

# Announcements and Such

- One Song — *Yes, Classic Yes*
  - I've Seen All Good People: Your Move/All Good People
- No office hours for Branden on Thursday.
- Schedule Change: Only 1 lecture on Testimony.
  - We may/may not add another lecture (stay tuned).
  - So, we're one-day ahead on the schedule (for now).
- Today: Inference & the Extension of Knowledge (I/II)

## Inference & The Extension of Knowledge I

### Inference: Psychology vs Epistemology I

- Some beliefs arise from a *process* of inference. This is a *psychological* claim about *how beliefs arise*, not an *epistemic* claim — it's *not normative*.
- Not every inferential process will be a *good* one — in the sense of leading from truths to truths.
- Often (as in math/logic, explicit philosophy) we *consciously infer* a conclusion from premises.
- But, inference — *as a mental process* — *need not be conscious*. What's important is that one belief is *caused to arise by other beliefs* (in a particular way).
- This is *psychological/causal dependence* of beliefs.
- Inferential *formation* is to be contrasted with other (*direct*) *non-inferential* formations of belief — *e.g.*, perceptual, memorial, testimonial, introspective...

## Inference & The Extension of Knowledge I

### Inference: Psychology vs Epistemology II

- Beliefs and inferences are *mental* states and processes. These are *psychological* entities.
- But, the *contents* or *objects* of beliefs are *not* psychological (but, *logical*) — these are bearers of truth and falsity (we've been calling these *propositions*).
  - Example: when I *infer* a proposition *p* from a set of propositions *Q*, I start out believing each member of *Q*, and I end-up believing *p* (in addition to *Q*).
  - The *inferring*, and *believing* are *psychological*, but *what* I believe and infer (*p* and *Q*) are not.
- It's crucial to stay clear on the psychological vs epistemic aspects of inference.
- We'll mainly be interested in the epistemic, of course. But, it's important to think about both.

## Inference & The Extension of Knowledge II

### Two Related Senses of "Inference"

- Psychological sense: *inferential process*.
- Logical/Epistemic sense: *inferential content*.
  - Example: I believe (at *t0*) that (*p*) Alberto has Lyme disease, and (*q*) Lyme disease is caused by ticks. I *infer from p, q* (at *t1*) that (*r*) Alberto was bitten by a tick.
  - In this case, the *inferential process* is *how my mental state evolves from t0 to t1*.
  - But, the *inferential content* is an *argument* that has *p* and *q* as its *premises*, and *r* as its *conclusion*.
  - Inferential content can *mirror* (the structure of) inferential process, but they are distinct.
  - This need not involve "saying" (even subconsciously) "therefore". What matters is how my belief that *r* is *based on/depends on* my beliefs that *p* and that *q*.

### Inference & The Extension of Knowledge III Reasoned Belief vs Belief for a Reason I

- We need not be *conscious* of our reasoning. We may simply draw an inference when our grounds for it register in our consciousness in the right way.
- When a belief *arises from* reasoning *and is based on* this reasoning, we call it a *reasoned belief*.
- When a belief is *based on* reasons, it's a *belief for a reason*. All reasoned beliefs are beliefs for reasons.
- But, *not all beliefs for reasons are reasoned beliefs*.
- Some beliefs are *based on* others, even though they were *not arrived at* by a reasoning process.
- “On the basis of” can be used in both *epistemic* and *psychological* senses. “Arising from” is *psychological*. We are (so far) talking about *psychology* here.
- And, there is a *spectrum* of cases here to consider.

### Inference & The Extension of Knowledge III Reasoned Belief vs Belief for a Reason II

- Example #1 — A Reasoned Belief.
- I hear a sound outside my window. I realize it's a pecking sound, and I come to believe — *by inference* from this and my belief that woodpeckers are the most common “peckers” in these parts — that there's a woodpecker outside.
- Example #2 — A (mere) Belief for a Reason
- A car backfires in the distance. I do not think about the sound, but I come to believe that a car has driven by. This *need not* be a case of *inference*.
- I might simply have recognized the sound as a backfire and, *on the basis of* this together with my standing belief that backfires are from (driven) vehicles, *automatically formed the belief* that someone drove by. It's still a *belief for a reason*.

### Inference & The Extension of Knowledge III Reasoned Belief vs Belief for a Reason III

- There is a *spectrum of intermediate cases* here:
  - I might even *automatically come to believe* that someone drove by upon hearing the noise.
  - I might be so familiar with backfire sounds that I “*just hear*” vehicles pass when I hear backfires.
  - Or, I may be so unfamiliar with them that I first cautiously form the belief *that* the noise *is* a backfire, *and then I infer* that a vehicle passed.
  - The case above was “in the middle” of this spectrum, in that I “just heard” the backfire, but I didn't “just hear” the vehicle passing by.
- This goes back to a question about perception: the role of background knowledge/experience on *what is (or can be) directly perceived* by the agent.

### Inference & The Extension of Knowledge III Reasoned Belief vs Belief for a Reason IV

- Depending on background knowledge/experience, one's *direct perceiving* can be another's *inference*.
- What the novice must realize through drawing inferences, the professional can “just see”.
- In the examples above, notice that the contexts are different in an important way.
- In the case of backfires, the sound is *distinctive* of cars (to me), but in the case of “pecking sounds,” there could be many causes of similar sounds. This makes the latter more prone to *inference* (for me).
- What cases of reasoned belief and belief for a reason have in common is that the resulting belief is believed *on the basis of* other beliefs I have.
- My beliefs have *inferential structure* in both cases

## Inference & The Extension of Knowledge IV Two Ways Beliefs May Be Inferential

- A belief that is the result of an inferential process will be called *episodically* inferential.
- A belief that is based on other beliefs will be called *structurally* inferential.
- In both cases, I believe the “conclusion” *on the basis of* the “premises” — I believe the “conclusion” *because* (causally) I believe the “premises”.
- So, both cases are *structurally* inferential. But...
- In the first case, I *do* something—*make an inference*.
- In the second case, *something happens in me* — a belief is arises on the basis of other beliefs I hold.
- Reasons can lead to belief in two ways: one requiring a process of reasoning, and the other not.

