

LECTURE TWO | MICHAELMAS 2017

Dr Maarten Steenhagen

[ms2416@cam.ac.uk](mailto:ms2416@cam.ac.uk)

<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

# THE WELLSPRINGS

# MENU

## STARTERS

**Soup of the Day £3.95**  
Served with a crusty roll

**Guacamole £4.95**  
Served with a tortilla bowl, this traditional Mexican dip, prepared with avocados, delicately seasoned

**Quesadillas £4.95**  
Grilled flour tortilla served with melted cheese and nacho salsa, topped with guacamole and sour cream

**Taco Bowl £4.95**  
Carni con carne in a corn bowl topped off with cheese and tortilla chips

**Paulos Nachos £7.25**  
Serves two

Corn tortilla chips covered with tomato salsa, melted cheese, guacamole, refried beans, sour cream, tortilla, onions and jalapeños

**Smoked Alistas £4.95**  
A chicken salad sandwich, smoked and served hot with salsa

**Albondigas en Salsa de Chipotle £5.25**  
Meatballs with tomatoes and jalapeño salsa

**Nachos £5.95**  
Corn tortilla chips covered with melted cheese, jalapeño salsa, sliced tomatoes, lettuce and sour cream

## MAIN DISHES

### Chicken

**Pollo Assado (Fajitas) £14.95**  
Chicken marinated in Mexico's barbecue mix, with fried onions and green peppers, cheese and cream

**Cajun Chicken £14.95**  
Chicken cooked in a hot and spicy Mexican style Cajun marinade

**Chicken and Bacon £13.95**  
A chicken breast wrapped in bacon, served with a white wine and mushroom sauce

**Chicken Chimichangas £15.95**  
A flour tortilla with chicken, oven baked to a golden brown, covered with nacho salsa, cheese, guacamole and sour cream

**Chicken Enchiladas £13.95**  
A flour tortilla rolled and filled with chicken, oven baked, covered with enchiladas sauce, melted cheese and sour cream

**Chicken Burrito £13.95**  
A flour tortilla with chicken, baked in the oven, served with cheese, lettuce, tomatoes, nacho salsa and sour cream

### Beef

**Mexican Chilli £13.95**  
Marinced beef with fried onions, jalapeños and Mexican salsa sauce, served in a tortilla bowl with rice, topped with melted cheese and sour cream

**Chilli Enchiladas £13.95**  
Mexican Chilli wrapped in a tortilla, oven-baked and covered in an enchiladas sauce, topped with melted cheese and sour cream

**Beef Enchiladas £13.95**  
Beef strips covered in enchiladas sauce topped with melted cheese and sour cream

**Beef Chemichengas £13.95**  
Beef strips covered in salsa sauce, oven-baked in a golden brown and topped with guacamole and sour cream

