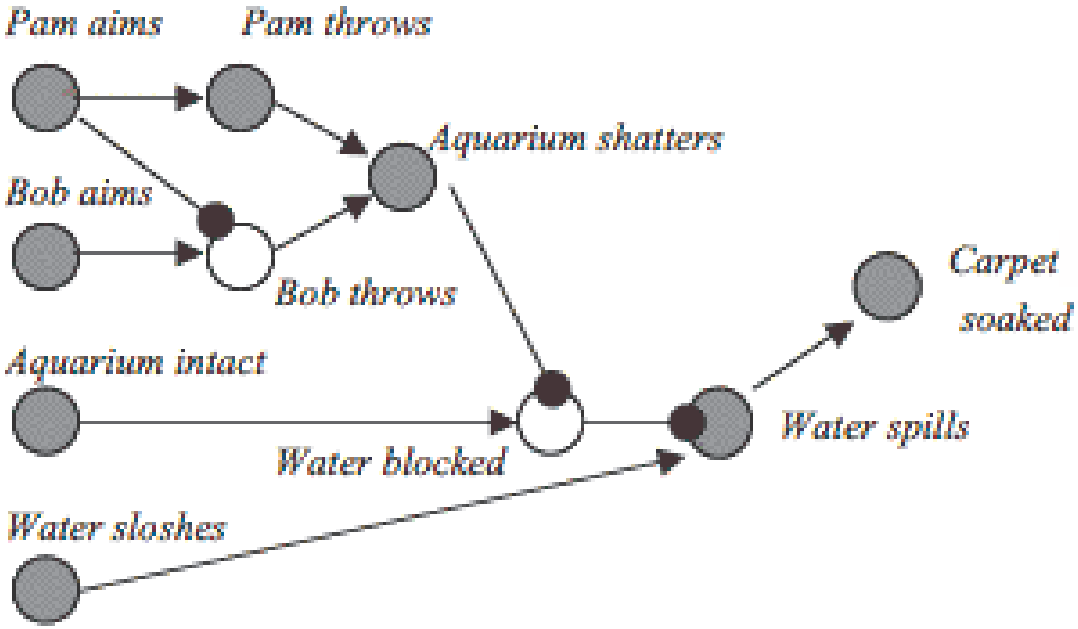


- A simpler example: John removes the safety net which would have prevented the acrobat from plunging to his death, and the acrobat dies as a result.

- 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*.