

## Philosophy 57 — Day 2

- Administrative Stuff
  - Final Rosters Announced Today (please *email me* for add codes)
  - People who missed last time, pick-up greensheet and see webpage:  
<http://philosophy.wisc.edu/fitelson/57/>
- Back to Chapter 1
  - Brief Review from Last Time
    - \* Arguments, statements, truth values (building blocks)
    - \* Recognizing Arguments & Arguments *vs* Non-Arguments
  - Chapter 1, Continued
    - \* Two more non-arguments: expository passages and conditionals
    - \* Validity, Soundness, Strength, and Cogency (“goodness” of arguments)
    - \* Deductive (these are our focus) *vs* Inductive (only chs. 1, 3) Arguments
    - \* Kinds and Examples of Deductive & Inductive Arguments



## Review I: Statements, Truth Values, Arguments & Non-Arguments

- A **statement** is expressed by a *declarative* sentence — one which makes a definite assertion about the world — also called **claims** or **propositions**.
- All statements have **truth values**: they are either **true** or **false**.
- An **argument** is a group of **statements**, one of which — the **conclusion** — is meant to be supported by (proved by) the others — the **premises**.
- **Not all groups of statements are arguments**. Arguments have two features: (1) a claim (at least implicit) that its premises are true, and (2) a claim (at least implicit) that its premises *support* (*prove*, *provide evidence for*) its conclusion.
- There are many kinds of *non*-arguments. **Reports**, **pieces of advice**, **warnings**, and **statements of belief or opinion** are some simple non-arguments.
- The most subtle kinds of non-arguments are **explanations**, **expository passages**, and **conditional statements**. These are often mistaken with arguments. Let's look at some example non-arguments.



## Simple Non-Inferential (Non-Argumentative) Passages

- Here are some examples of the simple kinds of non-arguments:

- **Reports:**

A powerful car bomb blew up outside the regional telephone company headquarters in Medellín (a city in Colombia), injuring 25 people and causing millions of dollars in damage to nearby buildings, local police said.

- **Pieces of Advice:**

Before accepting a job after class hours, I would suggest that you give careful consideration to your course load. Will you have sufficient time to prepare for classes and tests, and will the job excessively drain on your energies?

- **Warnings:** “Watch out that you don’t slip on the ice.”

- **Statements of belief or opinion:**

We believe that our company must develop and produce outstanding products that will perform a great service or fulfill a need for our customers. We believe that our business must be run at an adequate profit and that services and products we offer must be better than those offered by our customers.



## Subtle Non-Argumentative Passages I: Explanations

- An **explanation** is a group of statements, one of which — the **explanandum** — is meant to be *explained by* (but *not proved by*!) the others, which are called the **explanans**. Explanations are easily confused with arguments.
- Indeed, whether a passage is viewed as an argument or an explanation will depend on whether the main point of the passage is controversial or accepted.
- For instance, consider the following passage:

The sky is blue because blue light's short wavelength causes it to get scattered around 10 times more by oxygen and nitrogen molecules in the atmosphere than the longer wavelengths (like red) of the other colors of sunlight visible to us. In short, the blue in the sky we see is scattered blue (sun)light.
- I think we would all view this passage as an *explanation* and *not* an argument. This is because we all *know* that the sky is blue. We do not view the talk about the scattering of light as meant to *prove* this, but only to *explain* it.



### Subtle Non-Argumentative Passages II: Expository Passages

- An **expository passage** is one that begins with a topic sentence followed by one or more sentences that develop the topic sentence. If the aim is not to prove, but only expand on the topic sentence, then there is no argument.

Each population in an ecosystem has a habitat and a niche. The habitat of an organism is its place of residence, such as under a log or at the bottom of the pond. The niche of an organism is its total role in the community, including its interactions with the environment and other organisms in the community.

- Sometimes, expository passages can also be argumentative or explanatory:  
Skin and the mucous membrane lining the respiratory and digestive tracts serve as mechanical barriers to entry by microbes. Oil gland secretions contain chemicals that weaken or kill bacteria on skin. The respiratory tract is lined by cells that sweep mucus and trapped particles up into the throat, where they can be swallowed. The stomach is acidic, which inhibits the growth of bacteria.
- This not only *expands on* the topic, but also *explains how* it is true, and/or provides *evidence for* its truth (depending on what the audience knows).