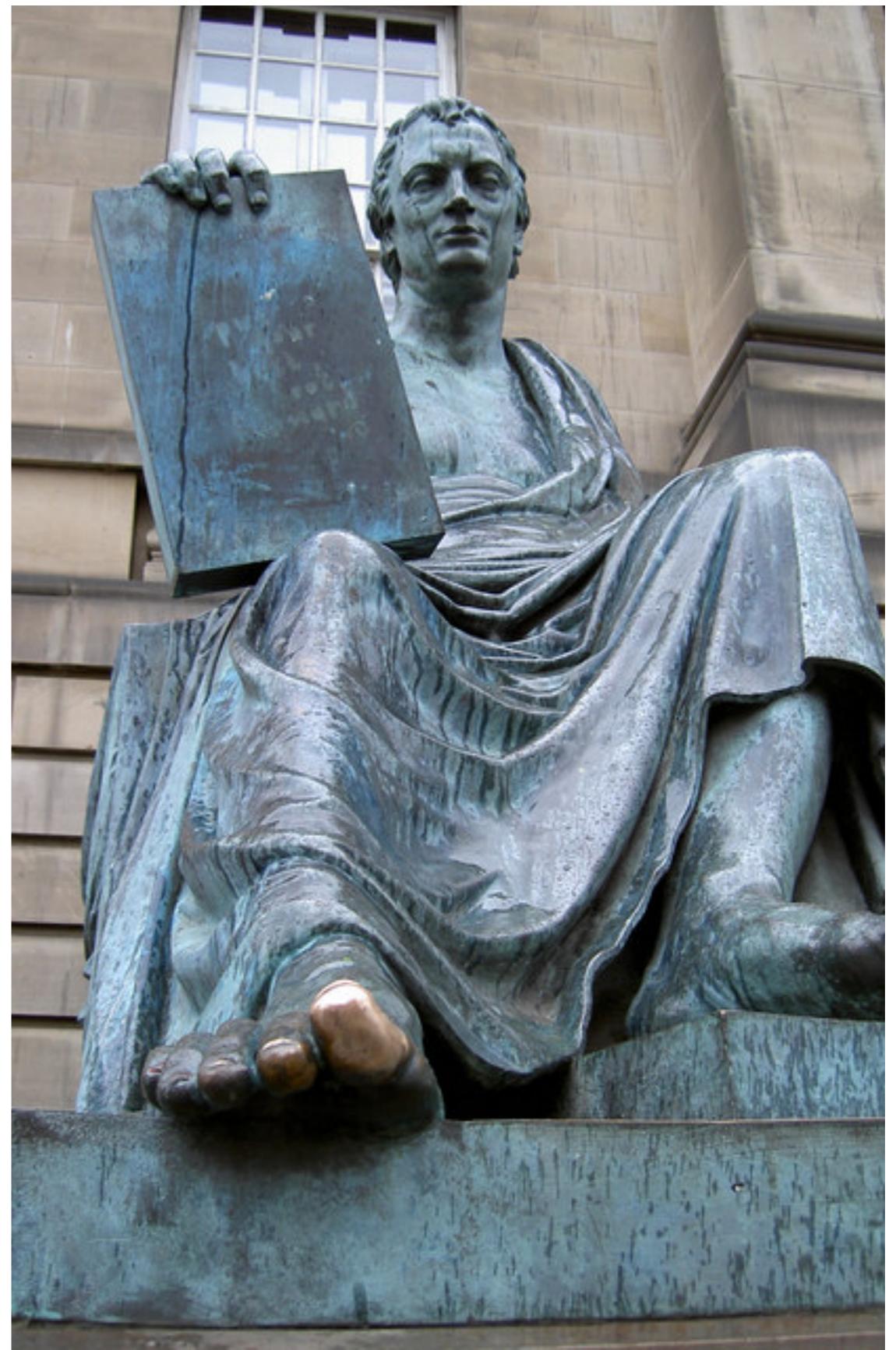
**Beef Burrito £13.95**  
Beef strips covered in salsa sauce baked in the oven, served with cheese, lettuce, tomatoes and salsa



# Today

1. David Hume's sceptical approach to causation
2. The regularity theory
3. Regularity and laws
4. INUS: Causation and conditions
5. Three problems for Mackie's theory

# Hume on causation



# Hume

- David Hume (1711-1776)
- *A Treatise of Human Nature: Being an Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects* (1739-40)
- *Essays, Moral and Political* (1741-1742)
- *The History of England, from the Invasion of Julius Cæsar to the Revolution in 1688* (1754-1762)
- 'Empiricism': all **ideas** (general notions) are ultimately copied from **impressions** (sense perception)
  - Conceptual truths (connections between ideas)
  - Empirical truths (based in impressions)



When we run over libraries, persuaded of these principles, what havock must we make? If we take in our hand any volume of divinity, or school metaphysics, for instance ; let us ask, Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames: For it can contain nothing but sophistry and illusion.

— David Hume

# Empty metaphysics?

- Hume thought that our ordinary *idea* of causation seems to involve the idea of necessary connection

(Note: we must distinguish between *our idea of causation* and *causation itself!*)

- Hume's method: From what impressions could our idea of causation derive?

