

## LECTURE THREE | MICHAELMAS 2017

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<http://msteenhagen.github.io/teaching/>

# Causation

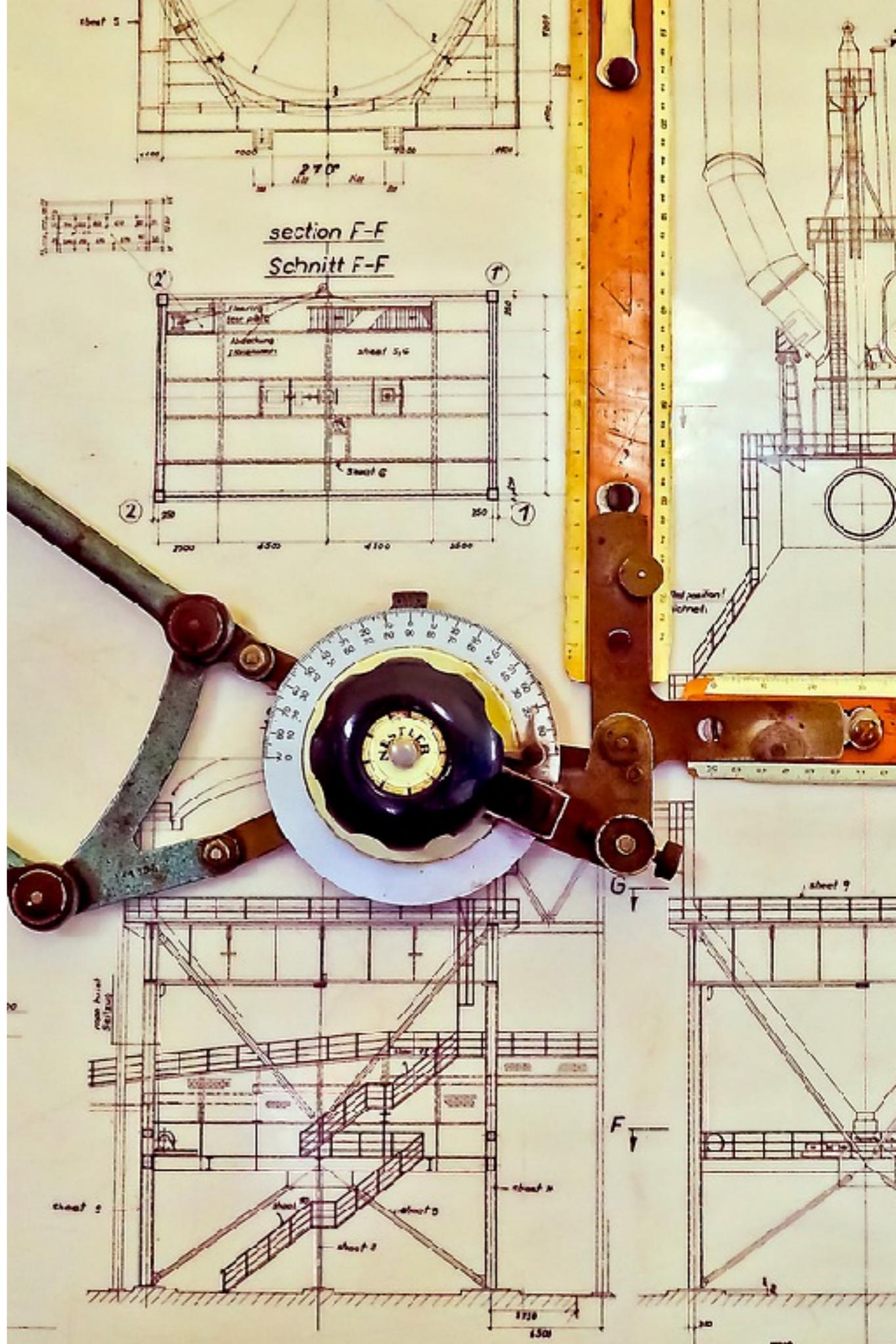


# These lectures

- Lecture 1: ~~The very idea of a cause~~
- Lecture 2: ~~Regularity theories~~
- Lecture 3: Counterfactual theories
- Lecture 4: The problem of redundant causation

