Evaluating Causal Counterfactuals with Simulation and a Default World.

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What is causality?

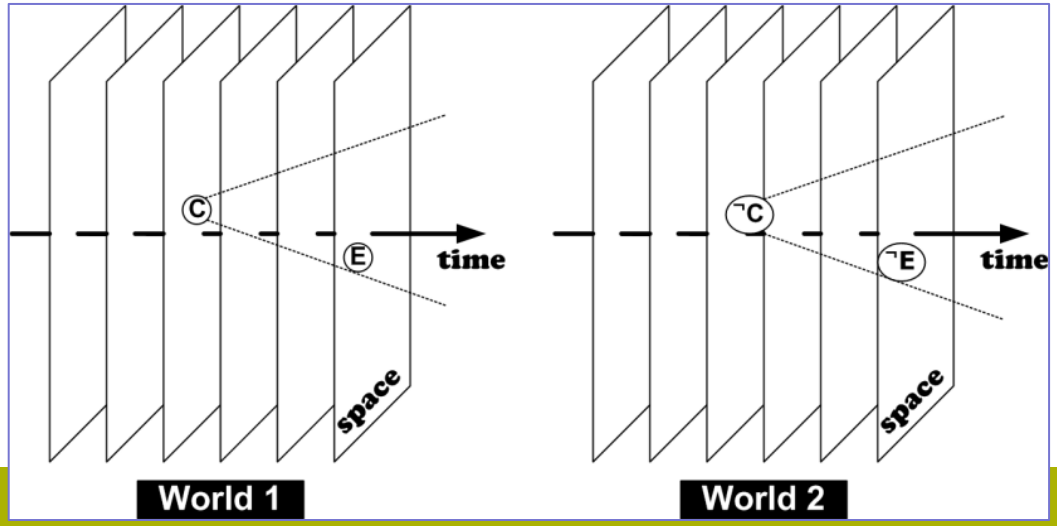
What makes that *C causes E*

- Production, bringing about
  - Mechanism, process
- Difference-making
  - Iff not C, then not E

We can't do without

Focus: Evidence-makers for singular causation

We start with…



Context should be taken into account

- I went on holiday. My plants died.
  - My neighbor didn't water my plants. He is the cause!
  - The king of Belgium also didn't. He is the/a cause?

➔ **Menzies' account**

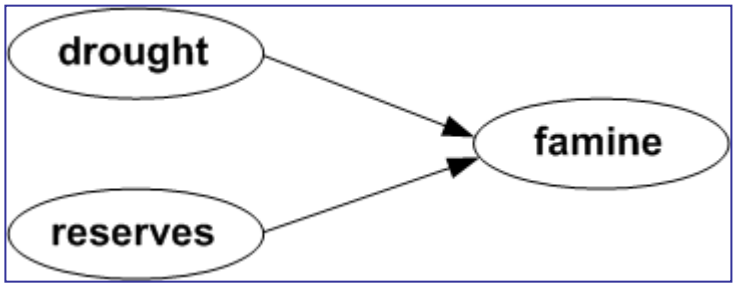
- Make the *context-sensitivity* intrinsic to the truth conditions of causal claims

➔ **Contrastive Causation**: add contrast

Context and contrast

- Drought and Indian Famine (Hart and Honoré 1985)
  - Famine in India: what's the cause?
    - Drought;
    - Government who didn't take appropriate measures.
- Reiss' solution: contrast is given by
  - "determine admissibility of contrast events by considering the beliefs (B), desires (D) and opportunities (O) the agents in situations face, her presuppositions (P) and normative commitments (N) as well as the assumed general principles (L)"
  - (L): Queen does queenly things, Italians to Italian things…

Menzies: Structural Equations



drought AND NOT reserves => famine

Production!

