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ILLINOIS TECH | College of Computing

ITMM 485 / 585
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Legal and Ethical Issues in Information Technology

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Ch3: Critical Reasoning Skills for Evaluating Disputes in Cyberethics
P2: Evaluate Arguments- valid/invalid, sound/unsound

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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
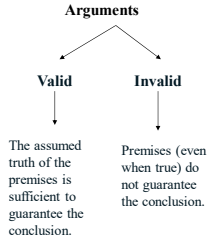
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The Form of a Valid Argument

➤ A valid argument is valid solely in virtue of its *logical form*, not its content.

➤ An example of a valid logical form is:

   PREMISE 1.   Every A is a B.
   PREMISE 2.   C is an A.
   CONCLUSION. C is a B.

➤ No matter what values are substituted for A, B, and C, the argument form is always valid.

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Figure 3-1: Valid and Invalid Arguments

Arguments
→ Valid
→ Invalid

Valid: The assumed truth of the premises is sufficient to guarantee the conclusion.

Invalid: Premises (even when true) do not guarantee the conclusion.

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Valid Arguments that are not Sound

➤ An argument can be valid (in virtue of its logical *form*), but still not succeed in accomplishing its task.

➤ For example, one or more of the (valid) argument's premises might not be true in the actual world.

➤ In this case the argument would still be valid, but it would not be *sound*.

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Sound and Unsound Arguments

➢ **For an argument to be *sound*, it must satisfy two conditions – i.e., it must be:**

a) **valid (i.e., the *assumed* truth of the premises would guarantee the truth of the argument's conclusion);**

b) **the (valid) argument's premises must also be *true in the actual world*.**

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Arguments that are Valid and Unsound

The following argument is valid, but unsound:

PREMISE 1. People who own iPhones are smarter than those who own Android phones.
PREMISE 2. My roommate owns an iPhone.
PREMISE 3. I own an Android.
**CONCLUSION.** My roommate is smarter than me.

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Sound Arguments

➢ **Sound arguments are very rare; the following argument is sound:**

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.

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Sound and Unsound Arguments

Valid Arguments

Sound   Unsound

All the premises are true.   At least one premise is false.
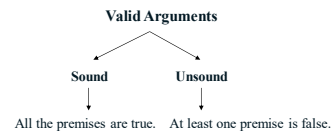
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Invalid Arguments: Inductive vs. Fallacious Reasoning

➢ An argument is *invalid* if you can give one counterexample to the argument.

➢ We saw that a *counterexample* is
a possible case where the premises can be assumed to be true while, at the same time, the conclusion could be false (Nolt).

➢ Invalid arguments will be either:

a) *inductive*,

b) *fallacious*.

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Invalid Arguments (Continued)

➢ **The following argument is invalid because a counter example is possible:**

PREMISE 1. All CEOs of major United States computer corporations have been United States citizens.

PREMISE 2. Bill Gates is a United States citizen.

CONCLUSION. Bill Gates has been a CEO of a major computer corporation in the U.S.

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Inductive Arguments

➢ **An argument is *inductive* when:**

the conclusion would likely be true when the premises of the argument are assumed to be true.

➢ **Even though a counterexample to an inductive argument is possible, the argument's conclusion would likely be true in the majority of cases where the premises are assumed true.**

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Inductive Arguments (Continued)

➢ **The following is an example of an inductive argument:**

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

PREMISE 2. Satya Nadella is the CEO of Microsoft, a computer corporation.

CONCLUSION. Satya Nadella is a college graduate.

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Fallacious Arguments

➢ **An argument is *fallacious* when:**

the argument's conclusion would not likely follow from its premises, even when all of the premises are assumed true.

➢ **Multiple counterexamples to a fallacious argument can be provided.**

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Fallacious Arguments (Continued)

➢ Recall an argument we considered earlier:
➢ Premise: The Internet is in public space.
➢ Conclusion: Those who use the Internet should not expect to retain any personal privacy while online.
➢ We noted that the argument seemed weak.
➢ Now we can see why this argument is not only weak, but also *fallacious*.
➢ Note that we can apply *numerous counterexamples* that show why the conclusion would not likely be true even when the premise is assumed true.
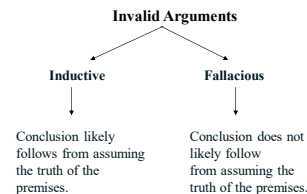
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Fallacious Arguments (Continued)

➢ **The following reasoning form is an example of a fallacious argument:**

PREMISE 1. Ten percent of people who own iPods also own iPhones.

PREMISE 2. My roommate owns an iPod.

CONCLUSION. My roommate also owns an iPhone.