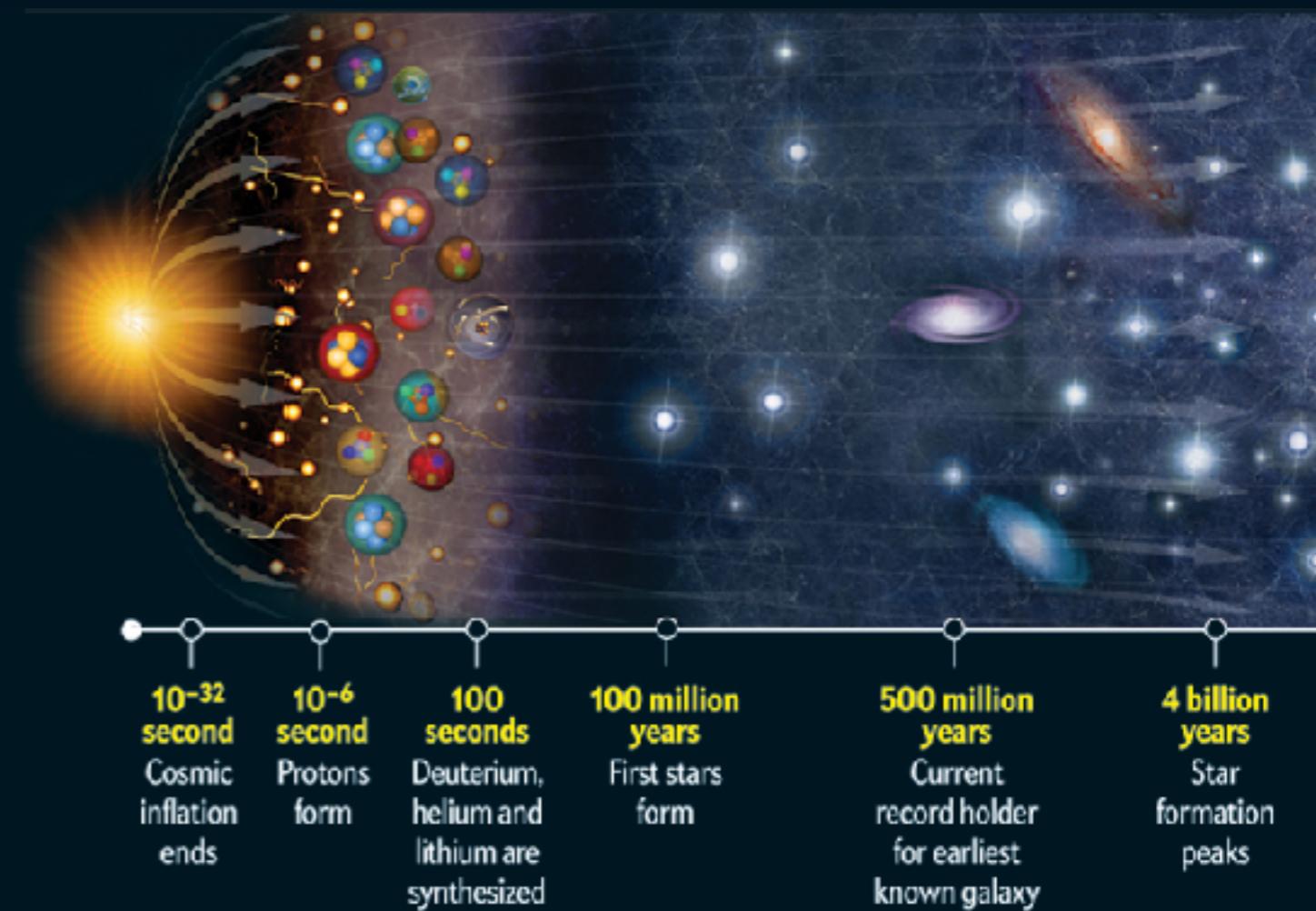
# Today

1. The thing that made the difference
2. Counterfactual dependence
3. Causal dependence
4. Is causal dependence necessary and sufficient for causation?



# Causes as INUS conditions

- INUS conditions are causes
- The short circuit is an **Insufficient** but **Necessary** part of a condition which it itself **Unnecessary** (for the effect) but **Sufficient**
- The sufficient condition for the fire includes a lot of things. If all those things are the case, then a fire will ignite
- The short-circuit was a necessary condition for that total condition to occur (i.e. for that total condition to be the sufficient condition it is)



# What made the difference

- On Mackie's view, the INUS condition  $\mathfrak{N}$  is, on the particular occasion, necessary to render sufficient an instance of an unnecessary but sufficient condition  $\mathfrak{U}$
- $\mathfrak{U}$  could have been rendered sufficient by some other condition
- But in this actual instance  $\mathfrak{N}$  is what made the difference



# Hume's second definition

we form concerning it, that it is impossible to give any just definition of cause, except what is drawn from something extraneous and foreign to it. Similar objects are always conjoined with similar. Of this we have experience. Suitably to this experience, therefore, we may define a cause to be *an object, followed by another, and where all the objects, similar to the first, are followed by objects similar to the second.* Or in other words, *where, if the first object had not been, the second never had existed.* The appearance of a cause always conveys the mind, by a customary transition, to the idea of the effect. Of this also we have experience. We may, therefore, suit-

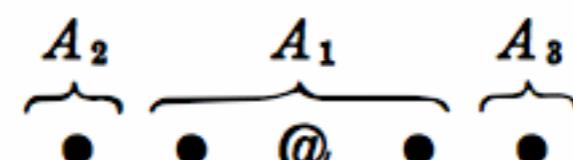
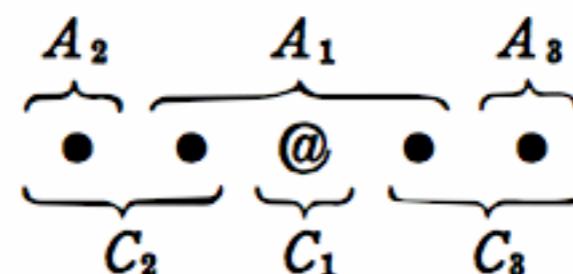
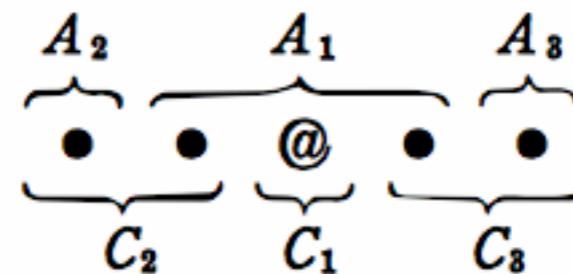
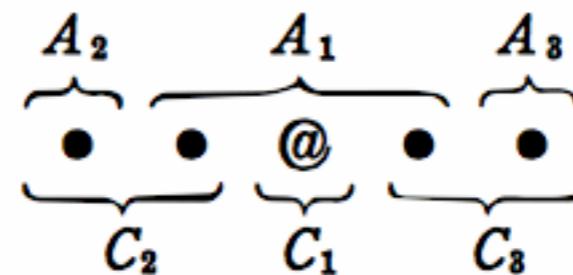
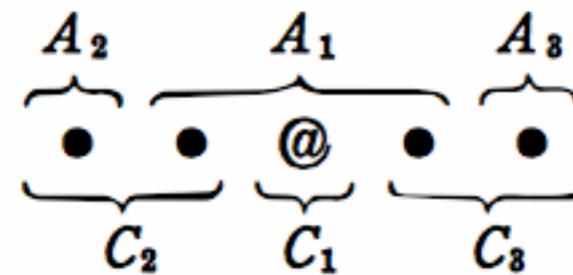
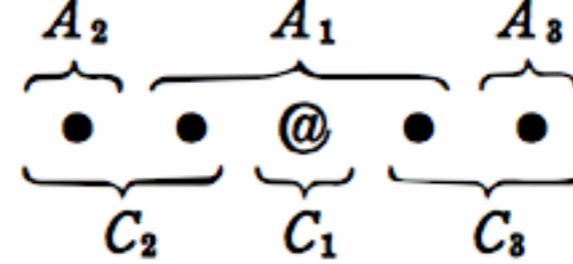


# Lewis' optimism

A promising alternative is not far to seek. Hume's "other words"—that if the cause had not been, the effect never had existed—are no mere restatement of his first definition. They propose something altogether different: a counterfactual analysis of causation.

The proposal has not been well received. True, we do know that causation has something or other to do with counterfactuals. We think of a cause as something that makes a difference, and the difference it makes must be a difference from what would have happened without it. Had it been absent, its effects—some of them, at least, and usually all—would have been absent as well. Yet it is one thing to mention these platitudes now and again, and another thing to rest an analysis on them. That has not seemed worth while.<sup>4</sup> We have learned all too well that counterfactuals are ill understood, wherefore it did not seem that much understanding could be gained by using them to analyze causation or anything else. Pending a better understanding of counterfactuals, moreover, we had no way to fight seeming counterexamples to a counterfactual analysis.

