

Philosophy 57 — Day 15

- Mid-Term will be returned after spring break.
- Quiz #4 after spring break (04/1/03). Will cover:
 - Translations from English to CL.
 - Very beginning of chapter 5 (section 5.1 only).
- Today: Introduction to Chapter 5
 - Categorical Syllogisms
 - Standard Form, Mood, Figure
 - 3-Circle Venn Diagram Technique for Syllogisms (not on quiz #4)



Chapter 5: Categorical Syllogisms I

- A **Categorical Syllogism** is an argument in categorical logic which contains exactly two premises and three terms. Here's a simple example:

All soldiers are patriots. (All *S* are *P*.)
 No traitors are patriots. (No *T* are *P*.)
 Therefore, no traitors are soldiers. (No *T* are *S*.)
- The three terms in a categorical syllogism (CS) each have names:
 - * The **major term** is the predicate term of the CS's conclusion.
 - * The **minor term** is the subject term of the CS's conclusion.
 - * The **middle term** is the remaining term in the CS.
- In our simple example above, which are the major, minor, middle terms?
- The premises in a CS also have names (which are which in our example?):
 - * The **major premise** is the premise containing the major term.
 - * The **minor premise** is the premise containing the minor term.



Chapter 5: Categorical Syllogisms II

- A categorical syllogism said to be in **standard form** iff:
 1. All three statements are standard-form categorical propositions.
 2. The two occurrences of each term are identical.
 3. Each term is used in the same sense throughout the argument.
 4. Order: major premise first, minor premise second, conclusion third.
- The following syllogisms are *not* in standard form (why?):

Anyone who led America into the space age will live in history. John Glenn led America into the space age. Therefore, John Glenn will live in history.	All <i>P</i> are non- <i>W</i> . Some <i>E</i> are <i>W</i> . Therefore, Some non- <i>P</i> are not non- <i>E</i> .
No men are pregnant animals. All human beings are men. ∴ No human beings are pregnant animals.	All <i>W</i> are <i>P</i> . Some <i>W</i> are <i>M</i> . Therefore, Some <i>P</i> are <i>M</i> .



Chapter 5: Categorical Syllogisms III

- The **mood** of a categorical syllogism consists of the letter names of the categorical propositions that make it up (in order).
 - Example: if the major premise is an **A** claim, the minor premise is an **O** claim, and the conclusion is an **E** claim, then the *mood* of the CS is **AOE**.
- The **figure** of a categorical syllogism is determined by the location of the two occurrences of the middle term in the premises. Four possible arrangements:

Figure 1	Figure 2	Figure 3	Figure 4
<i>M P</i> <i>S M</i> ∴ <i>S P</i>	<i>P M</i> <i>S M</i> ∴ <i>S P</i>	<i>M P</i> <i>M S</i> ∴ <i>S P</i>	<i>P M</i> <i>M S</i> ∴ <i>S P</i>

- What are the mood and figure of the following categorical syllogisms?

No <i>P</i> are <i>M</i> .	No <i>P</i> are <i>M</i> .	Some <i>P</i> are <i>M</i> .
Some <i>M</i> are <i>S</i> .	All <i>S</i> are <i>M</i> .	All <i>M</i> are <i>S</i> .
∴ Some <i>S</i> are not <i>P</i> .	∴ No <i>S</i> are <i>P</i> .	∴ Some <i>S</i> are <i>P</i> .



Chapter 5: Categorical Syllogisms IV

- The **form** of a categorical syllogism is determined by its mood and its figure. For instance, the form of the following categorical syllogism is **EAE-2**:
 No *P* are *M*.
 All *S* are *M*.
 ∴ No *S* are *P*.
- Since there are 4 kinds of categorical propositions and there are 3 categorical propositions in a categorical syllogism, there are $4^3 = 4 \times 4 \times 4 = 64$ moods.
- Since there are 4 different figures and 64 different moods, there are grand total of $4 \times 64 = 256$ different forms of categorical syllogisms.
- The validity of a categorical syllogism is determined entirely by its form.
- As it turns out, exactly 15 of the 256 forms are valid (the rest are invalid).
- Hurley gives a list of the valid forms (page 245). You will *not* need to remember this list. We'll use (3-circle) Venn Diagrams to *determine* validities.



Chapter 5: Categorical Syllogisms V

- Here are the 15 valid categorical syllogism forms (Boolean!):

Figure 1	Figure 2	Figure 3	Figure 4
AAA	EAE	IAI	AEE
EAE	AEE	AII	IAI
AII	EIO	AOO	EIO
EIO	AOO	EIO	

- Going from mood and figure to standard syllogistic form. Example: **EIO-4**.
 – Step 1: Use mood to determine the “skeleton form”:

E No _____ are _____.
I Some _____ are _____.
O Some _____ are not _____.



- Step 2: Use figure to determine the arrangement of middle terms:

E No _____ are *M*.
I Some *M* are _____.
O Some _____ are not _____.
 – Step 3: Fill in minor and major terms (*S* and *P*)

E No *P* are *M*.
I Some *M* are *S*.
O Some *S* are not *P*.

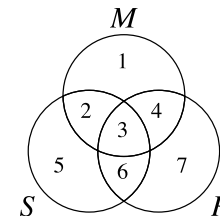
- Example #2: **AOO-3**

O Some _____ are not _____.
A All _____ are _____.
O Some _____ are not _____.
 – How do we fill this in?



Chapter 5: Categorical Syllogisms VI

- Because categorical syllogisms involve 3 terms, Venn Diagrams for categorical syllogisms will require 3 circles. We draw them like this:



- As was the case with our 2-circle diagrams, we will need some conventions for marking these 3-circle Venn Diagrams for categorical syllogisms.
- The basic rules are the same as before. If a region is empty, then we shade it, and if a region is non-empty, then we put an “X” in it (the precise placement of “X”s will be a little more subtle in the 3-circle case). Work lots of examples!



Chapter 5: Categorical Syllogisms VII

• 3-Circle Venn Diagram Rules and Tips

1. Marks (shading, or placing an “X”) are entered only for the premises. No marks are made for the conclusion.
2. If the argument contains one universal premise, then this premise should be entered first in the diagram. If there are two universal premises, either one can be done first.
3. When entering the information contained in a premise, one should concentrate on the circles corresponding to the two terms in the statement. While the third circle cannot be ignored altogether, it should be given only minimal attention.
4. When inspecting a completed diagram to see whether it supports a particular conclusion, one should remember that particular statements assert two things: “Some *S* are *P*” means “At least one *S* exists and that *S* is a *P*.”
5. When shading a region, one must be careful to shade *all* of the area in question.
6. The region in which an “X” goes is initially always divided up into two parts. If one of these parts has been shaded, then the “X” goes in the other part of the region.



7. If neither of the two parts in a region is shaded, then the ‘X’ goes on the line separating the two parts of the region.