## Inference & The Extension of Knowledge V The Basing Relation: Direct and Indirect Belief

- Suppose you see someone you take to be Alasdair. You do not get a good look, but believe in any case that it is Alasdair. When a friend says that she has just met Alasdair's wife at the train station, you now believe (in part) *on the basis of* her information that you saw him.
- The new information provided becomes part of the *structural inferential basis* of your belief.
- This *need not* involve any *inference* on your part, *from* the information she provided to you.
- Analogy: like adding pillars beneath a pre-standing porch. The porch now has *more pillars of support*.
- These are all *indirect* beliefs that are *mediated by* other beliefs. As above, one person's indirect belief may be another's direct belief. In general, direct vs indirect has nothing to do with the *content* of belief.

## Inference & The Extension of Knowledge VI Confirmatory vs Generative Inference

- I may infer something that I *already* believe, just to *confirm* for myself that it is true.
- I *directly* believe that a vehicle backfired after hearing the sound. But, then I remember that firecrackers have been set-off frequently in recent days.
- So, I reflect on my memory of the sound, and I *infer* from some of its properties that it was a backfire, and not a firecracker after all. [I never gave up my belief.]
- In this case, I was able to *infer* (from a memory of the sound) what I believed about it all along.
- The belief was *not generated by* inference (say, from a sense datum of the sound), but it was *confirmed* by an inference (from a memory image of the sound).
- *Generative* just means *belief-forming*. This was a belief-*altering*, but *not* a belief-*forming* inference.

## Inference & The Extension of Knowledge VII Inference as a Dependent Source of Justification & Knowledge

- In the case above, not only does my belief go from being non-inferential to being inferential, but it may also go from being *unjustified* to being *justified*.
- As imagined, the case involved me *ruling-out an alternative explanation*: that it was a firecracker.
- In such a case, this process of ruling-out alternatives can render a belief *justified*, when it wasn't before.
- If I am unjustified, however, in believing one of the premises of my inference, then the resulting belief (the conclusion) will not be justified either.
- *Even if* I am justified in believing all of my premises, if one of them happens to be *false*, then I cannot come to *know* the conclusion *by the inference*.
- Thus, inference is *not a basic source* of J or K.

## Inference & The Extension of Knowledge VIII

### Inference as an Extender of Justification and Knowledge

- Two kinds of inferential extension of knowledge and justification have been seen so far.
  - Acquisition of new knowledge or new justified beliefs, as a result of inference (generative).
  - Increase in justification/support for something we already believe (confirmatory).
- A third kind: inference from two or more sets of *independent* premises. The *joint support* provided by such inferences is *more than each individually*.
- These things can all happen “in the background”
  - As a timber can be silently and unobtrusively placed beneath a porch in a way that supports it, one belief can, without our noticing it, provide support for another that is already in place, or even lead to the formation of a belief one did not previously hold.

## Inference & The Extension of Knowledge IX

### Source conditions & Transmission Conditions for Inferential J/K

- Inferences can *transmit/extend* knowledge or justification under the right circumstances.
- There are both *source conditions* and *transmission conditions* that have to be satisfied.
- The source conditions tell us when the *premises* are *justified/known* (say, from basic sources). This is what Chapters 1-5 have been mainly about.
- The *transmission conditions* tell us when our inferences (of various kinds) *succeed in transmitting* the justification/knowledge we start with.
  - Example: I *know* that the muffled sound I heard was a *vehicle* backfiring. But, I infer from this that it was a *truck* backfiring, and *not a car* backfiring. However, *I can't tell the difference between the two*. I *don't know via inference* that it was a truck backfiring.

## Inference & The Extension of Knowledge X

### Deductive and Inductive Inference I

- A *deductively valid* argument is such that it is *impossible* for its premises *P* to (all) be true, and (at the same time) its conclusion *C* be false. We call such arguments *necessarily truth-preserving*.
- An *inductively strong* argument is such that “*if* its premises *P* are all true, *then* its conclusion *C* is *probably* true.” Careful! This is *ambiguous*:
  - Probably(if *P* is true, then *C* is true). NO!
    - *Even if P refutes C*, this can still be true!
  - If *P* is true, then probably(*C* is true). NO!
    - *Even if P refutes C*, this can still be true!
  - $\text{Pr}(P \ \& \ C) / \text{Pr}(P) = \text{Pr}(C \mid P)$  is high. YES!
    - Gets entailment/refutation as proper extremes.

## Inference & The Extension of Knowledge XI

### Deductive and Inductive Inference II

- Hume had an interesting view about inductive beliefs. He thought that they were *not* (ever) the product of *inference*, but merely *habit* or *association*.
  - Specifically, whenever our minds transition from a belief about observed things to a belief about unobserved things, this is *not via inference*.
  - That is, Hume might have said that unless there is a *deductive* underlying *structural* inference, the “conclusion” is not *inferred* from the “premises”.
- It's not entirely clear *why* Hume thought this, and why he didn't think the same thing about transitions that are mirrored by *deductive structural* inferences.
- What he says makes it sound like he's appealing to *epistemic/logical* considerations here (an inductive argument would be *circular*, a deductive one *invalid*).