Traditional Logic and Natural Language

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Personal Reminiscence

Professor Heinrich Schepers. In 1981, director of the Leibniz-Forschungsstelle at the University of Münster.
Overview

Part 1: Ancient and Medieval Semantics

Part 2A: The Square: Doctrine

Part 2B: The Square: Diagrams

Part 3: Doubts

Part 4: Collapse

Part 5: Strawson’s Proposal

Part 6: Critique

Part 7: Defense
Semantics?

- Was it really Semantics?
  - Well, there was no real syntax, so compositionality wasn’t quite as much of a driving concern
- But there was a kind of “molecular” structure to semantics
  - syncategorematic treatments
  - semantics for *only*, etc.
Why Care?

- Two Questions for Semantics
  1. What do sentences mean?
  2. How do they come to mean what they mean?
- Ancients and medievals did important groundwork on the first question
- Philosophers and logicians continue to do this for us
The Golden Age?

The “word” was the central path to truth, so logic and linguistics were among the most supreme of sciences, not usurped yet by the natural sciences.
Main logical works:

- Peri Hermeneias (De Interpretatione)
- Prior Analytics
The Square

- **SaP**: Every S is P
- **SeP**: No S is P
- **SiP**: Some S is P
- **SoP**: Some S is not P

Contradictories:
- **A**
- **E**

Contraries:
- **A**
- **E**

Subcontraries:
- **I**
- **O**

Subaltern:
- From A to E
- From I to O

- not both true
- not both false
A central addition to the doctrine of the square:

- The E and I forms convert *simpliciter*
  - SeP $\equiv$ PeS
  - SiP $\equiv$ PiS
- In other words, *no* and *some* are symmetric determiners
Lucius Apuleius of Madaura (2nd century CE)
Boethius (6th century CE)
Margarita Philosophica of Gregor Reisch (1508)
What about empty terms?

Suppose that S is an empty term; it is true of nothing. Then the I form: ‘Some S is P’ is false. But then its contradictory E form: ‘No S is P’ must be true. But then the subaltern O form: ‘Some S is not P’ must be true. But that is wrong, since there aren’t any S’s. So something must be wrong somewhere.

(from Parsons)
No Empty Terms?

Could it be that the medievals did not countenance empty terms? No. They loved thinking about chimeras, phoenixes, . . .
The Standard Solution

- The affirmative forms, A and I, have existential import.
- The negative forms, E and O, do not have existential import.
- The O form is true when there are no S’s!
Nam semper in propositionibus talibus affirmativis denotatur terminus supponere pro aliquo, et ideo si pro nullo supponit est proposition falsa. In propositionibus autem negativis denotatur terminus non supponere pro aliquo, vel supponere pro aliquo a quo vere negatur praedicatum, et ideo talis negativa habet duas causas veritatis.

[from Ockham’s *Summa Logicae*, I.72]
How can anybody of sane mind think that “Some S is not P” is true if there are no S’s?
Confusion about the O form

- SoP: Not (every S is P)
- SoP: Some S is not P
- Aristotle: *ou pas anthropos leukos*
- Later medievals: *quidam homo non currit*
Adding Contraposition

- Many logicians added an inference principle called Conversion by *Contraposition*
- This involved negated terms ("infinite negation")
- Every S is P ≡ Every non-P is non-S
Obversion, as well

- Obversion is another common inference principle involving infinite negation:
- Every $S$ is $P \equiv$ No $S$ is non-$P$
- Generally: Change the quantifier from affirmative to negative (and vice versa) while at the same time changing the predicate from finite to infinite (or vice versa)
Problem!

- Every man is a being (true; everything is a being!)
- ∴ Every non-being is a non-man
- But that is absurd, since the conclusion entails that there are non-beings!
Conversion by Contraposition is not a formal consequence, but can be, under the assumption that all of the terms supposit for something.

[from Buridan’s *Tractatus de Consequentiis*, I.8.1.100]
The Question

How is it that traditional logicians managed to work successfully over a long period within an inconsistent system?

As Buridan suggested, Contraposition is valid with an additional assumption, viz. that the subject terms in both sentences stand for something.

Tacit existential premisses were called assumptions of *constantia*.

So, perhaps logicians were making those assumptions tacitly all over the place?
Strawson’s Proposal, Part One

- All of the forms are understood as *presupposing* that there are Ss.
- Then, the subaltern entailments follow from the premiss together with its presupposition.
Problem: This will invalidate Conversion.

“No S is P” together with its presupposition (that there are S’s) will not entail “No P is S” and its presupposition (that there are P’s).

Solution:

We are to imagine that every logical rule of the system, when expressed in terms of truth and falsity, is preceded by the phrase ’Assuming that the statements concerned are either true or false, then …’

[Strawson, Introduction to Logical Theory, 1952, p.176]
Smiley’s Problem

A chain of inference from the True to the False:

- No man is a chimera.
- No chimera is a man. (by Conversion)
- Every chimera is a non-man. (by Obversion)
- Some chimera is a non-man. (by Subalternation)
- Some non-man is a chimera. (by Conversion)
Response

Distinguish:

▶ Classic entailment, classic validity
▶ Strawson entailment, Strawson validity

Only classic entailments can be string together in a chain.
Conclusion

- Traditional logic (as a whole) is inconsistent
  - Nevertheless, many logicians did not seem to be aware of the problem
  - Did they make tacit existence assumptions all over the place?
  - If so, why?
- Proposal: Natural language quantifiers (at least those used in the examples considered in traditional logic) trigger existence presuppositions
  - When presuppositions are present, Strawson validity is a natural notion
  - Felicitously using a presupposition trigger depends on the tacit assumption that the presuppositions are satisfied
  - So, using presuppositionally loaded items might be a bad idea when you want to develop a fully explicit system of logic
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