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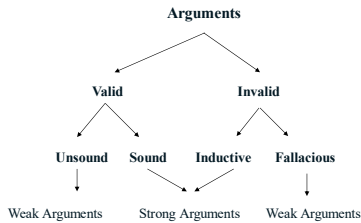## Inductive vs. Fallacious Arguments (Continued)

Invalid Arguments

Inductive   **Fallacious**

Conclusion likely follows from assuming the truth of the premises.

Conclusion does not likely follow from assuming the truth of the premises.

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A Comprehensive Scheme for Viewing Argument Strength

Arguments

```
                    Arguments
                   /         \
              Valid           Invalid
             /     \          /      \
      Unsound  Sound   Inductive   Fallacious
         |        \      /            |
  Weak Arguments  Strong Arguments  Weak Arguments
```

Seven-Step Strategy for Evaluating Arguments I: Steps 1-4

Step 1. Convert the argument into standard form. (List the premises first, followed by the conclusion.)

Step 2. Test the argument for its reasoning strength to see whether it is valid or invalid. (Assume the premises to be true, and ask yourself whether the conclusion must also be true when those premises are assumed true. Is a counterexample to the argument possible?)

Step 3. Is the argument valid?

If yes, go to Step 4.

If no, go to Step 5.

Step 4. Is the (valid) argument also sound? That is, are the premises true in the actual world?
4a. If the argument is valid and if all of the premises are true in the actual world, then the argument is also sound. (To determine truth-values for statements, see Appendix G.)
4b. If the argument is valid, but one or more premises can be shown to be either false or not capable of being verified in the actual world, then argument is unsound.

Seven-Step Strategy For Evaluating Arguments II: Steps 5-7

(Part II: Steps 5-7)

Step 5. Is the (invalid) argument inductive or fallacious? (How likely will the conclusion be true when the premises are assumed true?)
5a. If the conclusion would likely be true because the premises are assumed true, the argument is inductive.
5b. If the conclusion would not likely be true even when the premises are assumed true, the argument is fallacious. (Keep in mind that a fallacious argument can be made up of Individual claims that are themselves true in the actual world.)

Step 6. Determine whether the premises in your argument are either true or false.

Step 7: Make an overall assessment of the argument. That is, describe the argument's strength of reasoning in conjunction with the truth conditions of the argument's premises. For example, is the argument inductive with all true premises? Is it inductive with some false premises? Is it fallacious with a mixture of true and false premises, and so forth? Remember that an inductive argument with premises that are all true is stronger than a valid argument with one or more false premises.)

Applying the Seven-Step Strategy

➢ **Revisit Scenario 1-1 and apply the seven-step strategy to it.**

❖ **PREMISE 1**. Downloading proprietary software (without permission from the copyright holder) is identical to stealing physical property.

❖ **PREMISE 2**. Stealing physical property is morally wrong.

❖ **CONCLUSION**. Downloading proprietary software (without permission) is morally wrong.

Applying the Seven-Step Strategy Continued)

➢ Applying Step 1, we note that the argument is already in standard form (so there is no need to convert it into this form).

➢ At Step 2, we examine the argument's strength of reasoning and determine that the argument is *valid* because:

➢ Consider that if we assume the truth of both of its premises (viz., Premises 1 and 2), the conclusion cannot be false (i.e., the combination of true premises and false conclusion in this example would be a logical contradiction).

Applying the Seven-Step Strategy Continued)

➢ Now that we determined that the argument is valid (at Step 3), we next go to Step 4 and ask whether it is also either *sound* or *unsound*.

➢ Premise 2 is a true statement (and is easily verifiable as well as uncontroversial).

➢ But the truth or falsity of Premise 1 is less clear cut.

➢ Although there is a strong analogy between stealing physical property and downloading unauthorized software, there are also some disanalogies; thus, the two behaviors are not, strictly speaking, "identical."

Applying the Seven-Step Strategy Continued)

➢ Because Premise 1 may be either false or indeterminate (i.e., it is not literally true, as stated), we now see that this argument is *unsound*.
➢ However, the argument is still valid; so we can skip Step 5, which applies only to invalid arguments.
➢ At Step 6, we note that both Premise 2 and the conclusion are true, while Premise 1 may be either false or indeterminate (since it is not literally true).
➢ So our overall evaluation of this argument, at Step 7, is: *Valid but Unsound*.
➢ Note that the conclusion happens to be true, even though its truth is not logically supported by the argument's premises.

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A Less Formal Strategy for Identifying Fallacious arguments

➢ While the seven-step strategy is a useful tool for evaluating a wide range of arguments, it is worth noting that some less formal techniques are also available to us for spotting fallacious arguments that commonly occur in ordinary, everyday reasoning.
➢ So, fortunately, there is also an *informal*, and arguably simpler, way of identifying and cataloging many (informal) logical fallacies that frequently appear in everyday discourse.
➢ We need to understand what is meant by "informal logical fallacy."

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