Establishing premises

- This is hard, subtle, and crucial to good arguments.
- Various kinds of considerations are used to establish the truth (high justification) of premises
  - Deduction
  - Analogy
  - Induction
  - Inference to the best explanation

Done

Explanation

- What is an explanation?
    - An answer to a ‘why’ questions
- Beliefs are often justified because they help explain our experience.
- What kinds of explanation are there?
    - saying how something is the consequence of more general facts (deductive)
    - stating the causes of an event (causal)
    - stating the purpose of an event (teleological)

Causal explanation

- Generally, we're interested in stating some necessary (not sufficient) conditions of an event
- Definitions:
  - sufficient conditions together always guarantee a result (although they might not have to obtain for the result). **A**->B
  - necessary conditions must obtain to get the explained result (but don't guarantee the result on their own) A->**B**
- E.g.,
  - The vase broke because I hit it with a hammer, it's glass, I hit it hard, ... (suff: given these it had to break, but can break other ways))
  - The vase broke because I knocked off the table (necess: if i didn't knock it off it wouldn't have broken)

Structure of causal explanation

- Usually, causal explanation is about constructing an 'abductive' argument (aka Inference to the Best Explanation (IBE))
- These are of the (non-deductive/invalid) form:
    - One observes O
    - E is part of the best explanation for O
    - Therefore, E.

O

E->O

Therefore, E

- E.g.: I see a broken vase and small, muddy feline-like foot prints nearby. My cat breaking the vase is part of the best explanation for it being broken. Therefore, my cat broke the vase.

It’s not valid

Homer: Well, there's not a bear in sight. The Bear Patrol is sure doing its job.

Lisa: That's specious reasoning, Dad.

Homer: Thank you, sweetie.

Lisa: Dad, what if I were to tell you that this rock keeps away tigers.

Homer: Uh-huh, and how does it work?

Lisa: It doesn't work. It's just a stupid rock.

Homer: I see.

Lisa: But you don't see any tigers around, do you?

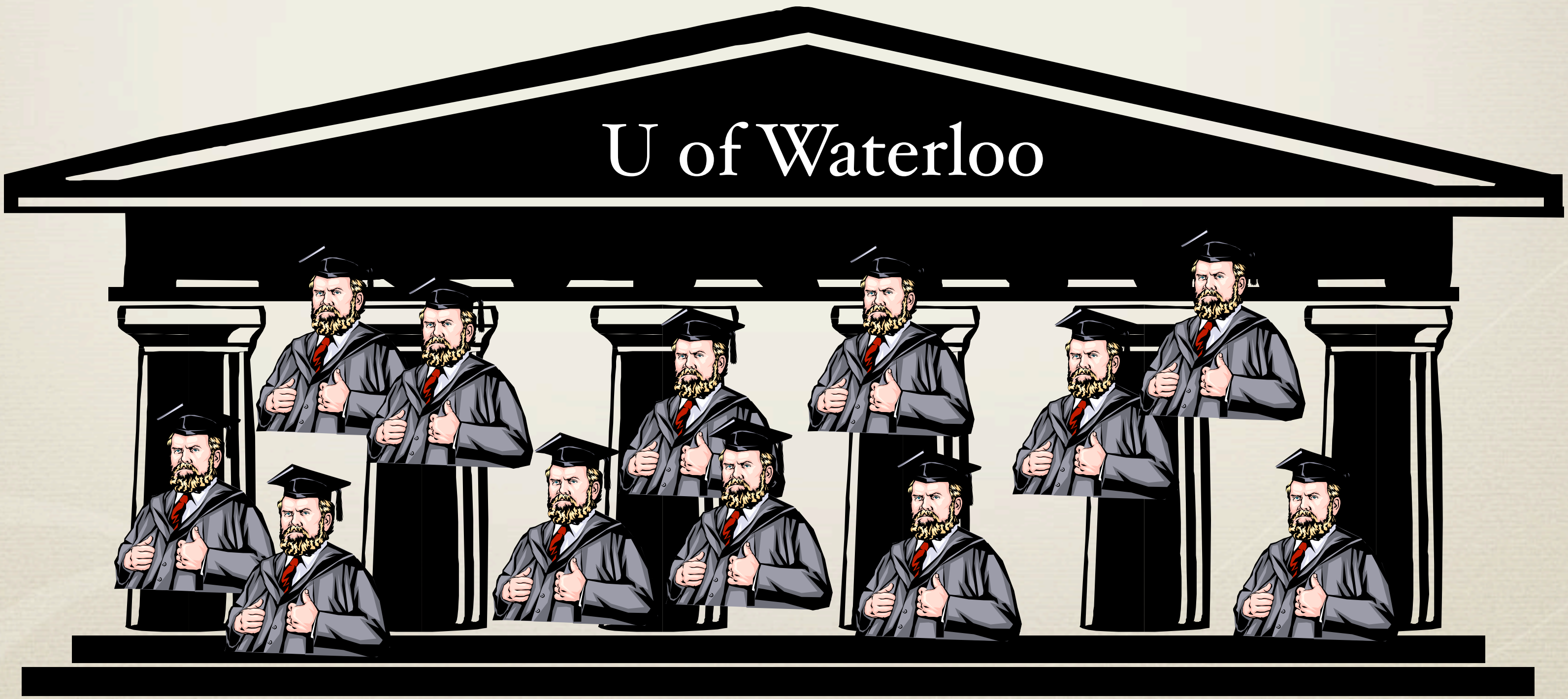
Homer: Lisa, I'd like to buy your rock.

