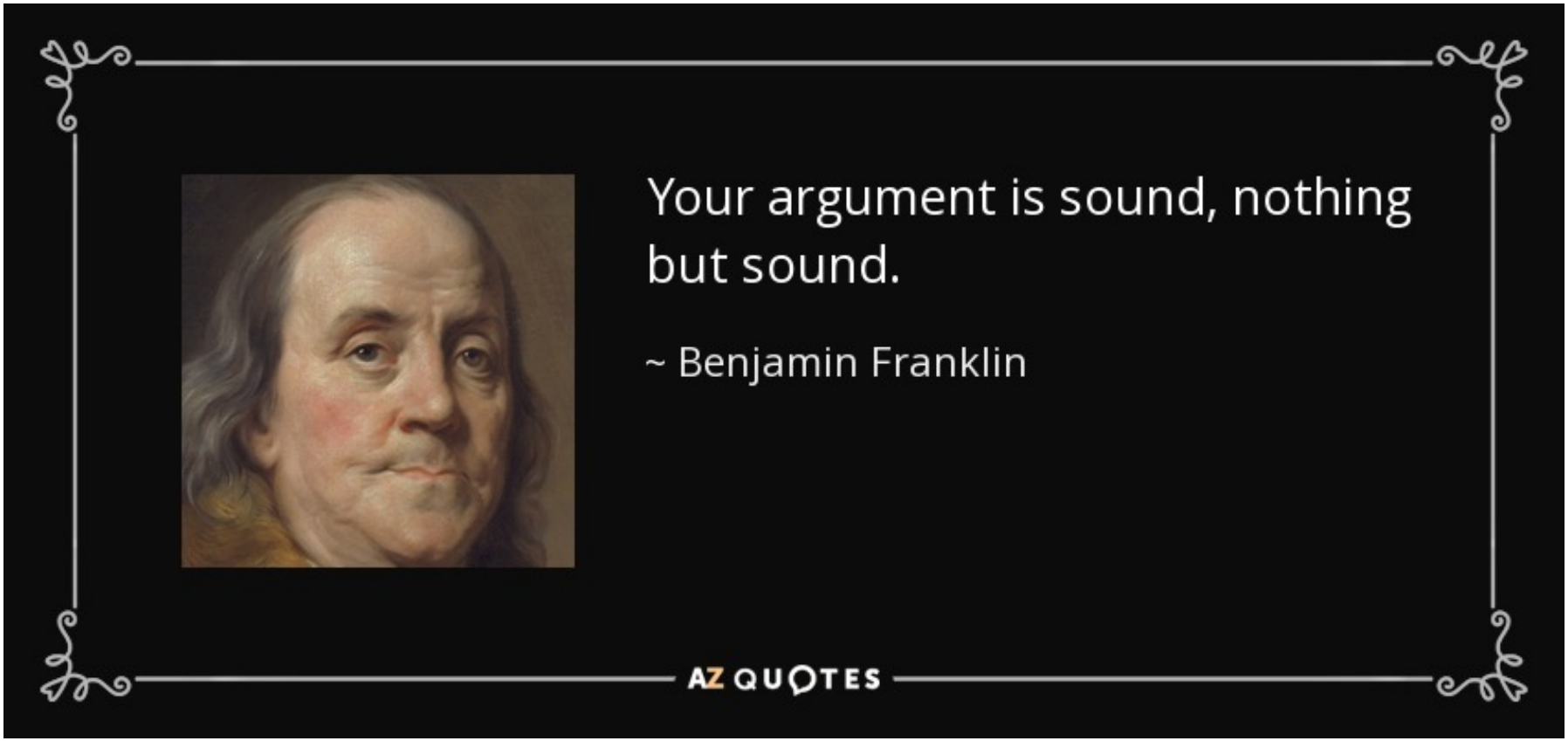
Lect. #14: Critical Reasoning 2



www.azquotes.com/picture-quotes/quote-your-argument-is-sound-nothing-but-sound-benjamin-franklin-141-75-18.jpg

Agenda for Today

1. Structured Argument with Ethical Theory

2. Structured Arguments: Valid vs Sound

3. Structured Arguments: Inductive vs Fallacious

4. Types of Fallacious Arguments

5. GCS Project (if sufficient time)

Announcements

- Midterm grades are based only on homework and attendance/participation, so not very informative
- GCS case descriptions with Google Doc sign-up sheet will be available at 3:00 pm today.
- Read the case descriptions (skim them first and read the ones that interest you—there are 49 of them, some more interesting than others and some more meaty than others) and then get together with your team asap to decide on a case
- Case choices due Monday, 10.17.22, by 11:59 pm; only one team per case
- If case not chosen by deadline, I'll assign a case to a team

POLL

A valid argument is always a strong argument.