# Counterfactual dependence



# Counterfactuals

- Conditionals: “if A, then B”
- Counterfactual conditionals (subjunctive mood): “if it were the case that A, then it would be the case that B”
- We can formalise this:  $A \Box \rightarrow B$
- Often, counterfactuals have antecedents that are ‘contrary to fact’ (i.e. are actually false); but this need not be the case!



# What makes a counterfactual true?

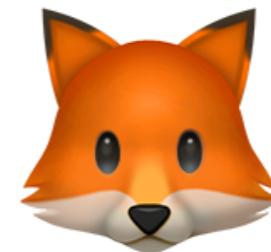
- What makes the material conditional ( $\rightarrow$ ) true is familiar from TFL
  - The counterfactual conditional ( $\Box\rightarrow$ ) has very different truth-conditions
  - Lewis uses the notion of comparative overall similarity of possible worlds
- 

## COMPARATIVE SIMILARITY

To begin, I take as primitive a relation of *comparative over-all similarity* among possible worlds. We may say that one world is *closer to actuality* than another if the first resembles our actual world more than the second does, taking account of all the respects of similarity and difference and balancing them off one against another.

# Similarity

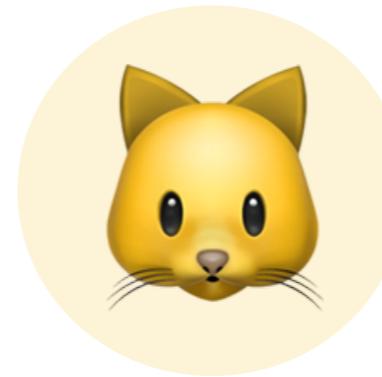
- We easily make judgments of overall comparative similarity



- We can create a weak ordering of items that are more and more similar than some target

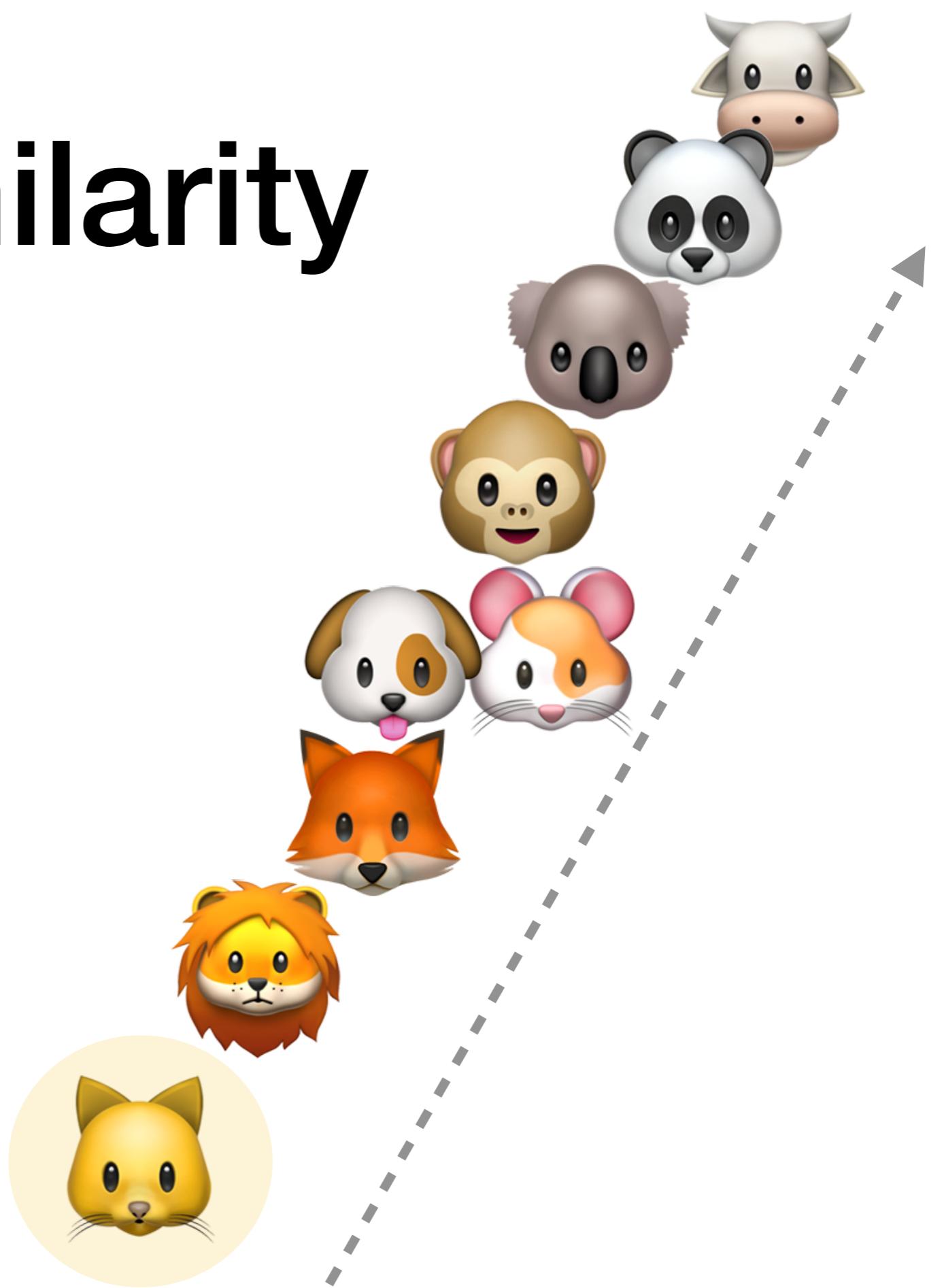


- It is not always obvious how we weigh the relevance of specific features to the overall similarity