- "when system deviates from normal course of evolution, something made the difference; that's the cause"
- Default world:
  - known laws and regularities;
  - regular course of events unaffected by human intervention;
  - proper functioning of system.
- Default: drought=true and reserves=true
  - ➡ Famine is due to government not stockpiling food reserves

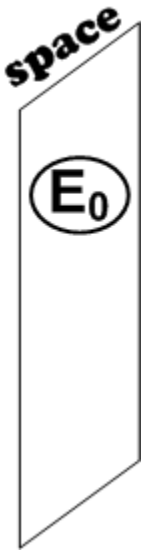
Contributions and Open Questions

- Three drawbacks :
  - Account for default world (A)
    - Counter-examples can easily be created:
      - proper functioning is not the default in certain contexts
    - *General characterization is missing*
  - SEM approach might be too restricted (B)
    - I put forward simulation
  - Multiple deviations from the default (C)
- Two Discussion Points (D) & (E)

(A) The default world

- Default state = most probable in the given context.
  - Function $\mathcal{D}$ is based on observations/available information $\mathcal{O}$
  - ➡ *Generates Reiss' en Menzies' list*

Discussion Point 1



- If no state has a probability sufficiently larger than those of the other possible states

➡ default state is set to "don't know" (e.g. gender)

Basic Principle

Deviations from the expected deserve explanation.

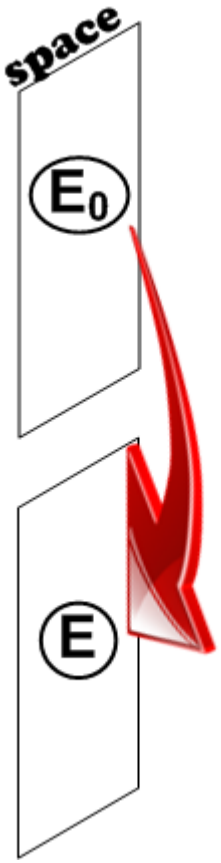
- Causal explanation

Not about metaphysics.
What is this `secret connexion'?

