Logic

1. What is Logic?

Two Definitions of Logic

- "Logic is an art directive of the acts of reason themselves."—St. Thomas Aquinas
  - St. Thomas clarifies the definition:
    - "… so that man may proceed orderly, easily, and without error in the very act of reason itself"
  - St. Albert explains the utility of logic:
    - "Logic teaches the principles by which one can arrive at the knowledge of things unknown through that which is known."
- "Logic is the science of second intentions."—Avicenna (also, Aquinas & others)
  - An *intention* is that which is present to the mind in thought.
  - Franz Brentano emphasized intentionality as the mark of mental, as opposed to physical, states.
  - There are two kinds of intention:
    - First intentions are about extramental things
      - frog, dog, &c.
    - Second intentions are about the way we represent extramental things
      - species, syllogism, &c.
- In this course, we will study the *art* of logic.

Fundamental Concepts of Thomistic Psychology
1. Powers

- What is an art (& what is a science)? Thomistic psychology distinguishes …
  - Powers
    - Vegetative powers
      - nutrition
      - growth
      - reproduction
    - Animal powers
      - sensation
      - appetite
      - locomotion
    - Rational powers
      - intellect
      - will
  - Habits
  - Operations (or Acts)

Fundamental Concepts of Thomistic Psychology
2a. Habits

- Thomistic psychology distinguishes …
  - Powers
  - Habits
    - Moral—These are habits of character; pertaining to choice (or concerned with doing)
      - Courage & temperance
      - Justice
      - Practical wisdom (prudence)
    - Intellectual—These are habits of mind; pertaining to thought
      - Arts (see next slide)
      - Sciences (see upcoming slide)
      - Prudence
  - Operations (or Acts)

Fundamental Concepts of Thomistic Psychology
2b. Habits (Arts)

- Arts
  - industrial—aimed at utility
  - fine—aimed at beauty
  - liberal—aimed at truth
    - linguistic (the trivium)
      - grammar = the composition of sentences,
      - logic = the composition of syllogisms
      - rhetoric = the composition of extended arguments
    - mathematical (the quadrivium)
      - pure
        - » arithmetic (for number) &
        - » geometry (for figure)
      - applied
        - » music (i.e., harmonics) &
        - » astronomy
- Sciences
- Prudence

Fundamental Concepts of Thomistic Psychology
2c. Habits (Sciences)

- Sciences
  - Aristotle defines "science" as a systematic body of knowledge
    - The system is a set of principles evident directly from experience & a set of facts which follow logically from those principles.
  - Science, for Aristotle, does not just mean knowledge of nature.
    - So, St. Thomas can ask whether theology is a science (*Summa* Ia, Q. 1, a. 2)

Fundamental Concepts of Thomistic Psychology
3. Operations (or Acts)

- Powers
- Habits
- Operations (Acts)
  - three acts of the intellect

Apprehension	Having a Concept or Idea	Dog Mammal
Judgment	Combining or Dividing Two Concepts	All dogs are mammals.
Reasoning	Inference	All mammals are vertebrates. All dogs are mammals. So, all dogs are vertebrates.

  - Logic is grounded in three acts of the human intellect
    - Apprehension of Concepts expressed in Terms
    - Judgment of the Truth of Propositions expressed in Sentences
    - Inference expressed in Syllogisms

Two Kinds of Reasoning:
Distinction #1

- Deductive vs. Inductive Reasoning
  - There are two different distinctions marked by this pair of terms.
    - Aristotle & modern science educators use them as follows:
      - Deductive = reasoning from general principles to more specific principles or instances (particulars), e.g.,
        1. All planets move in elliptical orbits.
        2. Mars is a planet.
        3. So, it moves in an elliptical orbit.
      - Inductive = reasoning from particulars to general principles, e.g.,
        1. I have observed a great variety of planets
        2. & all move in elliptical orbits.
        3. So, probably all planets move in elliptical orbits
    - Modern logicians generally use the terms to distinguish
      - arguments whose conclusions follow of necessity from the premises ("deductive") from
      - arguments whose conclusions follow from the premises only with probability ("inductive").

Two Kinds of Reasoning:
Distinction #2

- Explicative vs. Ampliative Reasoning
  - Explicative = reasoning that makes explicit what is implicit in the premises
    - In this kind of reasoning
      - the truth of the premises guarantees the truth of the conclusion.
    - Hence, the conclusion follows of necessity from the premises.
      - Since the rule fits the case, we *must* conclude that …
  - Ampliative = reasoning that goes beyond what is contained in the premises
    - In this kind of reasoning
      - the premises provides at best only good reason for the truth of the conclusion (it does not guarantee it).
        - » My sample shows that …, &c. so that's *probably* true of the whole.
        - » The best explanation of these facts would be that …, &c. so that's *probably* how things are.
    - Hence, the conclusion follows only with probability from the premises.