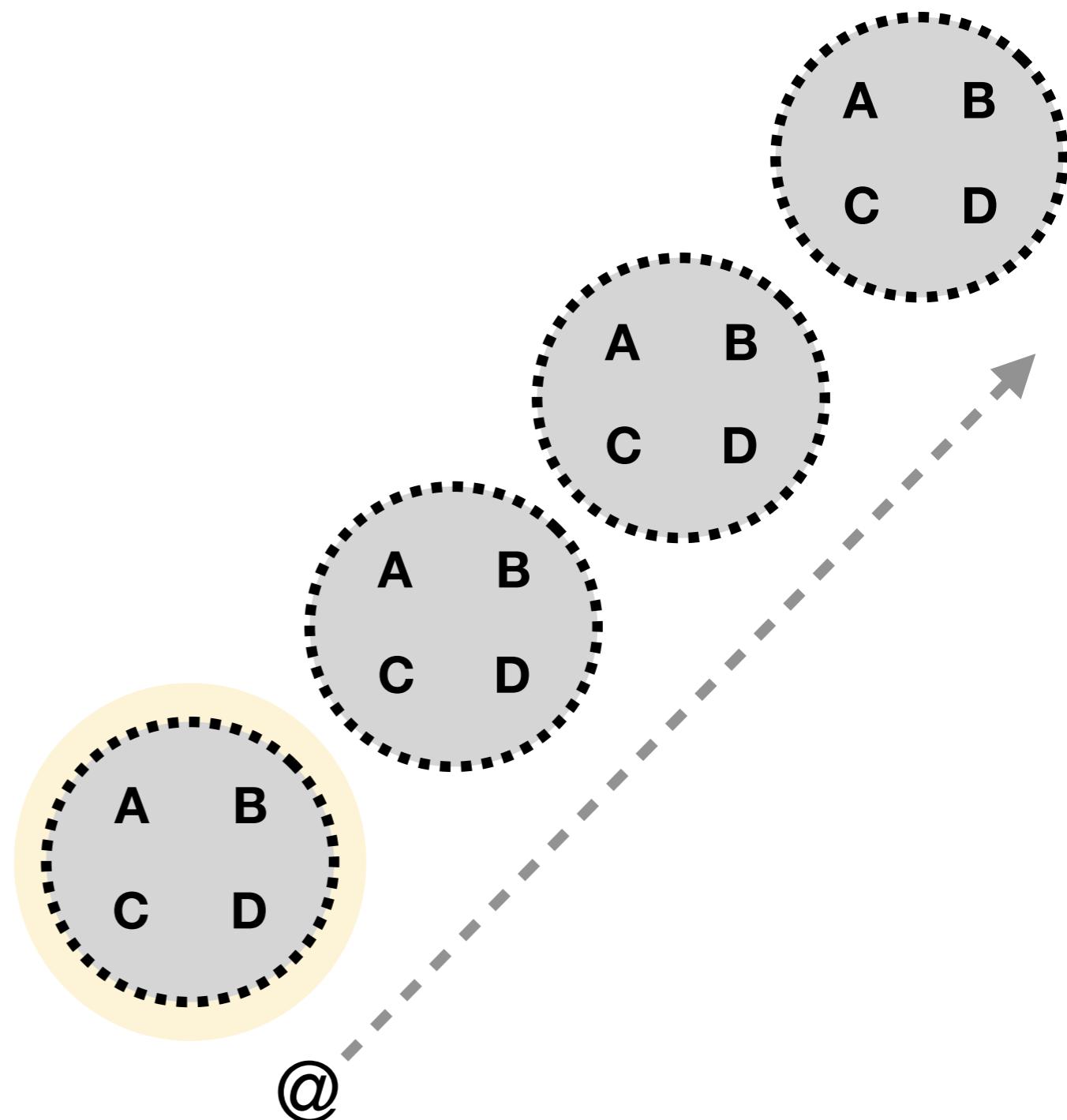
# Similarity

- We easily make judgments of overall comparative similarity
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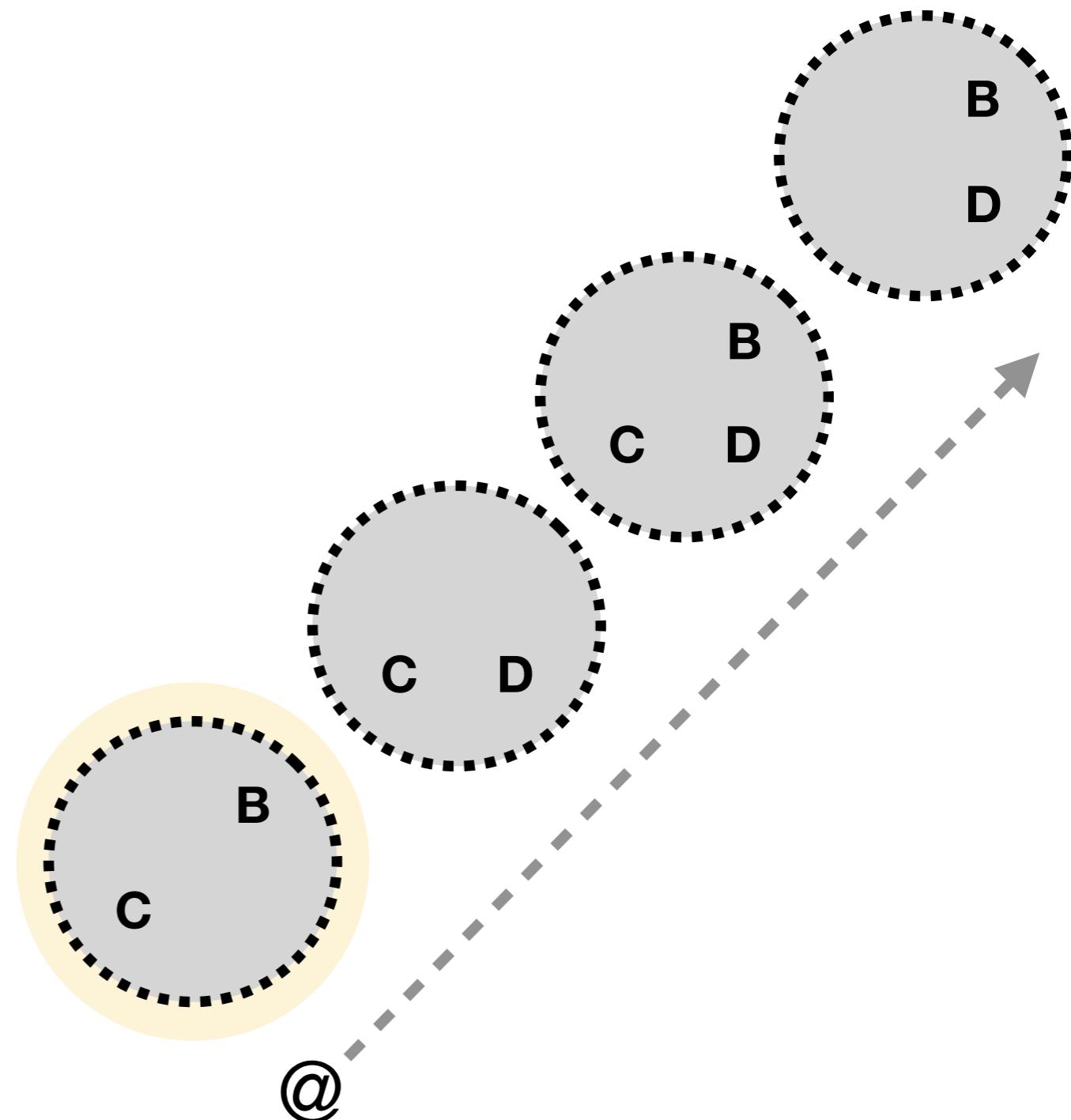
# Possible world semantics

