

Outline

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1 Introduction

About this lecture

- Arguments, Nolt. Ch. 1.
- Argument diagrams
- Argument evaluation: Nolt Ch. 2
- Fallacies Ch 8.
- Course homepages: <http://mathsci.kaist.ac.kr/~schoi/logic.html> and the moodle page <http://moodle.kaist.ac.kr>
- Grading and so on in the moodle. Ask questions in moodle.

Some helpful references

- "Susahak" in our library
- "Mookja" (1977) Mozi in our library
- "Nonuh", Lunyu (English: Analects)[1] (also known as the Analects of Confucius)
- Modern rhetoric / Brooks, Cleanth / Harcourt Brace Jovanovich (1979)
- Ancient Rhetorics, S. Crowley, D. Hawhee, 3rd Edition, Pearson, Longman
- <http://plato.stanford.edu/contents.html> has much resource. Search for rhetoric, informal logic, Mozi.

2 Arguments

Argument

- What is an "argument"?
 - It is an attempt to convince someone of certain beliefs.
 - This was developed by ancient rhetorics by Greek Sophists, Roman Orators (Cecero), Arab philosophers, and Chinese philosophers (Mozi).
 - The Logicians or School of Names was a Chinese philosophical school that grew out of Mohism in the Warring States Period. (See Stanford)
 - Confucius arguments are mainly about how to bring humane natural compulses out of any one.
 - Indian logic (Very developed and complete)
 - Buddhism (The west learned it mostly from the Japanese.)
 - Mostly, these involve much emotional components. Seizing the moments...
 - Exercise: Find some such argument as a homework. To be submitted together with Preview report.
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- Plato condemned the Sophists.
 - Aristotelian Syllogism: (<http://en.wikipedia.org/wiki/Syllogism>) (superceded by Frege and Russel.)
 - Aristoles Rhetoric (a book to Alexander). There are also books by Sophists for example by Isocrates.

Modern rhetorics

- In the modern times, we use "just the facts, please".
- Opinions of majority of people (or experts) are considered facts.
- Use examples.
- Mathematical arguments are limited to logical steps only. So this is very much distinctive.
- One follows the logic of Russel and Frege as only valid form of arguments.
- This is the formal logic (This is the content of Nolt, Ch. 3-7)
- Informal logic is the attempt to develop a logic to assess, analyse and improve ordinary language (or "everyday") reasoning

Mathematical arguments

- All humans are mortal. Socrates is human. Therefore, Socrates is mortal.
- Since the U.S. federal reserve has issued too much money, there will be inflation.
- China has many intelligent people. Thus, China must soon become very rich.
- Which of the above is right?
- The arguments involve premise (for, since, because, assuming that) and conclusions. (Therefore, thus, hence, accordingly...)

Some exercises

- Arguments has to be put in order of premise and then conclusion.
- One often need to break down the sentences into “atomic” pieces.
- This means that you break them down until no further decomposition can be done. (Linguistically always possible. So we assume or enforce.)
 - $\sqrt{2}$ cannot be expressed as a ratio of two integers
 - All rational number is expressible as a ratio of two integers.
 - Thus, $\sqrt{2}$ is not a rational number.

Argument diagram

- Label the atomic sentences.
- One groups atomic sentences into groups that implies another atomic sentence excluding any sentence that is not needed.
- The result has no cycles for the argument to be valid.
- Outside the formal logic, one can still draw argument diagrams..
 - – Seoul has most of the resources of Korea.
 - People need resources to be in their city.
 - Therefore, many people came to Seoul.
 - Hence, Seoul has too much population.
 - Too much people in Seoul create problems.
 - Seoul should not have the problems.
 - We must disperse the population to other places.
- $1 + 2 \rightarrow 3 \rightarrow 4 + 5 + 6 \rightarrow 7$

- China must grow fast or there will be instabilities.
- China must not become unstable.
- If a large country becomes unstable, then the nearby country suffers.
- China is large.
- South Korea is a nearby country.
- South Korea must not suffer.
- Therefore China must grow fast.
- $3+4+5+6 \rightarrow 2 + 1 \rightarrow 7$

Argument evaluation

- This is mostly in informal logic.
- Truth of premises
- Deductive argument: If all the premise is true, then the conclusion must be true. i.e., the conclusion is necessary.
- Inductive argument (Strong, weak): here, the conclusion is not necessary but often with large probability.
- Valid arguments: A deductive argument
- Invalid arguments: non-deductive argument (includes inductive ones)
- Any conclusion follows deductively from inconsistent premises.

Examples

- Some pigs have wings.
- All winged things sing.
- Therefore, pigs sing.
- All mathematical theorems are always true.
- The Black-Scholes equation is a mathematical theorem.
- Therefore, the Black-Scholes equations is always true.

3 Fallacies

Fallacies

- Mistakes or deceptions in arguments. See Stanford under informal logic. There are criticisms against classifying fallacies but
 - Fallacies of relevance
 - Circular reasoning
 - Semantic fallacies
 - Formal fallacies
 - False premise.

Fallacies of relevance

- Ad hominem
- The kind
 - Ad hominem abuse: attacks a person's age, character, ethnicity, personality,...
 - guilt by association: attacks the company he or she keeps
 - Tu quoque: attacks that a person has a double standard.
 - Vested interest: a proponent is motivated by greed
 - Circumstantial ad hominem: a proponent is endorsing a conflicting proposition.

Fallacies of relevance II

- Straw man argument: refutes a claim by confusing with less plausible claim.
- Ad baculum: Appeal to force.
- Ad verecundiam: Appeal to authority
- Ad populum: Appeal to the people
- Ad misericordiam: Appeal to pity
- Ad ignoratum: Appeal to ignorance
- Ignoratio elechi: missing the point.
- Red herring: tangential matter to divert attention.

Fallacies of relevance: examples

- Teachers are opposing teaching evaluations. They will live comfortably if there are no teaching evaluations. Therefore, we must implement teaching evaluations.
- The minister of education said that there will be no college entrance exams in five years. I am going to college 5 years later. Therefore, I don't have to study.
- Since the father of former president XXX is a sleazy person, we cannot trust XXX.

Circular reasoning

- Circular reasoning: the argument assume the conclusion
 - Question begging epithets: phrases that prejudice discussion
 - Complex question: question tricks people into the desired conclusion

Semantic fallacies

- Ambiguity (equivocation): multiple meaning
- Amphiboly: ambiguity in the level of sentence structures.
- Vagueness: indistinctiveness of words
 - doublethink: every sentence cancels out its predecessor and its successor. Orwell's 1984.
 - Accent; generate multiple interpretations.

Inductive fallacies

- Hasty generalization: generalizing from insufficient number of cases
 - Faulty analogy:
 - Gambler's fallacy: something will keep being so.
 - False cause : confusing cause.
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- Formal fallacies: logical mistakes
 - Fallacies of false premise (slippery slope also)