“All events seem entirely loose and separate ... one event follows another; but we can never observe any tie between them. They seem conjoined, but never connected”

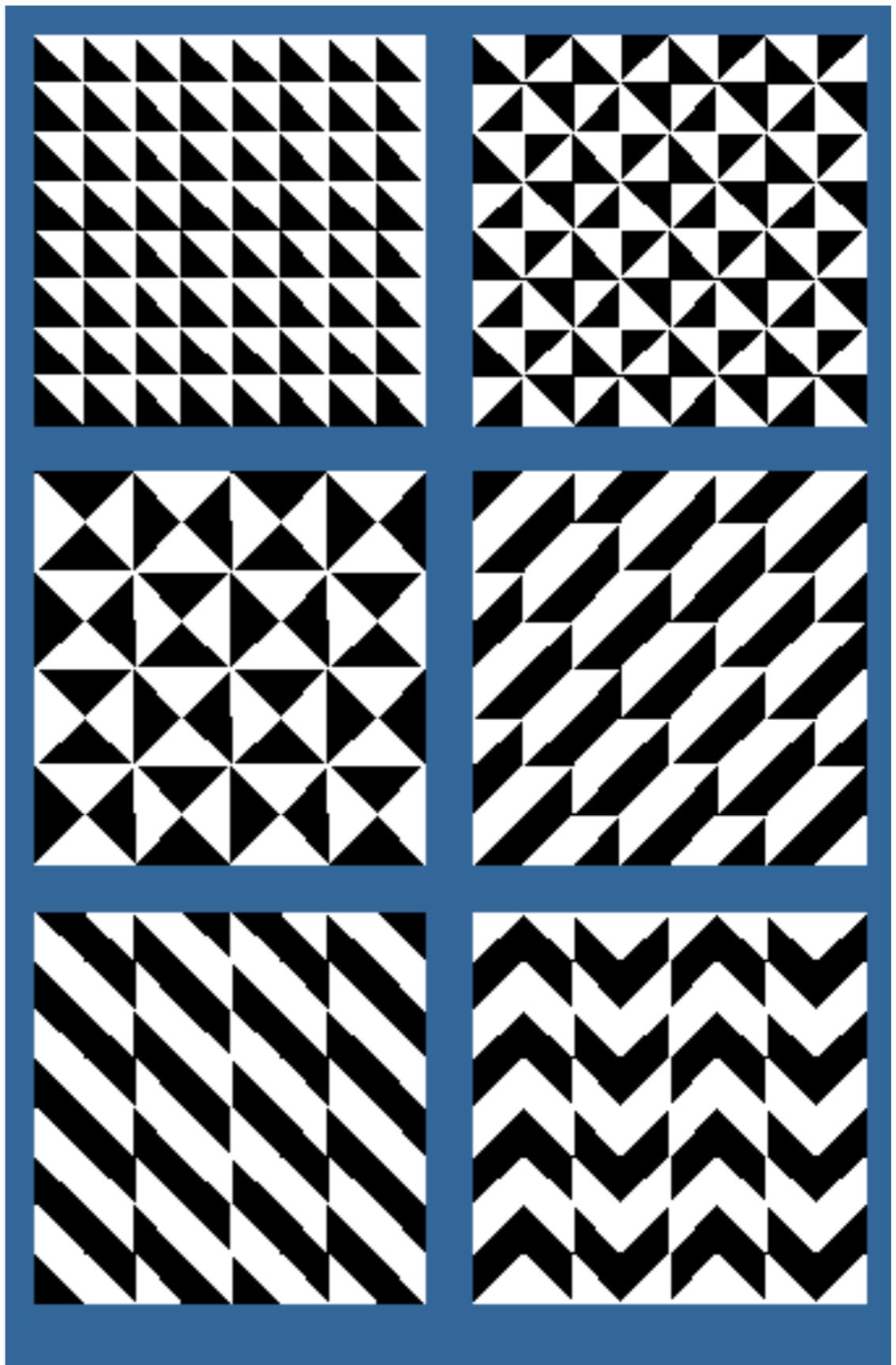
- Hume's conclusion is that this alleged ‘natural necessity’ is no more than an empty metaphysical dogma that has no basis in experience