Induction

- Also very common in science
- Of the form:
    - All observed A are B
    - Therefore all A are B.
- E.g.,
    - All observed crows are black
    - Therefore all crows are black

Example: Inductive failure

- All observed philosophy professors are at UW
- Therefore all philosophy professors are at UW



Induction (cont.)

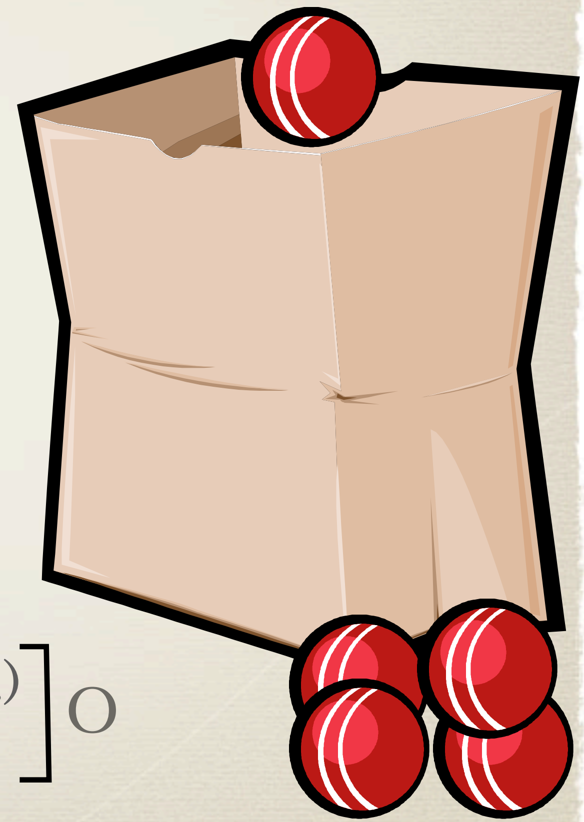
- How do we know the argument form isn't deductively valid?
- Determining when it is *justified* can be done by considering it as we have considered cases of abduction.
- Suppose we identify the implicit premise:
    - E is part of the best explanation for the first premise {where E=All A are B}
- What do we have?
    - abduction (i.e., IBE!)

Induction (cont.)

- The main determinant of the goodness of E will be how the statistics are collected (a later topic)
- In particular, E should reflect a good sampling of the relevant target population (e.g., ‘florks are white’ vs. ‘florks have livers’)
- Given this characterization of induction, we know that we can evaluate such arguments in the same way we evaluate abductions (IBE).
- Much of the latter part of the course is about how to evaluate IBE, because it is about how to evaluate theories.

Three kinds of argument

- Deduction
  - All balls from this bag are red
  - These balls are from this bag.
  - Therefore, these balls are red.
- Abduction
  - All balls from this bag are red
  - These balls are red. O
  - Therefore, these balls are from this bag. E
- Induction
  - These balls are from this bag. (& these balls, ...)
  - These balls are red O
  - Therefore, all balls from this bag are red. E



Induction and Abduction

- Abduction
  - Generates hypotheses
  - Becomes induction if we continue to test the conclusion
- Induction
  - Summarizes past observations
  - Becomes abduction if our best explanation of the observations is the conclusion
- Both
  - Are invalid forms
  - Are used in most of our reasoning

Causal reasoning

- Can provide reasons to believe A->B (all else being equal)
- We can characterize causal arguments as 'double' abduction (IBE).
- These arguments are of the form:
  - P1: Observed A and B are correlated
  - P2: C1 is part of the best explanation for P1
  - C1: Therefore, A and B are generally correlated
  - P3: C2 is part of the best explanation for C1
  - C2: Therefore, events of kind A cause events of kind B
- P1, P2, and C1 form the first abduction and C1, P3, and C2 form the second abduction.

