ILLINOIS TECH | College of Computing

ITMM 485 / 585
Dr. Gurram Gopal

Legal and Ethical Issues in Information Technology

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Ch3: Critical Reasoning Skills for Evaluating Disputes in Cyberethics
PI: Introduction and Structure of Arguments

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Learning Objectives:

Upon completion of this lesson the students should be able to:

- Describe the structure of a logical argument
  - Demonstrate how logical arguments can be used to resolve disputes affecting ethical aspects of cybertechnology
- Explain how to evaluate the strength of arguments by distinguishing between arguments that are valid & invalid, sound & unsound, inductive & fallacious
- Identify common logical fallacies
  - Demonstrate how they apply to arguments affecting cyberethics issues
- Explain the purpose of a legal argument
  - Recall how a legal argument is constructed
  - Describe the types of legal arguments often used and how these types are employed in the drafting of valid legal arguments

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Critical Reasoning and Logical Arguments

- Critical reasoning is a branch of *informal logic*.
- Critical reasoning tools, especially *argument analysis*, can help us to resolve many of the disputes in cyberethics.
- A logical argument, or *argument*, is a form of reasoning comprising various *claims*, or *statements*.

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Arguments

- As a "form of reasoning," or reasoning form/ structure, an argument has two important characteristics or features worth noting; it:

i. includes *at least two claims* (but can include an indefinite number of claims),

ii. aims at establishing a *conclusion* (i.e., the truth of one claim) based on evidence provided by one or more other claims, called *premises*.

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The Structure of an Argument

- **Premise 1**
- **. optional**
- **. optional**
- **Premise N optional**
- **Conclusion**

Note that this particular form/structure (i.e., where the premises are listed before the conclusion) is called the *standard form*.

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Argument Structure (Continued)

- **Examine the argument (in Chapter 3) claiming that a radically new computer chip is being developed in Japan.**
- **What is the structure of that argument?**
- **Is it in "standard form"?**
- **If not, you can easily convert into standard form.**

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Argument Structure (Continued): Converting an Argument to Standard Form

- **Premise 1**. When I recently visited the Computer Science Department at the University of Hiroshima I noticed that graduate students and professors there were field testing a new computer chip, whose code name is Chip X.
- **Premise 2**. I have a copy of the design specifications for Chip X, which shows that it will be several times faster than any chip currently available in the US.
- **Premise 3**. Lee Smith, a mutual colleague of ours who was recently an exchange student in the computer science program at the University of Hiroshima and who participated in the field testing of Chip X, will corroborate my account.
- **Conclusion**. Chip X is currently being developed in Japan.

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Argument *Structure* vs. Argument *Strength*

- Not all arguments are strong – i.e., not all arguments succeed in establishing their conclusions.
- Any form of reasoning will qualify as an argument *if* it satisfies the three conditions we specified above.
- Analyze the following argument and ask yourself whether it is a strong argument – i.e., does it establish its conclusion?

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Argument Structure vs. Argument Strength (Continued)

- **Premise 1**. An author's freedom to write a book on how to build a bomb is one that is protected by the First Amendment.
- **Premise 2**. Authoring a book is similar to constructing a Web Site.
- **Conclusion**. Constructing a Web site on how to build a bomb ought to be protected by the First Amendment.

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Argument Structure vs. Argument Strength (Continued)

- Initially, the preceding argument might seem convincing?
- The author of the argument seems to draw a compelling analogy between writing a book and composing a Web site.
- But, there are also some relevant disanalogies that are overlooked.
- Later, we will see why this argument is not strong and thus does not succeed.

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Argument Structure vs. Argument Strength (Continued)

- Analyze the following argument:
- **Premise**: The Internet is in public space.
- **Conclusion**: Those who use the Internet should not expect to retain any personal privacy while online.
- Is this argument strong – i.e., does it succeed in establishing its conclusion?
- Later, we will see why this argument is very weak (in this case, "fallacious").
- So, we can see why it is important to separate an argument's structure from its strength.

Constructing an Argument in Ordinary Language (Prose)

Consider the following argument that is expressed in prose (or narrative) form:

We must build a *national missile defense system* (NMD) because without such a system we are vulnerable to nuclear attacks from rogue nations that might arise in the future. Additionally, several engineers and computer scientists have testified that they can design a computer-guided missile defense system that is effective, safe and reliable. Furthermore, it is our obligation as Americans to take whatever measures we can to protect the safety of our citizens.

Converting the Preceding Argument into Standard Form

- **Premise 1. Without the new National Missile Defense System, the U.S. is vulnerable to nuclear attacks in the future from "rogue nations.**
- **Premise 2. Computer scientists and engineers have testified that they can design a computer-guided missile defense system that is both safe and reliable.**
- **Premise 3. The U.S. must do whatever is necessary to preserve the military defense of the nation and the safety of its citizens.**
- **Conclusion. Therefore, the U.S. should build the new National Missile Defense System.**

Argument Strength: Valid vs. Invalid Arguments

- Is the preceding argument involving the new National Missile Defense (NMD) system a strong argument (i.e., is it *valid*)?
- Assume that all of the premises in the argument are true, does the conclusion necessary follow from them?
- Can you imagine a *counterexample* to the argument?

Counterexamples to Arguments

- **A *counterexample* is:**

  a possible case where the premises in an argument can be imagined to be true while, at the same time, the conclusion could still be false (see, for example, Nolt 2002).
- **Note that if an argument is valid, no counterexample is possible.**

Valid and Invalid Arguments The Counterexample Strategy (Continued)

- Because a counterexample to the NMD argument is possible, it is *invalid*.
- For example, one can imagine a case where all of the premises in that argument are assumed true, while the argument's conclusion could still be imagined to be false.
- However, it is also possible to revise or reconstruct the NMD argument by adding another premise.

The NMD Argument Revised

- **Premise 1.** Without the new National Missile Defense System, the U.S. is vulnerable to nuclear attacks in the future from "rogue nations.
- **Premise 2.** Computer scientists and engineers have testified before Congress that they can design a computer-guided missile defense system that is both safe and reliable.
- **Premise 3.** The U.S. must do whatever is necessary to preserve the military defense of the nation and the safety of its citizens.
- **Premise 4.** The national missile defense system is necessary to preserve the defense and safety of the U.S. and its citizens.
- **Conclusion.** Therefore, the U.S. should build the new National Missile Defense System.