

Key Skills for Computer Science

Lecture 4: Argument

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The Limits of Deductive Logical Reasoning

- Deductive reasoning is the most mathematically robust kind of reasoning we can do
- But deductive reasoning is of limited value for many real-world situations, because it relies on *consistency*
- Many real-world situations fail the consistency test

An Example Inconsistent (but Reasonable) Argument

- Consider the following arguments:
 - *Raising taxes is good, because it allows us to invest in public services such as health care and infrastructure*
 - *Raising taxes is bad, because it stifles economic growth*
- In a logical sense, these statements are inconsistent: they imply that raising taxes is both good *and* bad
- But they are (probably) both true
- So how can we make sense of this? We need to look at the *strength* of the arguments involved, and how they relate

Types of Argument Dialogue (Walton)

- persuasion
 - e.g., politician trying to persuade you tax increases are bad
- information-seeking
 - e.g., I interview you
- negotiation
 - e.g., settling sale price of a second hand car
- inquiry
 - e.g., 7 July bombing inquiry
- eristic
 - e.g., quarrel

What is an Argument? (Toulmin)

- Claim
- Grounds
- Warrant
- Backing
- Qualifiers
- Rebuttals

Components of Argument: Claim

- The claim is *the position you are attempting to establish*
- What might the claim be in the following?
 - “If we don’t invade Ruritania then they may will weapons of mass destruction”
 - “Cannabis is less harmful than alcohol; it doesn’t make sense to have alcohol legal and cannabis illegal”
 - “A basic education is more important than fancy degrees that nobody uses. If we have to cut education funding, it should be university funding”

Components of Argument: Grounds

- The *grounds* are the *reasons in support of the claim*
- The *evidence* to support it
 - e.g.: experimental evidence, matters of common knowledge, personal testimony
- An argument is *no stronger than the grounds that support it*

Components of Argument: Grounds

- “A CIA agent in Ruritania reports the establishment of a nuclear fuel processing plant in the Ruritanian capital ”
- “A study reported in *Lancet* concludes that moderate consumption of cannabis in liquid form was less harmful than moderate alcohol consumption”
- “I’ve got three children and none of them went to university. And I pay my bloody taxes. University students are all drunken layabouts.”

Components of Argument: Warrant

- The *warrant* is what legitimises the claim on the basis of the grounds
- Hence the terminology
 - “that claim is warranted”
 - “that claim is not warranted”
- My wife saw me in a cafe with a woman. Is she *warranted* in concluding that I am having an affair?

Components of Argument: Warrant

- “The CIA have a sophisticated and reliable network of agents in Ruritania, with strong connections to the military”
- “Lancet is an extremely reputable venue for medical research; we can have confidence in a report published there”
- “I’m a normal bloke. My experience is typical, and my neighbours feel the same way.”

Components of Argument: Backing

- Indicates why you should trust the warrant
- Additional information supporting it

