

Logic

Aristotelian Syllogistic: Propositions

The Stages of Aristotelian Logic

Corresponding to ...	A Theory of ...
The First Act of the Intellect (Conception)	Terms
The Second Act of the Intellect (Judgment)	(Categorical) Propositions
The Third Act of the Intellect (Inference)	(Categorical) Syllogisms

II. Aristotelian Propositions

“Just as in our minds, some thoughts are neither true nor false, while some are necessarily one or the other, so also in speech. For combination or division are necessary for falsity and truth.”

— Aristotle, *On Interpretation* 2



Propositions

- A proposition is “a meaningful speech whose parts are meaningful.”
 - Combination and division [*synthesis & diairesis*]
 - Combination (& division) are of noun [phrase] and verb phrase
 - but here we will turn verb phrases back into noun phrases
 - » “Silver is a horse” becomes “Silver + horse”
 - » “Silver is white” becomes “Silver + white horse”
 - » “Silver runs fast” becomes “Silver + horse that runs fast”
- Not all sentences express propositions.
 - Statements do.
 - Questions, commands, &c. do not.
- *Proposition* is a logical concept, not a linguistic one.
 - All these express the same proposition:
 - “Mark sees John”
 - “That boy [pointing to Mark] sees John”
 - “Marcus Ioannem vidit”

Propositions & Judgments

- The utterance of a proposition may or not express a judgment.
- A judgment is characterized by stating that a proposition is True or False.
 - For singular subjects, that creates two kinds of proposition

Affirming a Combination	Socrates is mortal.	
Affirming a Separation	Zeus is not mortal.	
Denying a Combination	It is false that Zeus is mortal.	= Affirming a Separation: Zeus is not mortal.
Denying a Separation	It is false that Socrates is not mortal.	= Affirming a Combination: Socrates is mortal.

- For singular subjects, that creates two kinds of proposition (next slide).

Propositions & Judgments

- The utterance of a proposition may or not express a judgment.
- A judgment is characterized by affirmation and negation of a proposition.
 - For singular subjects, that creates two kinds of proposition (previous slide).
 - For universal subjects, that creates *four* kinds of proposition.

Affirming a Combination	All men are mortal.	
Affirming a Separation	No men are mortal.	
Denying a Combination	It is false that All men are mortal.	= Affirming the Separation? [Only] Some men are not mortal.
Denying a Separation	It is false that No men are mortal.	= Affirming the Combination? [Only] Some men are mortal.

- For propositions with a universal subject, a third distinction:
 - Universal *propositions*
 - Particular propositions

Summary: Four Kinds of Categorical Propositions

Name	Symbol	Example	
Universal Affirmative	A	All dogs are mammals.	Adm
Universal Negative	E	No dogs are mammals.	Edm
Particular Affirmative	I	Some dogs are mammals.	Idm
Particular Negative	O	Some dogs are not mammals.	Odm

- These propositions are said to vary in two ways.
 - In quantity—universality or particularity
 - In quality—affirmativity or negativity

Analysis of Propositions

- Thesis: All propositions are categorical propositions
- Pro
 - All propositions have to be about something (= have a subject)
 - All propositions have to say something about that subject (=have a predicate)
 - So, all subjects have to have the form: S+P
 - All propositions have to affirm or deny the predicate of the subject (= have a quality)
 - All propositions have to say something about all or about some of the subject (= have a quantity)
- Con
 - Some propositions do not fit into this form (see next slide)

Three Kinds of Propositions

- The Three Kinds
 - Categorical Propositions
 - e.g., All dogs are mammals.
 - Existential Propositions
 - e.g., There is a God
 - Identity Statements
 - e.g., Clark Kent is Superman
- Comments
 - The non-categorical can be made to look categorical
 - e.g., God exists
 - Clark Kent is the person identical to Superman
 - But this raises problems
 - They can also be treated directly

Hard Cases I:

Cases where the predicate is not a noun phrase

- There are three possible kinds of (grammatical) predicate
 - predicate nouns (e.g., “John is a good football player.”)
 - predicate adjectives (e.g., “That horse is white.”)
 - verb phrases (e.g., “That horse runs well”)
- In the latter two, one must make the predicate into a term
 - “white” becomes “white horse”
 - “runs well” becomes “horse that runs well”

Hard Cases II:

Cases where the Quality is Ambiguous

- “Some students are unpopular”
 - What’s the predicate?
 - “unpopular” with form I?
 - *Some ... are ...: [students] + [unpopular]*
 - or “popular” with form O?
 - *Some ... are not ...: [students] + [popular]*
 - either analysis is possible *if* everyone is either popular or unpopular
 - Using [a] as the complement of a, or non-a:
 - Oab & Ia[b] (or Iab & Oa[b]) are equivalent expressions
 - Each is called the obverse of the other
 - (Obversion applies to universal propositions as well)

Obversion

- Obversion—a relation between propositions (or sentences)
 - Definition—the obverse of a proposition is one in which
 - (1) the subject of the obverse is the subject of the original,
 - (2) the predicate of the obverse is the complement of the predicate of the original
 - (3) the quality of the obverse is the opposite of the quality of the original
$$Aa[b] \leftrightarrow Eab$$

$$Ia[b] \leftrightarrow Oab$$
 - Examples

All horses are large hoofed mammals having a short-haired coat, a long mane, and a long tail.	No horses are not large hoofed mammals having a short-haired coat, a long mane, and a long tail.
Some horses are stallions.	Some horses are not non-stallions.
Some horses are not black.	Some horses are non-black.
No horses are persons.	All horses are non-persons.

Obversion (cont'd.)

- Logical Rules
 - The obverse of a true statement is always true.
 - The obverse of a false statement is always false.

Hard Cases III: Cases where the Quantifier is not Explicit

1. Singular subjects
 - e.g., “John is bright”, “Fred is not good at soccer”
 - Treat these as universals.
 - The whole point of the particular propositions is to emphasize that some part of what is named by the subject is outside of consideration;
 - this is not possible for propositions with singular subjects as there is only one thing named by the subject.
2. No quantifier at all
 - Contrast
 - “American military pilots must salute their superior officers”
 - “American military pilots bombed Serbian artillery positions yesterday”
 - Use common sense—the former is universal, the latter particular.
 - If you can't tell, then either you lack sufficient knowledge of the subject or the author is being unclear.

Hard Cases IV: Cases with Non-Standard Quantifiers

- “Not all...” is “Some ... are not ...” (O)
- “Most...”, “A few...” and their equivalents are particular (I or O)
- “Only...” is “No non-...”
 - e.g.,
 - “Only students who study logic diligently will do well” =
 - “No students who don't study logic diligently will do well”

Hard Cases IV: Cases where cases there seems to be no Subject

- e.g., “It's raining”; “There's snow on the roads”
 - rephrase—“The weather is ...”; “The roads are snowy”