## Subtle Non-Argumentative Passages III: Conditional Statements

- An **conditional statement** (**conditional**) is a statement of the form “If A, then C.” It is a **compound statement**, composed of two **atomic statements** A and C.
- The statement immediately following the “if” (A) is called the **Antecedent** of the conditional. And, the other statement (C) is called its **Consequent**.
- **Conditional statements are not (in and of themselves) arguments.** Although a conditional may assert a logical connection between its antecedent and its consequent, *it comes with no commitment to the truth of its antecedent* (huh?).
- But, when one asserts an *argument*, one *is* (for argument’s sake) committed to the truth of its *premises*. Conditionals *can* be *parts* of arguments, though:  

If this match is struck in the future, it will subsequently light on fire.  
This match will be struck in the future.  
Therefore, this match will (in the future) light on fire.
- Here, we see a conditional as a *premise* (they can also serve as *conclusions*).



## Conditional Statements, Continued

- Conditionals are very important statements, and we will spend much more time on them in chapters 6 and 7. More terminology for conditionals:
- The following expressions are synonymous (explained in chapter 6):
  - If  $A$  is true, then  $C$  is true
  - $C$  is true if  $A$  is true
  - $A$  is true only if  $C$  is true
  - $C$  is a **necessary condition** for  $A$
  - $A$  is a **sufficient condition** for  $C$
- What's the difference between the following two passages?

If the moon is made of green cheese,  
then the moon is green.

The moon is made of green cheese.  
Therefore, the moon is green.



## Validity and Soundness of Arguments (The Ideals) I

- An argument is **valid** if *any* of the following hold (otherwise, it's **invalid**):
  - The truth of the premises *guarantees* the truth of the conclusion.
  - If all of the premises of the argument were true, then the conclusion of the argument would — *necessarily* — have to be true as well.
  - It is *impossible* for both of the following to be true simultaneously:
    1. All of the premises of the argument are true, *but*
    2. The conclusion of the argument is false.
- **Validity is the central concept in the course.** “Logic is the science of validity.”
- It is important to understand what validity does **not** mean.
  - Validity does **not** imply that the premises (or conclusion) are *actually* true.
  - Is the following argument *valid*?

The moon is made of green cheese.  
Therefore, the moon is green.





## Validity and Soundness of Arguments (The Ideals) II

- An argument is **sound** if *both* of the following hold (otherwise, it's **unsound**):
  1. The argument is *valid*, and
  2. All of the premises of the argument are (actually) *true*.

Note: (1) is for Logic to decide, but (2) is *not* purely a matter of Logic.
- In other words:

Sound = Valid [Logical Component] + All True Premises [Non-Logical Component]
- What can we say about the *conclusion* of a *sound* argument? Why?
- **Soundness is the 'ideal state' for an argument.** Soundness is as good as it gets.
- Is the following argument *sound*?

The moon is made of green cheese.  
Therefore, the moon is green.
- Is the following argument *sound*?

Glass is a liquid.  
Therefore, snow is white.



## Validity and Soundness of Arguments (The Ideals) III

- Can we classify the following according to validity/soundness?

|  |  |
|--|--|
| 1) All wines are beverages.<br>Chardonnay is a wine.<br>Therefore, chardonnay is a beverage.     | 5) All wines are beverages.<br>Chardonnay is a beverage.<br>Therefore, chardonnay is a wine. |
| 2) All wines are whiskeys.<br>Chardonnay is a wine.<br>Therefore, chardonnay is a whiskey.       | 6) All wines are beverages.<br>Ginger ale is a beverage.<br>Therefore, ginger ale is a wine. |
| 3) All wines are soft drinks.<br>Ginger ale is a wine.<br>Therefore, ginger ale is a soft drink. | 7) All wines are whiskeys.<br>Chardonnay is a whiskey.<br>Therefore, chardonnay is a wine.   |
| 4) All wines are whiskeys.<br>Ginger ale is a wine.<br>Therefore, ginger ale is a whiskey.       | 8) All wines are whiskeys.<br>Ginger ale is a whiskey.<br>Therefore, ginger ale is a wine.   |