A. True

B. False

Arguments: Valid vs Invalid Arguments (redux)

- Valid and invalid are technical terms in logic
- Claims can be true or false, but arguments are either valid or invalid
- To determine whether an argument is valid, we *assume* all premises are true
- Given this assumption, is it impossible for the conclusion to be false?

i.ytimg.com/vi/W6CSCuxrheE/maxresdefault.jpg

- If one counterexample is discovered, then the argument is invalid; otherwise it's valid

Arguments: Example Using Rule Deontology (redux)

PREMISE 1: Rule Deontology requires employers to treat their employees as rational beings (it's their duty).

PREMISE 2: In order to treat employees as rational beings, they must be informed that they are being monitored (universality).

PREMISE 3: Monitoring employees has been shown to help employees increase their productivity (impartiality).

PREMISE 4: Employers should take only those actions that (a) are consistent with Rule Deontology and (b) help increase employee productivity.

CONCLUSION: Employers should monitor their employees and inform them that they are being monitored.

Social Contract and Rights-Based Contract Theory
Thomas Hobbes (1588-1679)

- Contract-based ethical theory which provides motivation for being moral, unlike either utilitarianism or deontology
- We establish a "social contract" in order to establish social order. For our own good and good of society, we are motivated to follow established contracts (laws) that preserve *natural rights* (e.g., property, freedom, privacy)
- To apply this theory, ask the following question:
  - What legal contracts and natural rights are applicable to this situation?

Breakout Discussion (4 min)

- Construct an argument for or against workplace surveillance using Social Contract Theory (this will be easier if you're specific about what is monitored).
- You'll need at least three premises: one stating the use of social contract theory, one identifying the social contract(s), and one stating that actions taken must be in accordance with Social Contract Theory.
- Your conclusion should state that employers SHOULD or SHOULD NOT monitor their employees for a specific behavior.
- Choose someone to present your structured argument.

Arguments: Valid Argument
E4: AECL Response Correct

PREMISE 1: If AECL had informed organizations about the incidents with the Therac-25, these organizations would have stopped using it, and many cancer patients would not have received treatment.

PREMISE 2: Many cancer patients needed to be treated in a timely manner by the Therac-25 or they would have died.

PREMISE 3: We must always try to prevent cancer patients from dying.

CONCLUSION: AECL responded correctly by not informing others of previous incidents with the Therac-25.

Arguments: Valid Argument
E4: AECL Response Incorrect

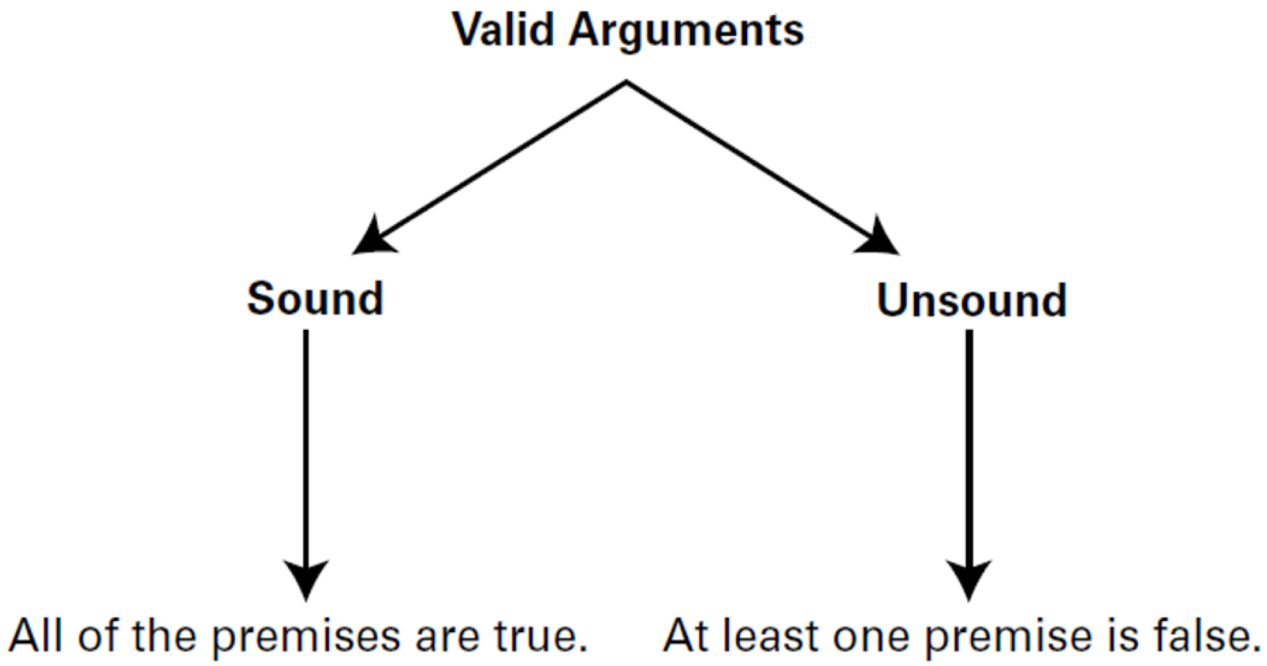
PREMISE 1: AECL is a friendly purple dinosaur.