- $A \Box \rightarrow B$  is true iff either
  - I. there are no possible A-worlds
  - II. some A-world which is also a B-world is closer to the actual world (actuality) than any A-world which is not also a B-world
- When ' $A \Box \rightarrow B$ ' is true we can say that B counterfactually depends on A. (Note, this is a relation between propositions)



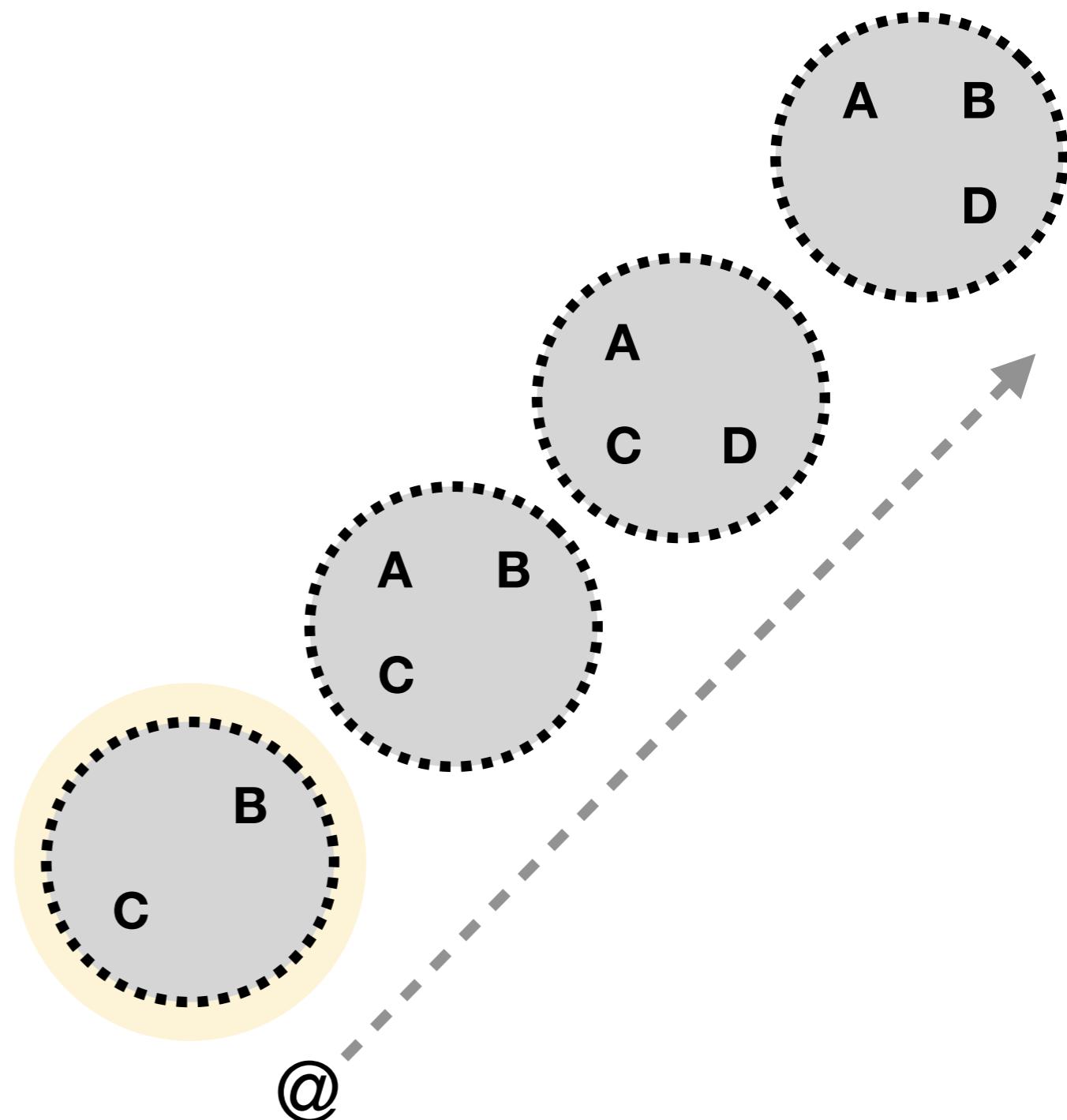
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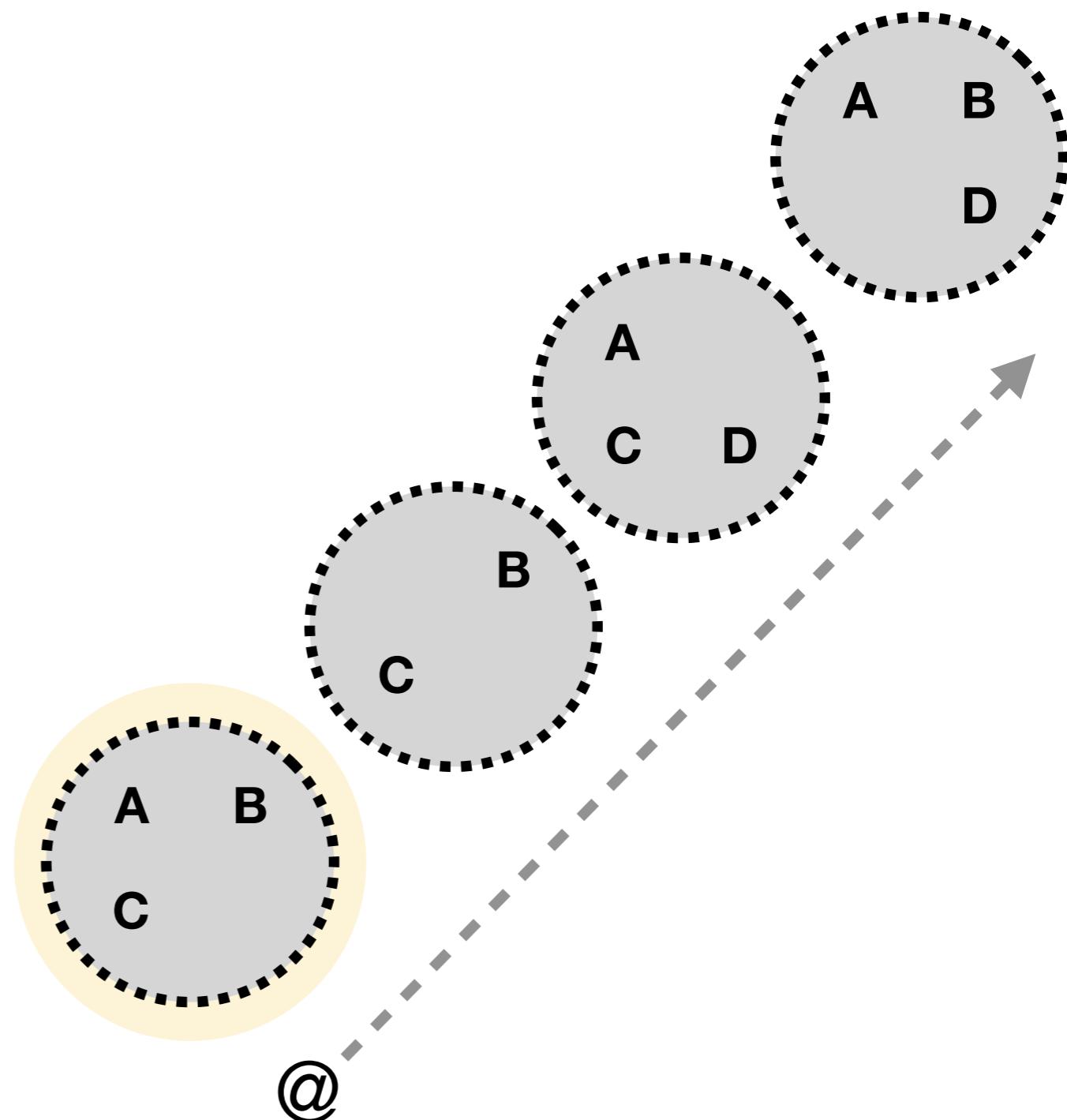
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# Causal dependence