|  | Valid   | Invalid  |
|--|---|--|
| True<br>premises<br>True<br>conclusion   | All wines are beverages.<br>Chardonnay is a wine.<br>Therefore, chardonnay is<br>a beverage.<br>[sound]       | All wines are beverages.<br>Chardonnay is a beverage.<br>Therefore, chardonnay is a wine.<br>[unsound] |
| True<br>premises<br>False<br>conclusion  | <b>Impossible</b><br>None exist   | All wines are beverages.<br>Ginger ale is a beverage.<br>Therefore, ginger ale is a wine.<br>[unsound] |
| False<br>premises<br>True<br>conclusion  | All wines are soft drinks.<br>Ginger ale is a wine.<br>Therefore, ginger ale is a<br>soft drink.<br>[unsound] | All wines are whiskeys.<br>Chardonnay is a whiskey.<br>Therefore, chardonnay is a wine.<br>[unsound]   |
| False<br>premises<br>False<br>conclusion | All wines are whiskeys.<br>Ginger ale is a wine.<br>Therefore, ginger ale is<br>a whiskey.<br>[unsound]       | All wines are whiskeys.<br>Ginger ale is a whiskey.<br>Therefore, ginger ale is a wine.<br>[unsound]   |



## Deductive vs Inductive Arguments I

- A **deductive argument** is an argument in which it is claimed (at least implicitly) that the argument is *valid*. In other words, a deductive argument aims to establish its conclusion *with certainty* (to *guarantee* its truth).
- **Deductive arguments will be the main focus of the course.** Chapters 4–7 will deal entirely with deductive arguments and establishing their validity or invalidity. Only chapters 1 and 3 will discuss non-deductive arguments.
- In particular, we will talk a bit about *inductive* arguments. **Inductive arguments** are arguments which aim only to establish their conclusions *with high probability*. Good inductive arguments are called “*strong*”, *not* “*valid*”.

All men are mortal.

Socrates is a man.

Therefore, Socrates is mortal.

vs

Most men are over 5' tall.

Socrates is a man.

Therefore, Socrates is over 5' tall.



## Deductive vs Inductive Arguments II

- An (inductive) argument is **strong** if *any* of the following hold (else it's **weak**):
  - The truth of the premises makes the truth of the conclusion *probable*.
  - If all of the premises of the argument were true, then the conclusion of the argument would — *probably* — have to be true as well.
- Unlike deductive arguments, inductive arguments involve some **risk** that their conclusion *might* be false — *even if all their premises are true*.
- An (inductive) argument is said to be **cogent** if *both* of the following obtain:
  1. The argument is *strong*, and
  2. All of the premises of the argument are (actually) *true*.

Note: (1) is for Logic to decide, but (2) is *not* purely a matter of Logic.
- In other words:

Cogent = Strong [Logical Component] + All True Premises [Non-Logical Component]



## Deductive vs Inductive Arguments III

- Sometimes “indicator words” can help distinguish deductive from inductive
  - If the argument draws its conclusion using words such as “necessarily”, “certainly”, or “absolutely”, then it is probably deductive.
  - If, instead, the argument uses words like “probably”, “likely”, or “plausibly” in drawing its conclusion, then it is probably inductive.
- There are several common types of deductive arguments:
  - Arguments in mathematics
  - Arguments with a recognizable *deductive form*
- There are several common types of inductive arguments:
  - Arguments which make predictions about the future (based on the past)
  - Arguments from analogy
  - Inductive generalizations, statistical, or causal arguments



## Deductive vs Inductive Arguments IV

- Chapters 4–7 will largely be concerned with *deductive forms*, including:

All *X*'s are *Y*'s.

- Categorical Syllogisms: All *Y*'s are *Z*'s.

Therefore, All *X*'s are *Z*'s.

If *A* is true then *B* is true.

- Hypothetical Syllogisms: *A* is true.

Therefore, *B* is true.

Either *A* is true or *B* is true.

- Disjunctive Syllogisms: *A* is false.

Therefore, *B* is true.

- If an argument is recognizably of one of the known deductive forms, then it is deductive. We will not worry too much about such things until chapters 4–7.



## Deductive vs Inductive Arguments V

- Are these arguments deductive or inductive?
  - The headline of today's New York Times said that a hurricane struck Indonesia. Therefore, a hurricane really did strike Indonesia.
  - $x + y = 18$ , and  $x = 12$ . Therefore,  $y = 5$ .
  - James got married a year ago, and today he is unhappy. Diane got married two years ago, and today, she, too, is unhappy. Apparently marriage no longer brings happiness to people.
  - Triangle  $A$  is inscribed in circle  $B$ . So, the area of  $A$  is  $<$  the area of  $B$ .
  - Sonya is taciturn. Therefore, she doesn't talk much.
  - Given that  $x$  and  $y$  are odd integers, it follows that  $x + y$  is an odd integer.
  - This bowling ball weighs 500 times as much as that marble. Therefore, if both are thrown out an open window at the same time, the bowling ball will fall 500 times faster than the marble.