Something unexpected happens

- Alberto is late…

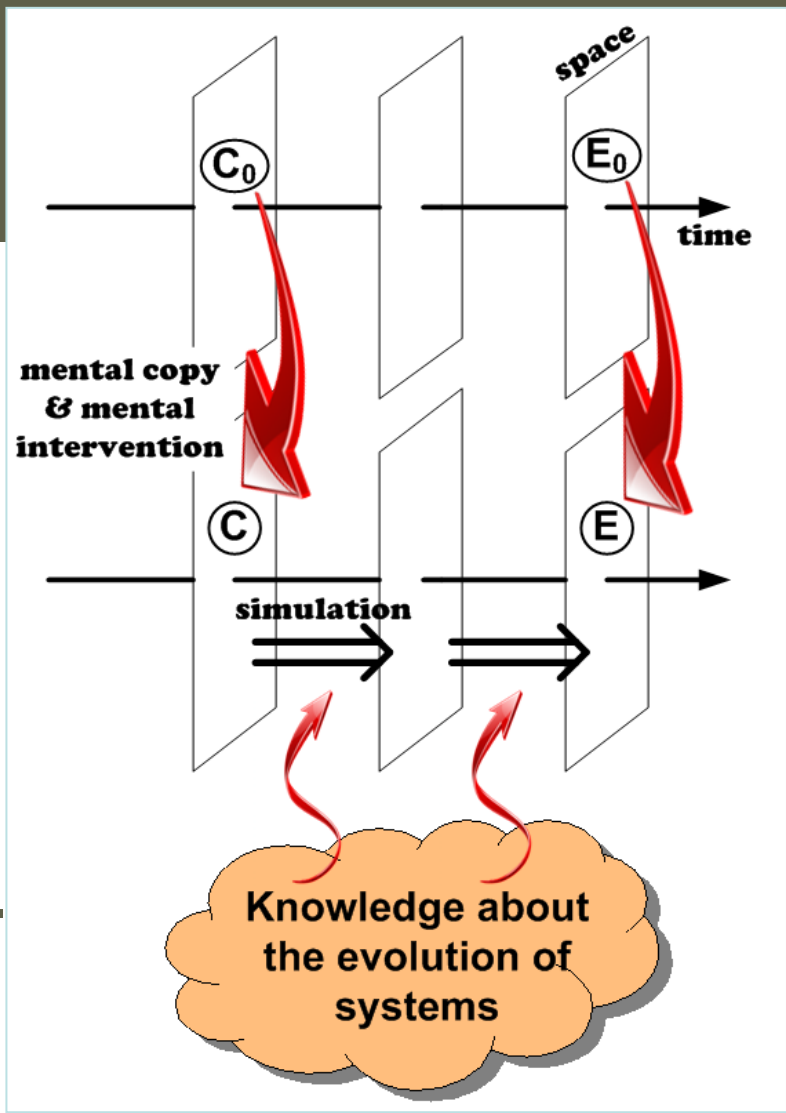
➡ deserves explanation



… find cause!

State *C* is the **cause** of non-default effect *E* if changing the default state C_0 to *C* in the default world leads to state *E* instead of E_0 by simulation based on knowledge $\mathcal{K}$.

- *Woodward*: … where among the relevant things only C is changed.
- *Lewis*: … where both worlds are maximally similar.



Causality is tool used by Cognitive Agent

- Agent tries to maximize its knowledge $\mathcal{K}$ about the world based on its observations $\mathcal{O}$
- *Simulation*:
  - To predict future
  - To verify its understanding
- *Hypothesis*: concept of causality (causal explanation) can only be fully understood when considering the agent