# Causal dependence defined

- Let
  - ‘c’ and ‘e’ as terms for events (e.g. ‘the assassination’, ‘the first world war’)
  - ‘O’ be a predicate of events, meaning ‘occurs’
  - ‘ $\neg$ ’ be negation
- We can now define causal dependence  
**e causally depends on c iff:**

**Oc  $\square\rightarrow$  Oe**

*and*

**$\neg$ Oc  $\square\rightarrow$   $\neg$ Oe**



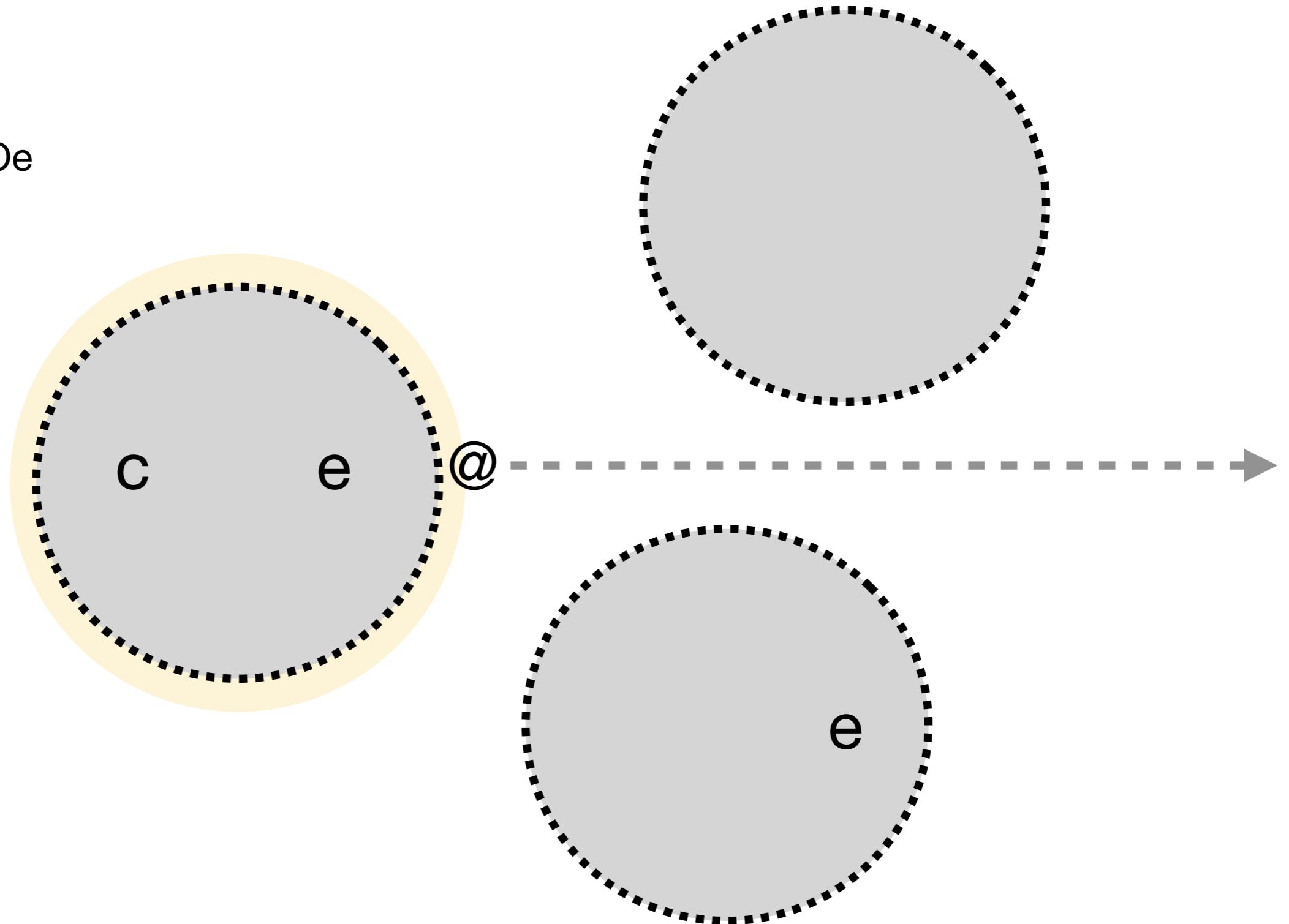
## S: Donald Trump's election victory causally depends on the leaking of DNC emails