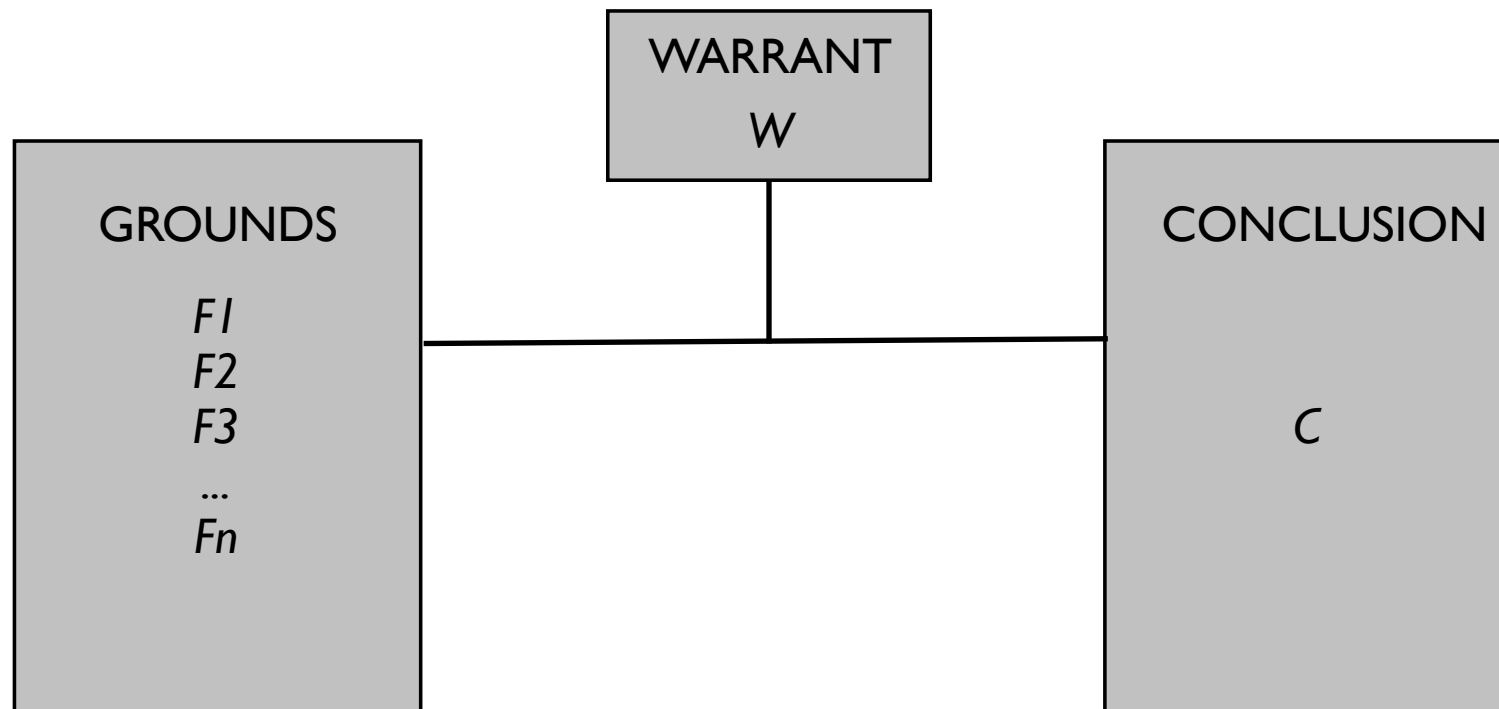
Components of Argument: Qualifiers

- Indicate the reliability of the warrant
 - “usually”
 - “mostly”
 - “in all the cases I’ve seen”
 - “in my experience”

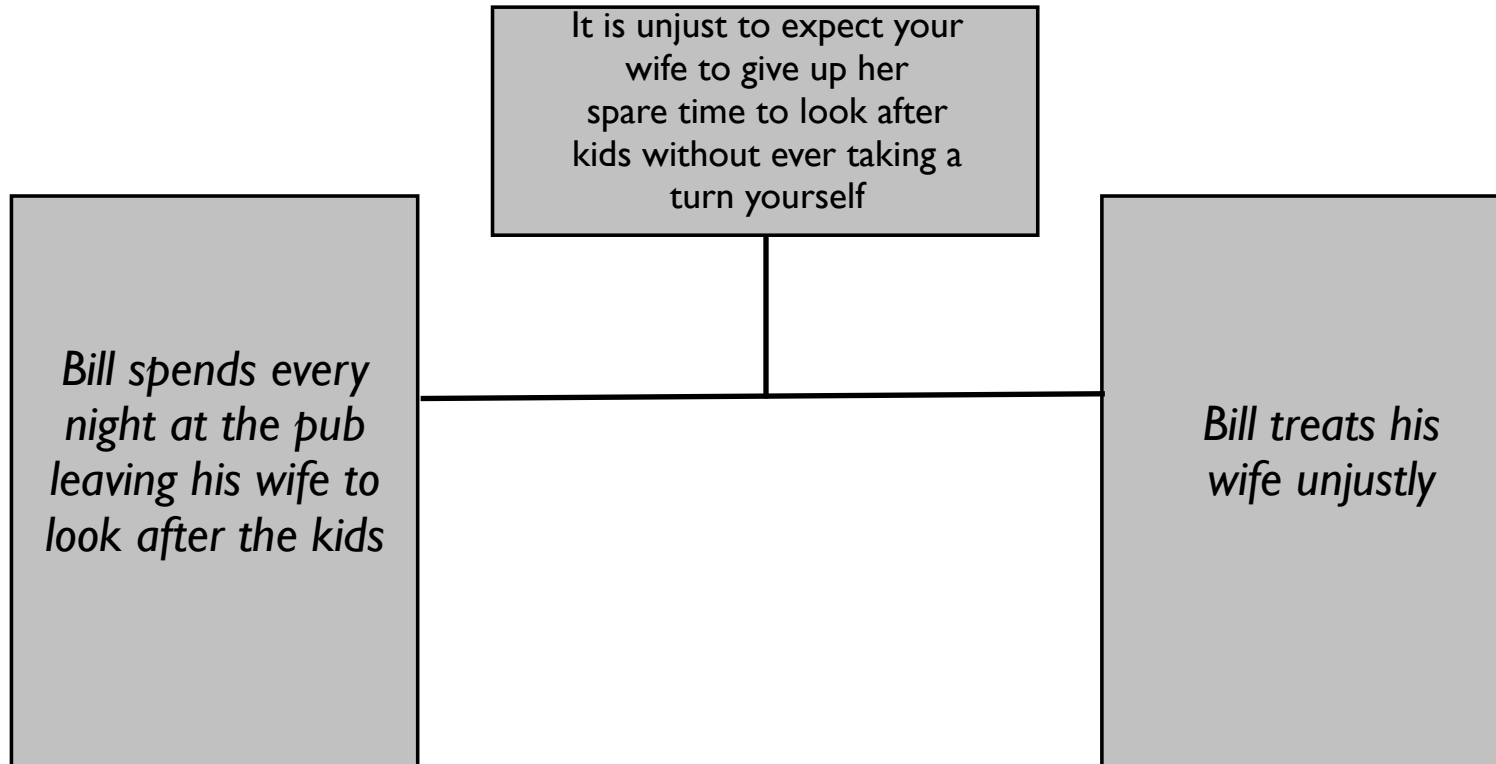
Components of Argument: Rebuttals

- The circumstances under which an argument might *fail*
- The possible *counter arguments*

Pictorially



An Example



Evaluating the Strength of Arguments: Alice Kills Burglar Bob

- Consider the following scenario:
 - *Bill breaks into Alice's house; Alice shoots & kills Bill.*
- Should Alice be prosecuted?
- What are the main arguments for & against?

