Philosophy 57 — Day 3

- Administrative Stuff

    - Quiz #1 On Tuesday (2/4) (on chapter 1 lectures)

    - Anyone new should consult webpage for greensheet, lecture notes, *etc*.

        http://philosophy.wisc.edu/fitelson/57/

- Back to Chapter 1

    - Brief Review from Last Time

        * Validity *&* Soundness — Key Concepts of Deductive Logic
        * Working Some Examples to Get a Feel for These Concepts

    - Onto New Stuff

        * Determining Validity/Invalidity of Deductive Arguments (chs. 4–7)
        * Inductive Strength/Cogency *vs* Deductive Validity/Soundness
        * Distinguishing Deductive Arguments from Inductive Arguments
        * Time Permitting: Introduction to Chapter 3 — Fallacies

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 — Some Examples

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

1) All wines are beverages.
Chardonnay is a wine.
Therefore, chardonnay is a beverage.

5) All wines are beverages.
Chardonnay is a beverage.
Therefore, chardonnay is a wine.

2) All wines are whiskeys.
Chardonnay is a wine.
Therefore, chardonnay is a whiskey.

6) All wines are beverages.
Ginger ale is a beverage.
Therefore, ginger ale is a wine.

3) All wines are soft drinks.
Ginger ale is a wine.
Therefore, ginger ale is a soft drink.

7) All wines are whiskeys.
Chardonnay is a whiskey.
Therefore, chardonnay is a wine.

4) All wines are whiskeys.
Ginger ale is a wine.
Therefore, ginger ale is a whiskey.

8) All wines are whiskeys.
Ginger ale is a whiskey.
Therefore, ginger ale is a wine.

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

Determining Validity/Invalidity of Deductive Arguments (Prelude to chs. 4–7)

- Deductive arguments often have forms (*i.e,*, they fit formal patterns). Once the form is determined, *techniques* can be applied to test arguments for validity.

- In chapters 4–5, we will learn Venn Diagram techniques for determining the validity or invalidity of Categorical Syllogisms like the following (*valid*) form:

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

  All *Y*'s are *Z*'s.

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

- In chapters 6–7, we will learn Truth Table and Natural Deduction (proof) techniques to evaluate Propositional Argument Forms like the following:

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

  A is true.

  Therefore, *B* is true.

- There are *precise techniques* for testing deductive argument forms for validity.

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.		Most men are over 5′ tall.
Socrates is a man.	*vs*	Socrates is a man.
Therefore, Socrates is mortal.		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

- There are techniques for determining the strength/weakness of certain *precise*, *statistical* inductive arguments. That is beyond the scope of this course (291).

- We will not focus on (nor will there be test questions on!) the determination of inductive argument strength or weakness (Hurley is a bit sloppy on this).

- But, it is interesting to think about "the probability that the conclusion would have, on the supposition that the premises are all true". Let's try a few:

  - The president of Roxidental Petroleum company says that we should drill a string of new oil wells in the Santa Barbara Channel, off the coast of California. Therefore, we should drill these new oil wells.

  - Tyler lives in a million dollar house and drives a large Mercedes. Therefore, Tyler is wealthy.

  - Most new brides like being carried over the threshold. Therefore, your 350 pound cousin, who is a new bride, would probably like it too.

Deductive *vs* Inductive Arguments IV

- 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* (see next slide)

- There are several common types of inductive arguments:

  – Arguments which make predictions about the future (based on the past)

  – Arguments from analogy or authority

  – Inductive generalizations, statistical, or causal arguments

Deductive *vs* Inductive Arguments V

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

  $$\text{All } X\text{'s are } Y\text{'s.}$$

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

    $$\text{Therefore, All } X\text{'s are } Z\text{'s.}$$

  $$\text{If } A \text{ is true then } B \text{ is true.}$$

  - Hypothetical Syllogisms: *A* is true.

    $$\text{Therefore, } B \text{ is true.}$$

  $$\text{Either } A \text{ is true or } B \text{ is true.}$$

  - Disjunctive Syllogisms: *A* is false.

    $$\text{Therefore, } B \text{ is true.}$$

- 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 VI

- Prediction: The barometric pressure has fallen significantly in the past 6 hours. Therefore, a storm will arrive soon.

- Analogy: Tina's 1998 Porche 911 has very good handling. Therefore, Branden's 1998 Porche 911 also has very good handling.

- Authority: My investment counselor says that Cisco stock will rise in the next 6 months. Therefore, Cisco stock will rise in the next 6 months.

- Generalization (from an observed sample): 89% of Palo Alto residents support more government funding for the arts. Therefore, 89% of California residents support more government funding for the arts.

- Causal (Cause to Effect): The bottle of wine was accidentally left in the freezer last night. Therefore, the bottle is frozen now.

- Causal (Effect to Cause): This chicken tastes dry and crunchy and it has a black color. Therefore, this chicken was overcooked.

Deductive *vs* Inductive Arguments VII

- Sometimes, arguments will not contain indicator words, nor will they be of an obvious form or a known type. In these cases, we need to think a bit.

- We need to determine whether the *intention* is to establish the conclusion *with certainty*, or merely to establish the conclusion with *high probability*.

- Sometimes, it will be clear from the context, or from the meanings of the concepts used in the argument as to whether it is deductive or inductive.

- For instance, if it seems clear (even though you may not see its *pattern*) that an argument is *valid*, then it's probably safe to say it is deductive.

- Example: "Eternity is simultaneously whole. But, time has a before and an after. Therefore, time and eternity are not the same thing." (Aquinas)

- This argument is deductive (because it is *valid*), but it does not fit any pattern we will study in this course (what is the pattern of argument here?).

Deductive *vs* Inductive Arguments VIII

- 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.

Moving on to Chapter 3 — Fallacies

- A fallacy is a defect in an argument that consists in something other than false premises. Both deductive & inductive arguments can be fallacious.

  – A formal fallacy is a fallacy that can be identified by merely examining the form or structure of an argument. We use the term 'formal fallacy' only for deductive arguments that have identifiable forms. Example:

    All X's are Y's.

    All Z's are Y's.

    Therefore, All X's are Z's.

  – An informal fallacy can only be identified by examining the *content* of the argument (*i.e.*, the *meaning* of its premises and conclusion). Example:

    The Brooklyn Bridge is made of atoms.

    Atoms are invisible.

    Therefore, the Brooklyn Bridge is invisible.

- Chapter 3 discusses common *in*formal fallacies (chs. 4–7 cover *formal* ones).