# Hume's definition of a cause

- Hume argues that our idea of causation really involves just two other ideas:
  - (I) temporal succession
  - (II) constant conjunction
- He defines causation as follows: “a cause is an object, followed by another, where all objects similar to the first are followed by objects similar to the second”



# The regularity theory



# Regularity analysis of causation

- Attempts to analyse causation in terms of regular patterns of succession are referred to as “regularity theories” of causation
- If such a **regular connection** between events A and B obtains, the occurrence of A will lead to (is sufficient for) the occurrence of B
- What is ‘regularly connected’? This cannot be the very same event (particular events are not obviously repeatable)
  - It is events of a specific kind (or type) that can be constantly conjoined with events of another specific kind
  - For example:  
*I strike a match and see that it causes the ignition of fire*
  - Regularity theory: For this particular event of striking to be a cause of the ignition is for events of that first kind (Kind A) to be regularly followed by events of the second kind (Kind B)

# What kind of regular connection?

- My trips to the countryside (Kind A) are invariably followed by rain (Kind B)
- We wouldn't say that the trip I took last weekend was the cause of the rain shower last weekend
- Though regularly connected they are not causally connected, and so if causal connection is regular connection, then it must be a specific kind of regular connection



# Regularities and laws



# Laws of nature

- We could distinguish between those regularities which are *laws of nature* ('nomological' regularities) and those which are not ('accidental' regularities)
- My striking is a cause of the fire because this particular succession of events is an *instance of a law of nature*
- That my trips to the countryside are followed by rain is not an instance of a law of nature (it's just bad luck!)



# A problem for nomological regularity theories

- Take our two examples:

**Case 1:** I strike a match (**A**) and fire lights up (**B**)

**Case 2:** I visit the countryside (**C**) and it starts raining (**D**)

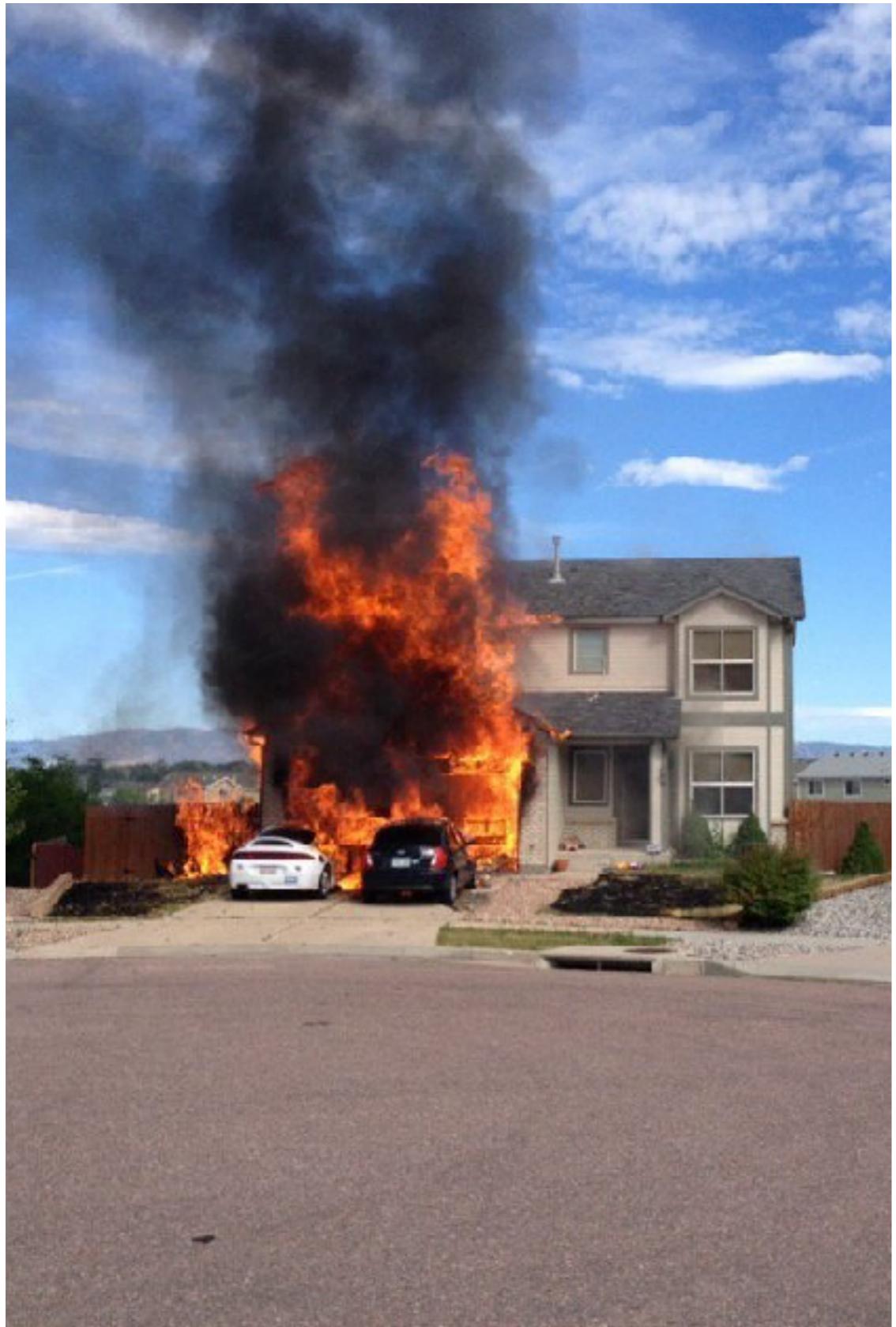
- On the nomological theory, there's nothing about the local relations between **A**, **B**, **C**, and **D** that explains why **A** is a cause of **B** while **C** is not a cause of **D**; Instead, what makes **A** a cause of **B** is that their relation is an instance of a law
- But why is the **A-B** connection an instance of a law but the **C-D** connection is not? It seems that the **A-B** connection is an instance of a law because of how these *particular* events are involved in bringing about other events. They are more than just temporally prior!
- If this is right, then we haven't really explained the difference between Case 1 and Case 2