Arguments for Prosecuting Alice

- Everyone has the right to life, even burglars
- Alice had the right to use reasonable force to protect herself and her property, but *not* to kill
- So, Alice should be prosecuted

Arguments against Prosecuting Alice

- Alice had the right to protect herself and her property
- Anyone entering a house with violence waives their right to the protection of the law -- they can expect to be treated without regard to their wellbeing

The Values at Stake (Bench-Capon)

- Broadly, we can see three **values** in these arguments:
 1. *the right to life*
 2. *the right to protect oneself*
 3. *the right to protect one's property*
- How you rank these values will determine how you judge the scenario

Evaluating the Strength of Arguments: Government Funding

- Consider the following scenario:
 - *The government must cut funding in either healthcare (NHS), defence, education, the welfare state, or infrastructure (roads etc).*
 - *How should the cuts fall?*
- Identify the arguments to support and rebut each of these, and the values they appeal to

Fallacies: When Arguments Go Bad

- **Fallacies** are “bugs” in arguments -- errors or fundamental weaknesses
- You need to be able to identify fallacies because:
 - you don't want to accept a faulty argument
 - if you make an argument with a fallacy this provides a route for your opponent to attack your argument
- Fallacies fall into two types:
 - non-logical
 - logical

Ad Hominem Fallacies

- Ad hominem (“against the person”) arguments attack a person’s age, gender, race, social status, music taste, dress sense...
- Example:
 - Jones thinks the Conservatives are the best party.
 - Jones is a convicted murderer.
 - ∴ We should not vote Conservative

***Ad Hominem* Fallacies**

- Is this an *ad hominem* argument?

Alice says she saw Bob burgle the house on 1 December

Alice is an habitual drunkard

∴ Alice's testimony is worthless

Ad Hominem Fallacies

- Is this an *ad hominem* argument?

Alice says she saw Bob burgle the house on 1 December

Alice was so drunk on 1 December her evidence couldn't possibly be relied upon

∴ Alice's testimony is worthless

Guilt by Association Fallacies

- The fallacy of *guilt by association* is the attempt to repudiate a claim by not attacking the proponent but the company they keep etc

- An example:

Jones thinks the Conservatives are the best party.

Jones is friends with drunkards

∴ We should not vote Conservative

Tu Quoque Fallacies

- This fallacy is committed if an argument is made on the grounds that a person is a hypocrite, upholds a double standard, etc

- An example:

Alice says we should ban alcohol

Alice is an habitual drunkard

∴ We should not ban alcohol

Vested Interest Fallacies

- In a vested interest fallacy, we (incorrectly) dismiss an argument on the grounds that the arguer has some interest in the argument being accepted

- Example

Alice says we would all cycle to work

Alice owns a bicycle shop

∴ We should not cycle to work

Ad Baculum Fallacies

- An *ad baculum* (appeal to force) argument often makes a threat
- Example:
 - Alice says you should vote for her or she'll send you to prison
 - ∴ You should vote for Alice

Straw Man Fallacies

- Straw man arguments deliberately confuse an argument with a less plausible claim

- Example:

There can be no truth if everything is relative

∴ Einstein's theory of relativity cannot be true

Appeals to Authority

- These assert that we should accept something because an authority says so
- Example (“dad” is the authority here):
 - My dad says all students are layabouts
 - ∴ All students are drunken layabouts
- Not all appeals to authority are wrong:
 - My dad says all students are layabouts
 - My dad is a university professor with 30 years experience of working with students
 - ∴ All students are drunken layabouts

Causation and Correlation

- Correlation:
 - two events are observed to occur at the same time or in the same order
- Causation:
 - one event was responsible for/brought about another

Correlation and Causation

- Example:

It is observed that people who take vitamin supplements have dramatically increased life expectancy

∴ Taking vitamin supplements increases life expectancy

- There is correlation here, but not necessarily causation
- People who take vitamin supplements are likely to be more health conscious in general!

Correlation and Causation

- Example:

It is observed that sick people recover quickly in hospitals in attractive locations

∴ We should build hospitals in attractive locations

- Are the attractive locations of the hospitals more likely to be affluent areas?

Argument Analysis

- Identify the **type** of argument being put forward (persuasion, negotiation, ...)
- Look for
 - the **claim** -- what the argument proponent is trying to establish;
 - the **grounds** -- the “evidence” supporting the claim; and
 - the **warrant** -- what allows us to link the grounds to the claim.
- In the event of competing arguments, identify and rank the **values** being advanced
- Look for any **fallacies** in the arguments being presented