Leibniz's Logic

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Phil. 373
February 22nd, 2017

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Aristotle's Logic

- In previous classes, I said that for Aristotle, all arguments are series of syllogisms.
- This is only half right . . .

Perfect vs. Imperfect Syllogisms

- For Aristotle, some syllogisms needed no proof. These are often called **perfect** syllogisms.
  - E.g., Barbara (All Bs are As; All Cs are Bs. Therefore, All Cs are As).
- Other syllogisms, however, require proof. These syllogisms are called **imperfect**.
  - E.g., Camestres (All Bs are As. No C is A. Therefore, no C is B.).

Perfect vs. Imperfect Syllogisms

Question: How could Aristotle "prove" one syllogism from another?

Answer: Using **conversion** and **reductio**.

Conversion

Recall assertions in Aristotelian syllogisms come in one of four forms. Here are three of them.

1. Aab - All bs are as.
2. Eab - No b is a.
3. Iab - Some b is a.

Conversion

Notice that

- If no bird is a mammal, then no mammal is a bird.
  - In general: $Eab \rightarrow Eba$
- If some person is a smart animal, then some smart animal is a person.
  - In general: $Iab \rightarrow Iba$
- If every person is a mammal, then some mammal is a person.
  - In general: $Aab \rightarrow Iba$
  - Note: This rule assumes that the class of persons is non-empty.

These rules of inference are called **conversion**.

Basic vs. Derived Rules in Aristotle's Logic

In Aristotle's logic

- The **basic rules** are the perfect syllogisms, conversion, and reductio.
- The **derived rules** are imperfect syllogisms.
  - Any instance of a derived rule in a proof can be eliminated by a sequence of applications of basic rules.

Leibniz's Universal Characteristic

Leibniz argues that, using his method for assigning characteristic numbers, he can **derive** the three conversion rules, instead of taking them as basic.

Group Work:

- Explain Leibniz's argument for each of the three rules. To do this, you'll need to review how Leibniz assigns characteristic numbers.
- Can Leibniz use a similar method to defend **perfect syllogisms**, such as Barbara? Explain.

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Where We're Going: Kant