# **INUS**

## **Causation and conditions**

J.L. Mackie's conditional  
theory of causation





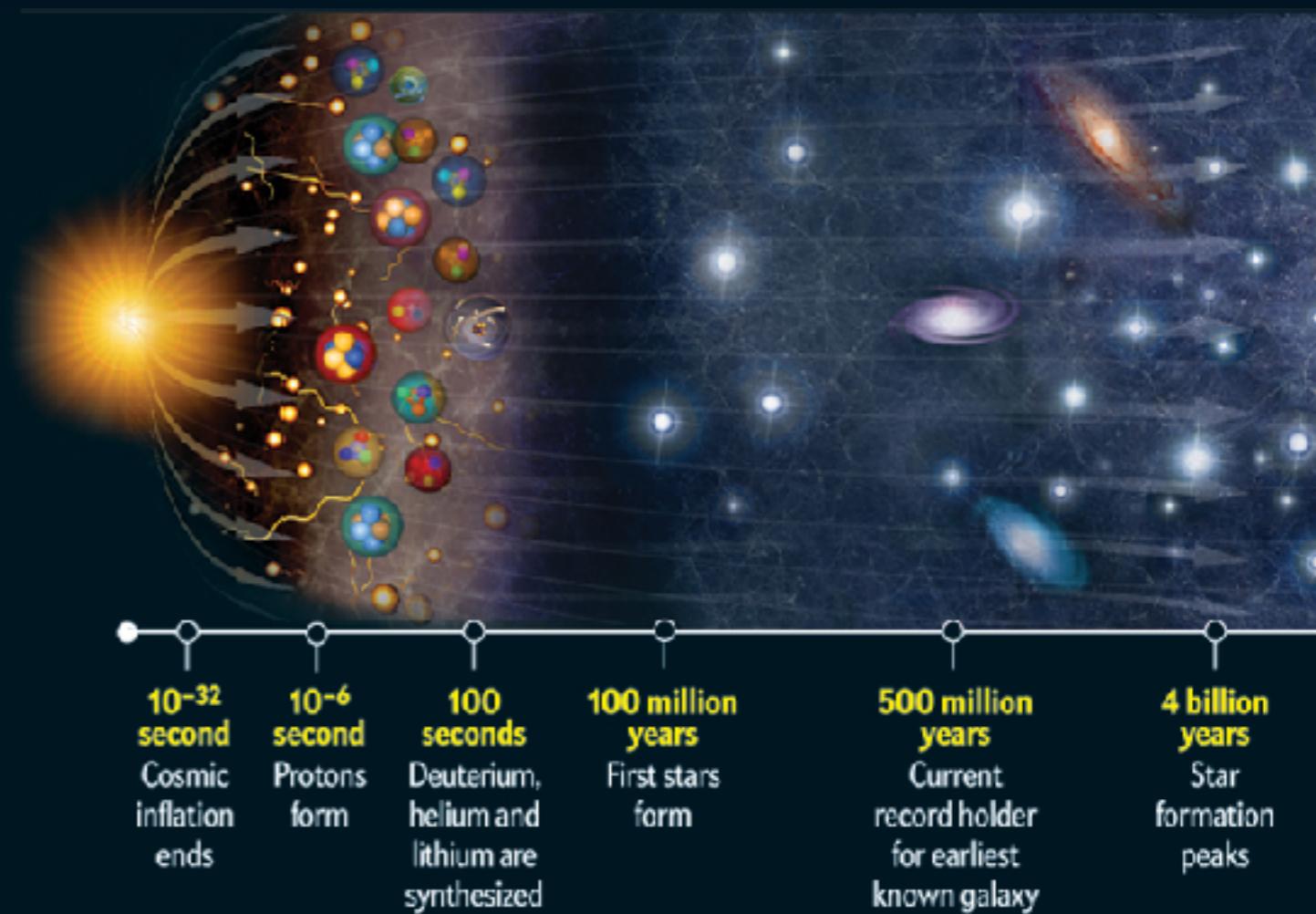
*A* is an INUS condition of a result *P* if and only if, for some *X* and for some *Y*, (*AX* or *Y*) is a necessary and sufficient condition of *P*, but *A* is not a sufficient condition of *P* and *X* is not a sufficient condition of *P*.