PREMISE 2: Friendly purple dinosaurs should always inform others of previous incidents involving the Therac-25.

CONCLUSION: AECL should have informed others of previous incidents with the Therac-25.

Arguments: Sound vs Unsound Arguments

Tavani, Fig. 3.2



- A *valid* argument is *sound* when **all** premises are true
- An argument can be valid but not sound
- However, an argument can't be sound if it isn't valid

Arguments: Valid, Invalid, Sound, Unsound?

PREMISE 1: The macOS operating system is better than the Windows operating system.

PREMISE 2: The Linux operating system is better than the macOS operating system.

CONCLUSION: The Linux operating system is better than the Windows operating system.

- Valid or invalid?
  - Valid!
- Sound or unsound?
  - Unsound!
  - Normative premises that can't be established as true

Arguments: More on Valid and Sound Arguments

- It's fairly easy to construct a valid argument by deduction: Every A is a B, C is an A => C is a B.
- It's also fairly easy to construct a sound argument if the argument is trivial, e.g.,

Premise 1: CEOs of major computer corporations are high-school graduates.

Premise 2: Bill Gates was the CEO of a major computer corporation.

Conclusion: Bill Gates is a high-school graduate.

- However, it's difficult to construct a sound argument about a controversial topic
- This is because it's difficult to prove premises are true in the real world

Arguments: Example Using Rule Deontology

PREMISE 1: Rule Deontology requires employers to treat their employees as rational beings (it's their duty).

PREMISE 2: In order to treat employees as rational beings, they must be informed that they are being monitored (universality).

PREMISE 3: Monitoring employees has been shown to help employees increase their productivity (impartiality).

PREMISE 4: Employers should take only those actions that (a) are consistent with Rule Deontology and (b) help increase employee productivity.

CONCLUSION: Employers should monitor their employees and inform them that they are being monitored.

POLL

Which of the following statements is true of the argument on the previous slide?

A. Valid and sound

B. Valid and unsound

C. Invalid and unsound

Arguments: Valid vs Invalid Arguments Revisited

PREMISE 1: All CEOs of major US computer corporations have been US citizens.

PREMISE 2: Steve Jobs was a US citizen.

CONCLUSION: Steve Jobs was a CEO of a major computer corporation in the US.

- All three of the claims in this argument (two premises and conclusion) are true in the real world.
- Valid or invalid?
  - Invalid!
    - Counterexample: Steve Jobs could have had some other job
    - More serious flaw: Swap out Steve Jobs and use Kevin Bacon

Arguments: Valid vs Invalid Arguments Revisited

PREMISE 1: Most CEOs of major computer corporations are college graduates.

PREMISE 2: Satya Nadella is the CEO of a major computer corporation.

CONCLUSION: Satya Nadella is a college graduate.

- All three of the claims in this argument (two premises and conclusion) are true in the real world.
- Valid or invalid?
  - Invalid!
    - Counterexample: Substitute Bill Gates for Satya Nadella

Arguments: Invalid Arguments Revisited
Inductive Arguments

- Invalid arguments can be strong
- *Deductive* arguments are based on logic, e.g., every A is a B, C is an A => C is a B
- *Inductive* arguments are invalid arguments, but their premises provide strong support for the conclusion, i.e., the conclusion is very likely to be true when the premises are true; based on strength of reasoning