Causal conclusions (cont.)

- P1: In most cases when I turn my key (A) my car starts (B).
- P2: Turning my key being generally correlated with my car starting is part of the best explanation for those observations
- C1: Therefore, turning my key is generally correlated with my car starting
- P3: That turning my key causes my car to start is the best explanation for that correlation
- C2: Therefore turning my key causes my car to start

Causal explanation (cont.)

- However, Correlation ≠ Causation:
- P1: In most cases when I have lunch (A) the peace tower bells ring (B).
- P2: My having lunch being generally correlated with the ringing bells is part of the BE
- C1: Therefore, my having lunch is generally correlated with ringing bells
- P3: That my having lunch causes ringing bells is the BE
- C2: Therefore my having lunch causes ringing bells

Causal conclusions (cont.)

- Why use correlation? Because:
    - Claiming that A is a cause is not the claim that A is sufficient for B, but rather that it is a necessary part of the sufficient conditions for B.
    - The other conditions that make the sufficient set may vary from case to case (and we may not know what they are), we must rely on imperfect correlations to suggest when events are causally related.

Causal conclusions (cont.)

- E.g., Helicobacter pylori hypothesis (Nobel Prize)
- Bacterium causes ulcers (but not in everyone all the time)
- Supported by an imperfect correlation (i.e. not everyone exposed to helicobacter gets an ulcer)
- The reason is that the remaining ‘background’ or ‘structuring’ conditions must be met as well
- They are only met in some individuals, so exposure to the bacterium only works in those cases.
- However, even in those individuals who do meet these conditions, ulcers won't appear unless they are exposed to the bacterium.

Causal conclusions (cont.)

- How can you help rule out other causes?
  - "in the lab", i.e., perform controlled experiments (we will talk about these in detail a few classes from now).
- Criticizing such causal arguments is much like criticizing abduction (or IBE). Except we can apply the criteria twice.
- To criticize the first premise, in particular, it is useful to understand the pitfalls of statistical data... which is a later topic

Observation

- What counts as an observation is relative to context.
- The context is generally determined by what we permit ourselves to take for granted (which can easily vary).
- So, we must agree on what the observations are before trying to compare explanations of the phenomena.

Finding the best explanation

- Determining which explanation is the best can be quite difficult.
- Generally we should prefer:
    - explanations that rely on already widely established theories
    - explanations that are specific (hence more evaluable)
- Often the best explanation will come from/be part of the best established theory (we will return to this shortly).

Science

- Pragmatically, science is a trusted source of factual knowledge
- Scientists often enjoy prestige and authority
- ‘Scientific’ denotes reliability, honesty, accuracy, care in production, generally positive associations.
- The claim that a statement is ‘scientific’ isn’t especially helpful (compare ‘reasonable’)
- What makes a statement (argument, method) scientific?

Science is...

- Just the facts
  - No science proceeds theory free
- A method
  - Mostly fit retrospectively or partially
- Naturalism
  - How to distinguish supernatural from natural
- Verifiability & falsifiability
  - Both are a matter of degree which don’t demarcate

An attitude

- No need to appeal to unwarranted objects (phlogiston)
- Always allow the possibility of error (ID pledges)
- Domain specific application of many critical thinking ideas
    - In short, a rejection of dubious statistics, biases (psychological & otherwise), fallacious reasoning, sloppy methods, irreproducibility, dogmatism
- Does not provide a sharp science/pseudo-science divide!

Evaluating theories

- So how do we determine which theories are good to have and which aren't?
- Generally, a good theory has:

1. Content: The theory should be testable.
2. Scope: The theory should be truly general.
3. Unity: The theory should integrate with other theories.
4. Accuracy: The theory should have many confirming cases (i.e. consistent with the data).
5. Uniqueness: The theory should rule out competing theories.