---

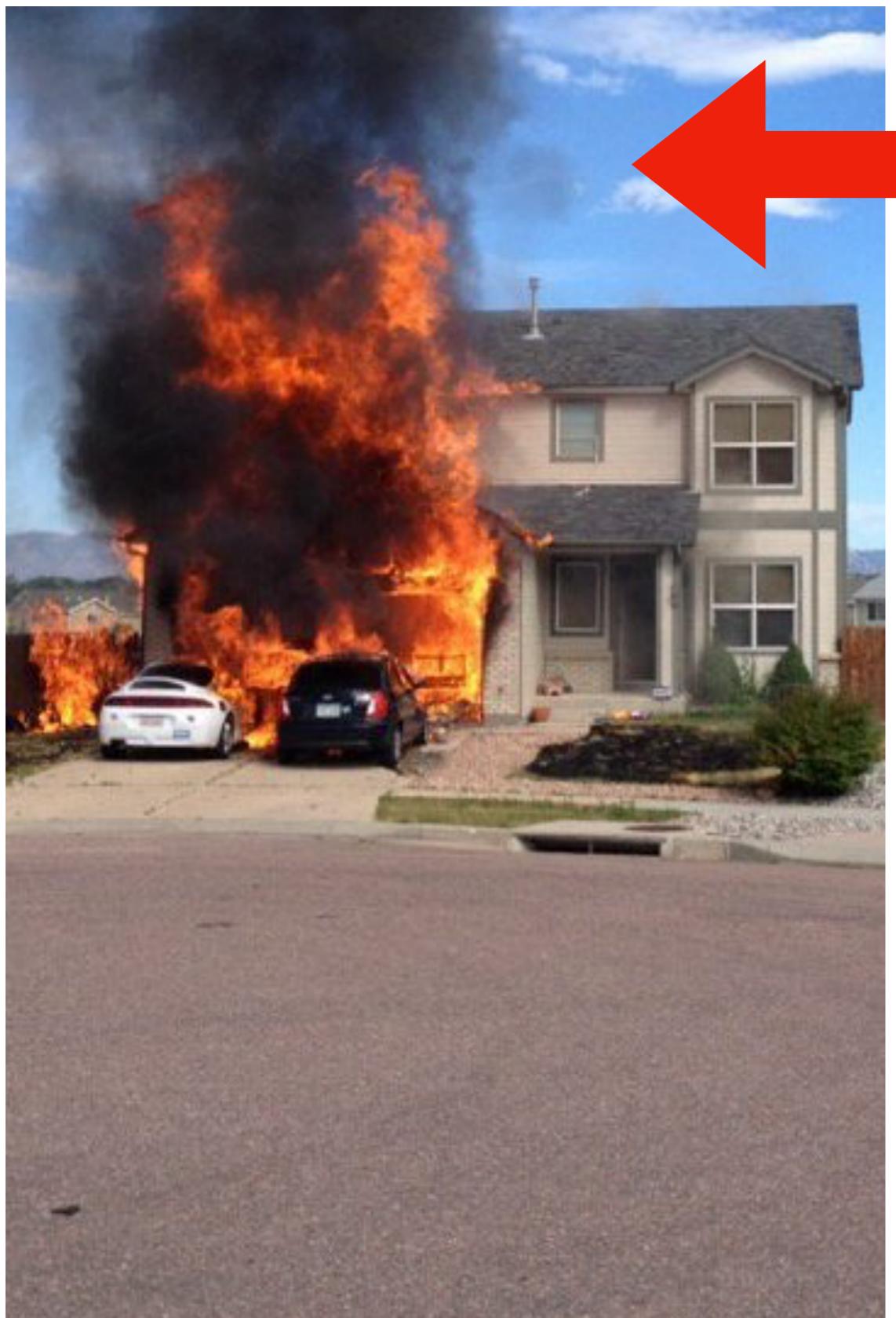
—J.L. Mackie

# Causes as INUS conditions

- Causes are INUS conditions
- The short circuit is an **Inufficient** 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)

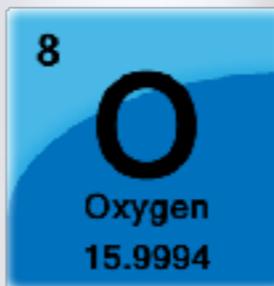


**'the cause of the fire'**



**Effect**

**INUS condition**



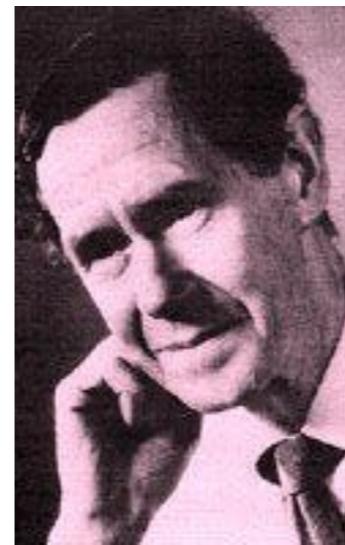
**Sufficient condition**

# Given the circumstances

- Here's a simpler presentation of Mackie's analysis:
  - Is the cause sufficient for the effect? Yes, but only *given* the other conditions or circumstances
  - Is the cause necessary for the effect? Yes, but only *given* the other conditions or circumstances (and given that other things remain equal)