Arguments: Inductive Argument Example

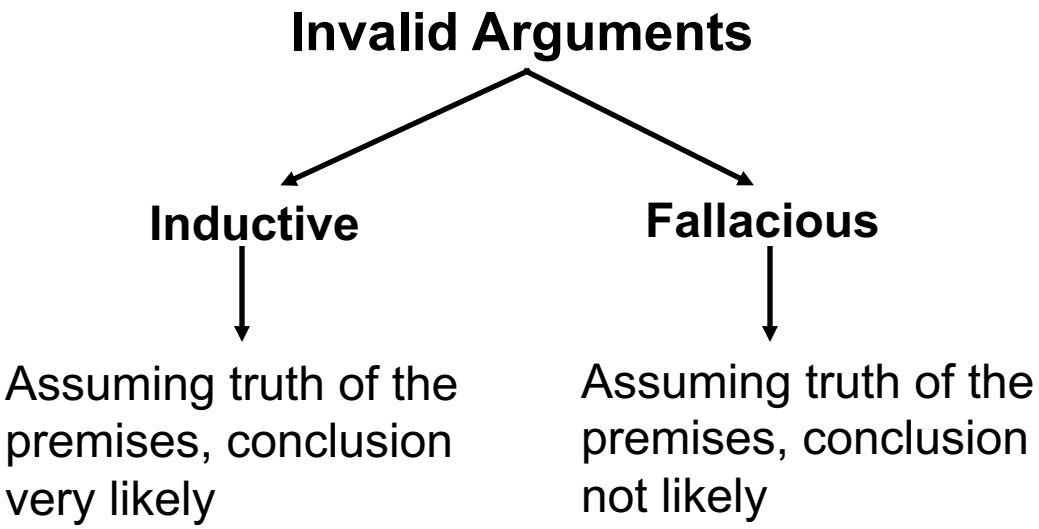
PREMISE 1: Seventy-five percent of people who own iPhones own iMac computers.

PREMISE 2: My roommate owns an iPhone.

CONCLUSION: My roommate owns an iMac computer.

- Valid or invalid?
  - Invalid! Roommate may be among the 25% who don't own an iMac
- However, the conclusion is very likely to be true, so this argument is much stronger than the example with Steve Jobs

Arguments: Inductive vs Fallacious Arguments



- An invalid argument is fallacious if the conclusion isn't likely
- An argument can be fallacious even if its premises and conclusion are all true
- Ironically, an argument can be valid even if one or more of its premises is false and its conclusion is also false

Breakout Discussion (4 min)

- Decide whether the argument below is valid or invalid; if valid, is it sound or unsound; if invalid, is it inductive or fallacious?
- Be prepared to explain the reasons for your answers

PREMISE 1: Artificial intelligence has some unique technological features.

PREMISE 2: Artificial intelligence has generated many ethical concerns.

CONCLUSION: Ethical concerns generated by artificial intelligence must be unique ethical concerns.

Arguments: Fallacy Types

1. *Ad hominem* (to the person) argument: attack directed at person
2. Slippery Slope Argument: "X could lead to Y, so we can't allow X."
3. Fallacy of Appeal to Authority: "X is an authority in field Y. X said Z. Z must be true."
4. False Cause Fallacy (*post hoc ergo propter hoc* – after this, therefore because of this): "X preceded Y; thus X is the cause of Y."
5. Fallacy of Composition/Fallacy of Division: attributing characteristics of parts to the whole and vice versa
6. Fallacy of Ambiguity/Equivocation: using terms ambiguously or interchangeably
7. False Dichotomy/Either-Or Fallacy/All-or-Nothing Fallacy: Two options presented as mutually exclusive
8. Appeal to People Argument: if many believe it, then it must be true
9. Many/Any Fallacy: If many items have a property, any item has that property
10. Virtuality Fallacy: "X exists in cyberspace, and cyberspace is virtual; thus, X isn't real."
11. Begging the Question: premises presuppose truth

Fallacy Types: Appeal to Authority Example

AECL has been in business for 20 years and is the world's leading manufacturer of medical radiation devices. If the company says that its devices are safe, they must be safe.

Fallacy Types: False Cause Example

One of the Therac-25 radiation overdoses occurred when the intercom allowing the machine operator to communicate with the patient malfunctioned. Therefore, the overdose must have been caused by the intercom malfunction.

Fallacy Types: Begging the Question Example

Therac-25 was designed with a hardware interlock device that prevents radiation overdoses from occurring. Because of this hardware interlock device, it would be impossible for the Therac-25 to administer an overdose.

Comic Strip for Poll

dilbert.com/strip/2008-09-07

Poll

What type of fallacy was exemplified in the Dilbert cartoon?

A. False Cause Fallacy

B. Many/Any Fallacy

C. Slippery Slope Argument

D. Fallacy of Composition