e = the victory of Trump

c = the leaking of emails

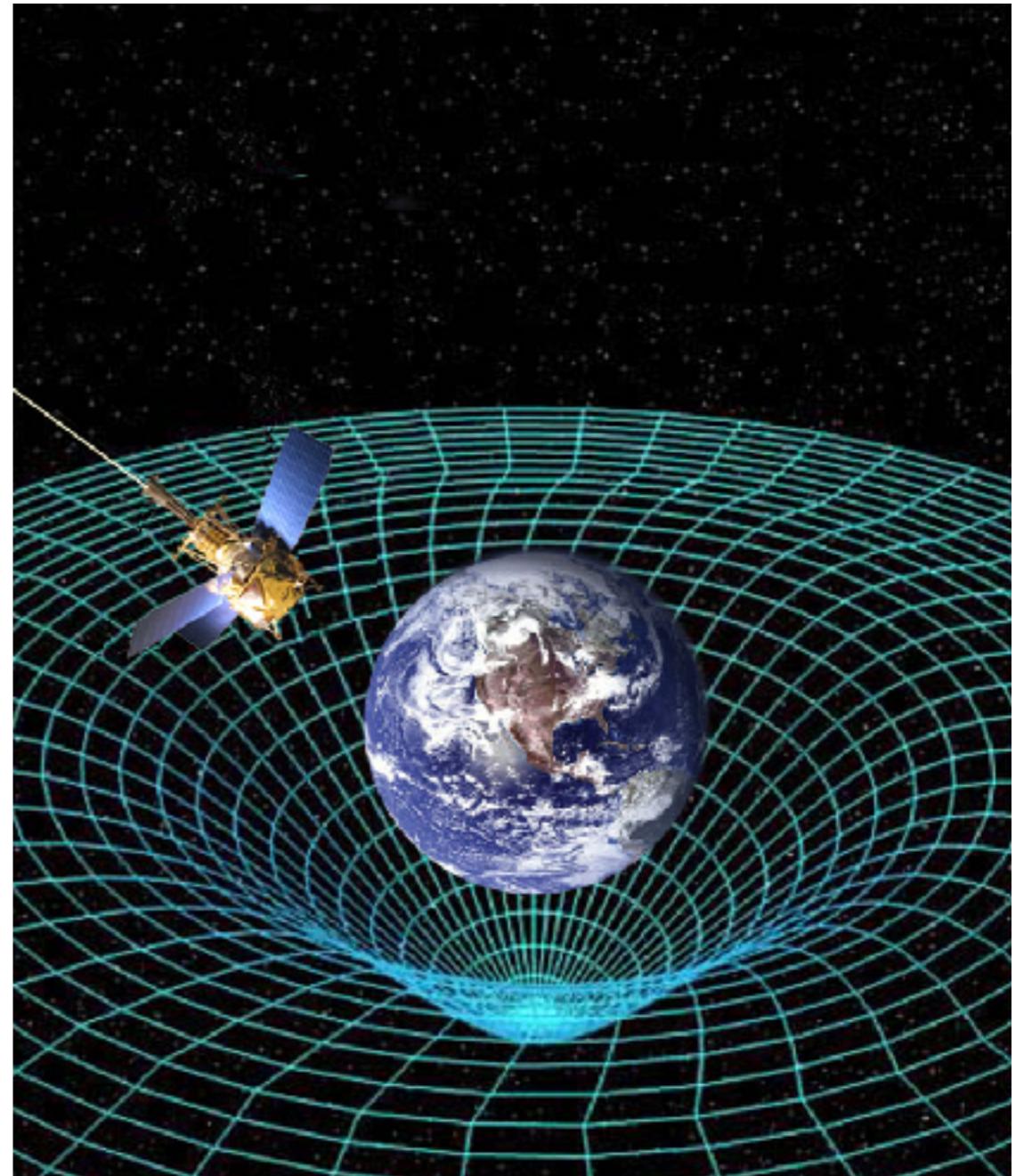
S is true iff

1.  $Oc \rightarrow Oe$
2.  $\neg Oc \rightarrow \neg Oe$



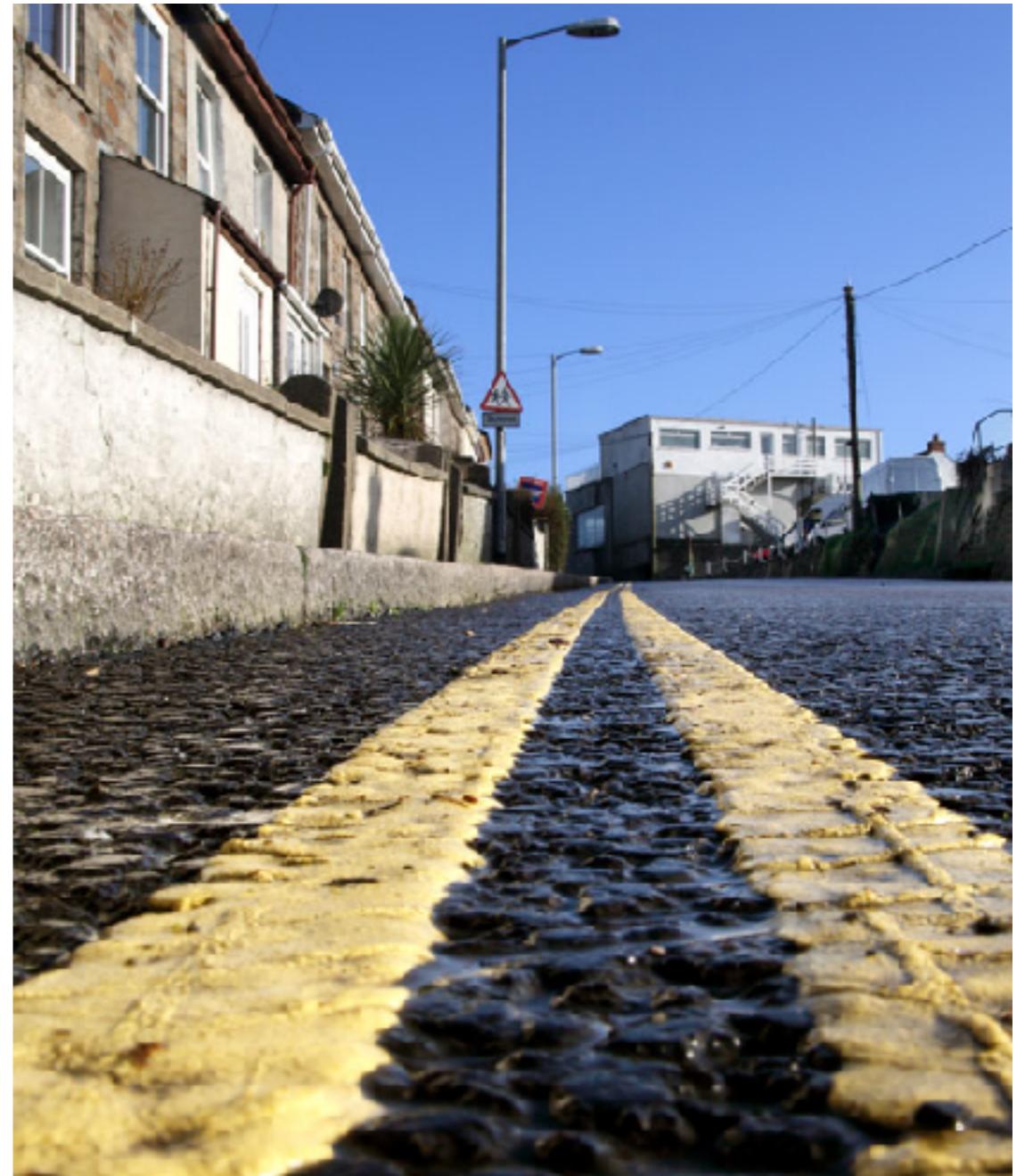
# Counterfactual dependence as such is not sufficient for causation