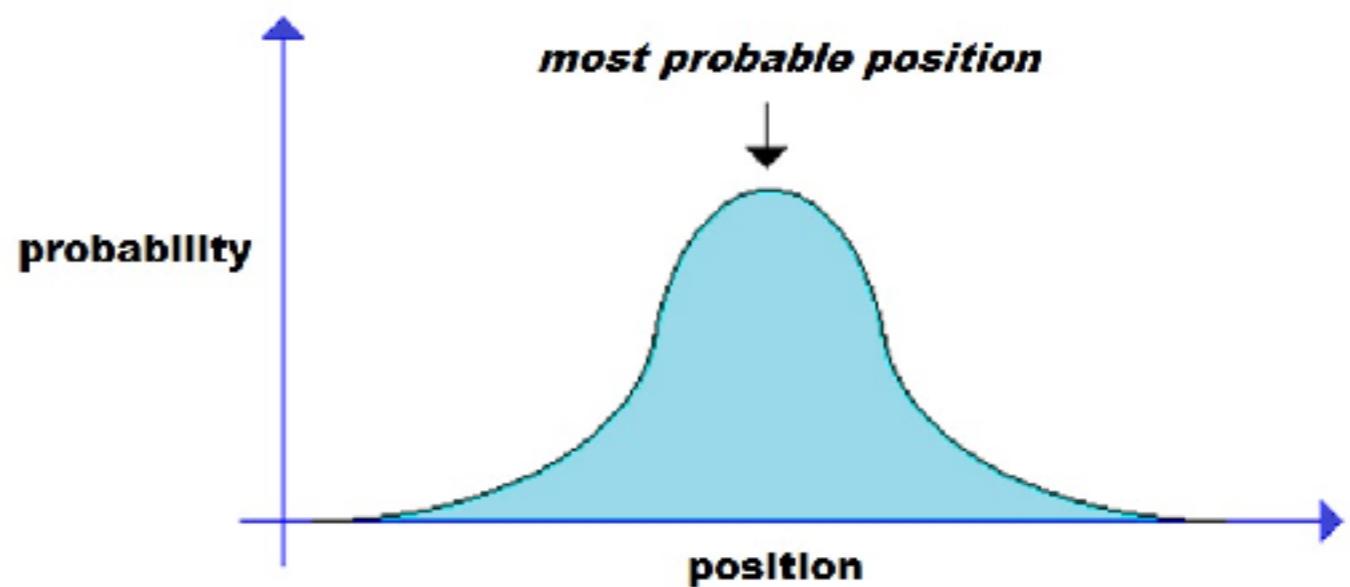
# Three problems for Mackie's theory



# 1. Pressure on sufficiency

- Assuming that a cause is sufficient for its effects commits you to the conclusion that all causation is *deterministic*
- But according to modern physics (e.g. quantum mechanics) not all causation is deterministic (some of it is probabilistic or ‘chancy’)
- So the idea that a cause is strictly sufficient, even given circumstances, is perhaps still too strong

**Quantum Wave Function**



# 2. Pressure on necessity

- What is it for a *particular* event to be ‘necessary in the circumstances’ for its effects? How should we understand this?
- Common solution: counterfactual truths (‘If I had not struck the match, the fire would not have ignited’)
- But we’ll see next week that as soon as we help ourself to counterfactual truths, an arguably more powerful analysis of causation becomes available

# 3. Speaking of ‘the cause’

- One obvious consequence of Mackie’s analysis is that every event has many causes
- The presence of oxygen was just as much an INUS condition as the short circuit
- So when we say that ‘a short circuit was the cause of the fire’, we say something false



# Events and conditions

- Possible way out: distinguish events and conditions
- Something is a cause only if it is an event; the presence of oxygen is not an event, it is merely a condition
- But then: what about the event of oxygen molecules being drawn to the chemical reaction in the tip of the match? That is an event, but we wouldn't call that a cause of the fire, let alone 'the' cause!

# Salient causes

- When we talk about ‘the cause of the fire’, this is best regarded as loose talk
- The short circuit is a cause among many other causes
- It is perhaps salient to us because we might have been able to prevent its occurrence (as opposed to preventing the oxygen to flow)



# 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