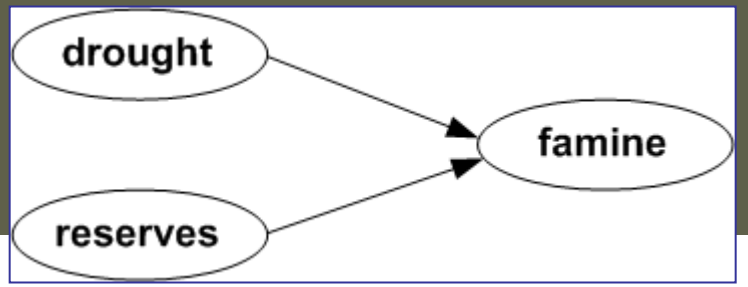

observing


experiencing


reflecting

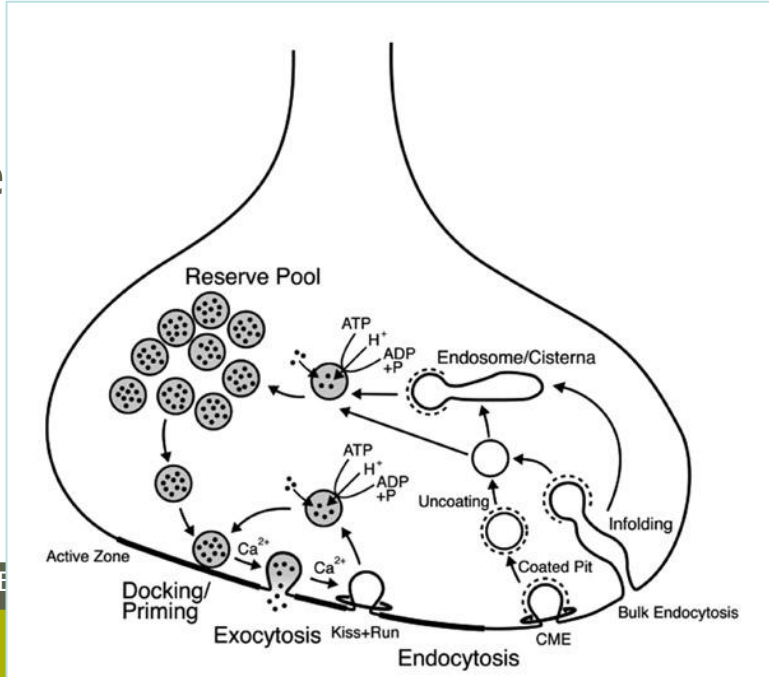

wondering

(B) More than SEM…

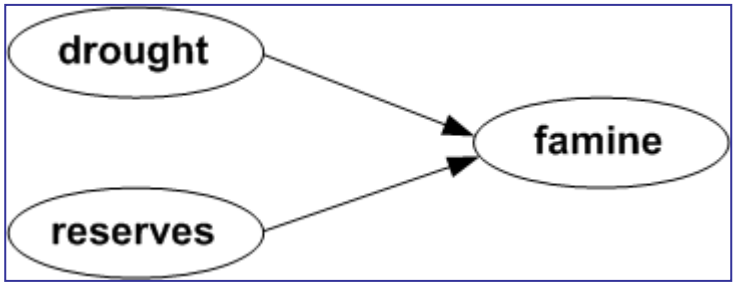


Discussion Point 2

- Structural equations suggest that rule *C* -> *E* as such determines that we attribute *C* as the cause of *E*.
  - Suggests that we should explicitly know all rules C->E for all relations and situations
- More: based on/backed by all available knowledge
  - *Simulation generates the rule*
- Example: Phyllisian mechanism
  - What if x changes cell membrane properties so that the osmosis process changes.
  - There is no rule "*cell membrane => Y*"



(C) Multiple deviations from default

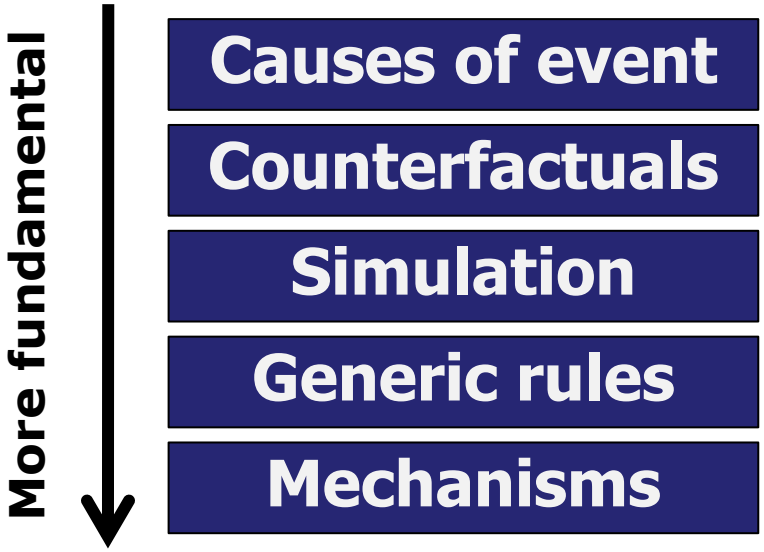


Discussion Point 3

- Menzies: drought is default
  - Is this the case?
  - There is a possibility of drought…
- Story telling: in story the deviations from the default are listed.
  - Generates an alternative evolution
  - *Hypothesis*: last deviation is cause

(D) Hierarchy

Discussion Point 4



There might be confusion on one level, but there isn't on a lower level

- Notes:
  - *Causation = Difference-making in a productive setting*
  - *Non-reductive*, cf Woodward

Hierarchy: examples

- Redundant causation: what's the cause?
- Example of Sherlock, Watson and Moriarty
  - Which counterfactual should be considered?
- (In)transitivity: "Dog-bite causes right-handed assassin to push the button with the left hand, the button pushing causes the bomb to explode. Dog bite causes explosion?"

(E) Perspectivalism?

Discussion Point 5

- What we call the **cause** depends on the perspective.
- Given $\mathcal{K}$ and $\mathcal{D}$, **cause** is objective and mind-independent
  - $\mathcal{K}$ might be wrong or limited (e.g. causes of cancer)
- Given $\mathcal{O}$: $\mathcal{K}$ and $\mathcal{D}$ are objective
  - ≈ Jon's Epistemic Causality: what an agent should adopt on rational grounds
- Given all $\mathcal{O}$: $\mathcal{K}$ and $\mathcal{D}$ are maximal
  - Does this determine truth-condition?
  - ➡ Causes appear through generalization/regularities