Content

- A theory has content just in case it has consequences that *could be* false
- The more 'non-accidental' the consequences, the more content it has (e.g. ↑ precision = ↑ content).
- The content of a theory is diminished if:
    - It lacks clarity
    - It is imprecise, meaning that although quantitative predictions are made, they have large ranges
    - It relies on *ad hoc* (literally 'to this') elements.
    - It is vacuous.

Scope

- It's truly *general*
- A theory that reduces the number of beliefs we need to have while explaining the same phenomena will be a strong candidate.
- Ockham's razor - simpler theories are to be preferred over more complex ones.

Unity

- A theory is generally better if it meshes with our previous beliefs, especially if we can derive it from those beliefs.
- We should generally be skeptical of theories that posit bizarre, unproven forces.

Accuracy

- A theory should have many confirming cases.
- Or, in contrast, we could say that theories should not be falsified (i.e., have disconfirming cases).
- However, falsification in science (and elsewhere) is seldom straight forward.
- We must consider the theory as a whole when determining if it is best or not.

Uniqueness

- A theory that predicts an outcome that no other theory predicts, or, better yet, contradicts previous theories will be very convincing.
- This essentially gives that theory a lot of content. The more such predictions, the more content the theory will have.

ID vs. evolution

- Question: How do evolution and creationism compare given these criteria?
    - Content: The theory should be testable.
    - Scope: The theory should be truly general.
    - Unity: The theory should integrate with other theories.
    - Accuracy: The theory should have many confirming cases (i.e. consistent with the data).
    - Uniqueness: The theory should rule out competing theories.

Kansas

- On October 18, 2004, the Defendant Dover Area School Board of Directors passed by a 6-3 vote the following resolution:
- Students will be made aware of gaps/problems in Darwin's theory and of other theories of evolution including, but not limited to, intelligent design. Note: Origins of Life is not taught.
- On November 19, 2004, the Defendant Dover Area School District announced by press release that, commencing in January 2005, teachers would be required to read the following statement to students in the ninth grade biology class at Dover High School:
- The Pennsylvania Academic Standards require students to learn about Darwin's Theory of Evolution and eventually to take a standardized test of which evolution is a part. Because Darwin's Theory is a theory, it continues to be tested as new evidence is discovered. The Theory is not a fact. Gaps in the Theory exist for which there is no evidence. A theory is defined as a well-tested explanation that unifies a broad range of observations. Intelligent Design is an explanation of the origin of life that differs from Darwin's view. The reference book, Of Pandas and People, is available for students who might be interested in gaining an understanding of what Intelligent Design actually involves. With respect to any theory, students are encouraged to keep an open mind. The school leaves the discussion of the Origins of Life to individual students and their families. As a Standards-driven district, class instruction focuses upon preparing students to achieve proficiency on Standards-based assessments.

ID vs. evolution

- Essentially these criteria were used to successfully challenge this attempt to introduce intelligent design into Kansas classrooms
  - http://files.findlaw.com/news.findlaw.com/hdocs/docs/educate/ktzmllrdvr122005opn.pdf

Criticisms of IBE

- We can criticize IBE (abduction) by attacking either of the premises or the conclusion.
- In attacking the first premise, we can either
  - show that it is false (i.e. O wasn't observed); or
  - show that there is a further observation that doesn't fit with E
- In attacking the second premise we can
  - apply the previously discussed criteria for evaluating explanations in the context of a theory

Criticizing abduction (cont.)

- In attacking the conclusion we can
  - Give a counter example to E; or
  - Derive consequences of E and show that they don't obtain (through experiment perhaps)

Example

- E.g.: Last night when I was out walking my dog, I looked up at the perfectly clear sky and saw a stationary light that hovered for a moment and then zoomed off. It must have been an alien space ship.
  - You didn't see a light in the sky, it was a firefly.
  - The UW meteorological society published a notice saying that they'd launch a weather balloon at exactly that time, and it burst shortly after takeoff.
  - Many lights with those properties aren't alien space ships.
  - If it was an alien space ship, we'd know about such things by now. If 'they' didn't want us to know, why was it lit?

Summary

- A general belief or theory is justified if it is part of the best explanation of what is observed.
- A particular belief is justified if it follows from some justified general belief.
- It should be clear that this incorporates a kind of circularity. The reason the circle is not vicious is because of the observations (and secondarily some of the criteria of what determines a 'best' explanation).

Question

- Question: Provide a causal argument for a simple, everyday causal connection (e.g. hitting glass causes it to break, striking a match causes it to light, flicking the light switch causes the light to go on, etc.).