- There are many cases of counterfactual dependence which are not cases of causation (see Kim's paper in the Sosa & Tooley volume for some examples)
- Lewis: the laws of motion in a world may counterfactually depend on the laws of gravity in that world, but the latter doesn't cause the former (better to say: laws of motion supervene on laws of gravity)



# Counterfactual dependence as such is not sufficient for causation

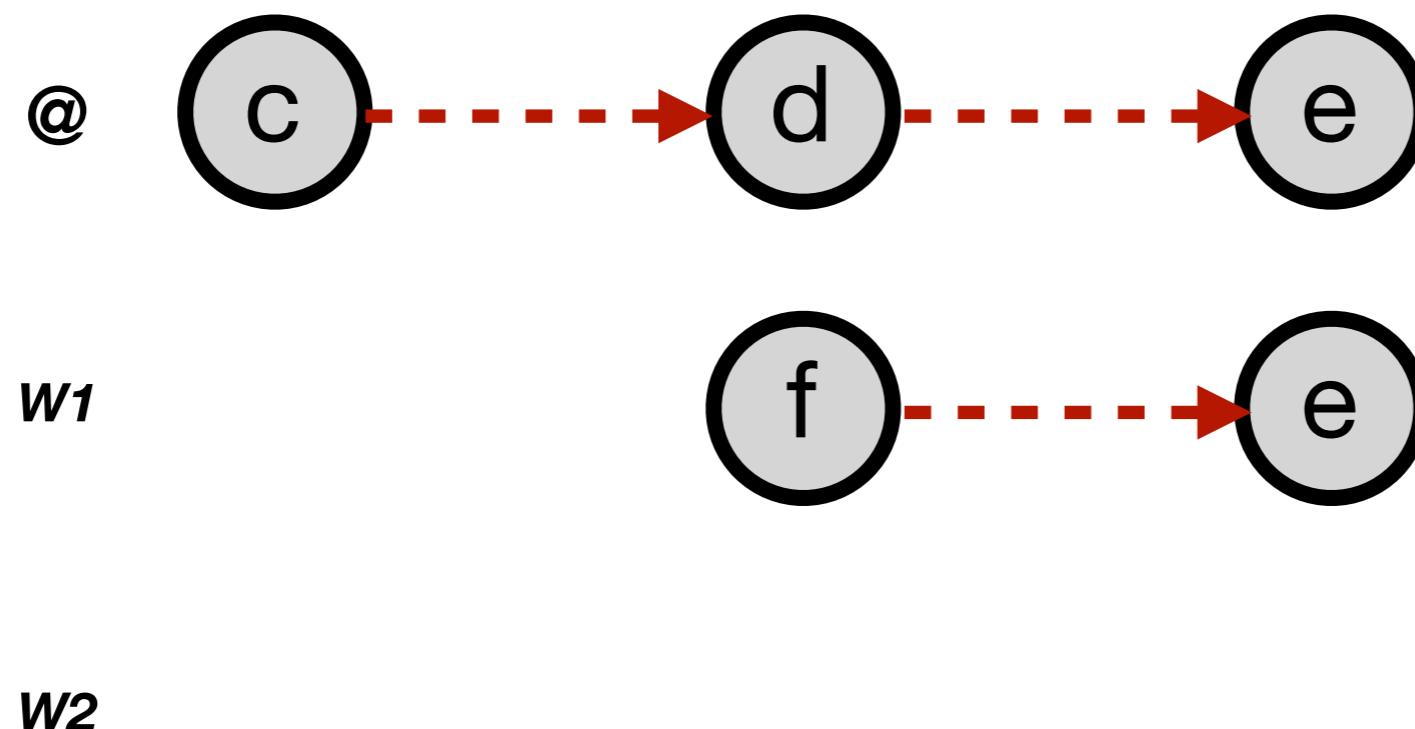
- If you park your car on a double yellow line, then you break the law. But parking the car there doesn't cause you to break the law (it constitutes breaking the law in this instance)
- What we have to have to add to exclude cases like this is to say that the events related as cause and effect must be *distinct* from one another



**Is causal  
dependence  
necessary and  
sufficient for  
causation?**



Causal dependence among actual events implies causation. If  $c$  and  $e$  are two actual events such that  $e$  would not have occurred without  $c$ , then  $c$  is a cause of  $e$ . But I reject the converse. Causation must always be transitive; causal dependence may not be; so there can be causation without causal dependence. Let  $c$ ,  $d$ , and  $e$  be three actual events such that  $d$  would not have occurred without  $c$  and  $e$  would not have occurred without  $d$ . Then  $c$  is a cause of  $e$  even if  $e$  would still have occurred (otherwise caused) without  $c$ .



**CAUSAL DEPENDENCE:**



# Next week

- ~~Lecture 1: The very idea of a cause~~
- ~~Lecture 2: Regularity theories~~
- ~~Lecture 3: Counterfactual theories~~
- Lecture 4: The problem of redundant causation