Baronett, *Logic* (4th ed.)
Chapter Guide

Chapter 5: Categorical Propositions

The study of categorical propositions includes the logical structure of individual categorical propositions (how the subject and predicate classes relate to each other), as well as how correct reasoning proceeds from one categorical proposition to another.

A. Categorical Propositions

Categorical propositions are statements about classes of things. A **class** is a group of objects. There are two class terms in each categorical proposition, a **subject** class (S) and a **predicate** class (P).

There are four types of categorical proposition:

- **A**-proposition: Asserts that the entire subject class is *included in* the predicate class.
    - Standard-form of the **A**-proposition: **All S are P**.
    - This is the **universal affirmative** proposition.
- **I**-proposition: Asserts that at least one member of the subject class is included in the predicate class.
    - Standard-form of the **I**-proposition: **Some S are P**.
    - This is the **particular affirmative** proposition.
- **E**-proposition: Asserts that the entire subject class is *excluded from* the predicate class.
    - Standard-form of the **E**-proposition: **No S are P**.
    - This is the **universal negative** proposition.
- **O**-proposition: Asserts that at least one member of the subject class is *excluded from* the predicate class.
    - Standard-form of the **O**-proposition: **Some S are not P**.
    - This is the **particular negative** proposition.

B. Quantity, Quality, and Distribution

Categorical propositions can be viewed in terms of **quantity** (universal or particular), **quality** (affirmative or negative) and whether or not a class is distributed.

If a categorical proposition asserts something about every member of a class, then the term designating that class is said to be **distributed.** If a proposition does not assert

something about every member of a class, then the term designating that class is said to be **undistributed**. In summary:

- **All S are P**. The subject term is distributed; the predicate class is not.
- **Some S are P**. Neither the subject nor predicate term is distributed.
- **No S are P**. Both the subject and predicate terms are distributed.
- **Some S are not P**. The subject term is not distributed; the predicate class is distributed.

C. Existential Import

A proposition has **existential import** if it presupposes the existence of certain kinds of objects.

Under the *traditional interpretation* of categorical propositions, the universal **A**- and **E**-propositions may be assumed to have existential import. This leads to problems determining truth value when the classes referred to in the propositions lack any members:

> "All unicorns are mammals."
> "No unicorns are reptiles."

Under the *modern interpretation* of categorical propositions, the universal **A**- and **E**-propositions are translated as conditional statements, thus resolving questions concerning the existence of the members of a class:

> "All unicorns are mammals." becomes "*If* something is a unicorn, *then* that thing is a mammal."
> "No unicorns are reptiles." becomes "*If* something is a unicorn, *then* that thing is a not a reptile."

The particular **I**- and **O**-propositions in both the traditional and modern interpretations of categorical propositions have existential import.

D. The Modern Square of Opposition and Venn Diagrams

The **square of opposition** shows us the logical inferences (**immediate inferences**) we can make from one proposition type (**A**, **I**, **E**, and **O**) to another.

Two propositions are said to be **contradictories** when both cannot be true at the same time and both cannot be false at the same time. **A** and **O** propositions are contradictory, and **E** and **I** propositions are contradictories.

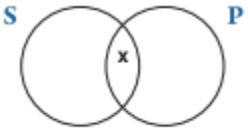
Venn Diagrams

Since the modern interpretation does **not** assume existential import for **A**- and **E**-propositions, their **Venn** diagrams picture this status with circles and shaded (empty) areas:

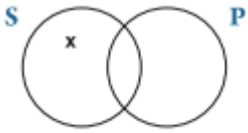
A: All S are P.

E: No S are P.

Venn diagrams for the two particular claims include an *x* representing existence:



I: Some S are P.



O: Some S are not P.

E. Conversion, Obversion, and Contraposition in the Modern Square

Conversion, **obversion**, and **contraposition** are further immediate inferences we can make between one categorical proposition and another.

An immediate argument can be created by interchanging the subject and predicate terms of a given categorical proposition, a process called **conversion**.

Under the modern interpretation, conversion is valid only for **E**- and **I**-propositions:

- "No S are P" is logically equivalent to "No P are S."
- "Some S are P" is logically equivalent to "Some P are S."

An immediate argument can also be formed by **obversion**, in which (1) the quality of the given proposition is changed, and (2) the predicate term is replaced with its class ***complement*** (the set of objects that do not belong to a given class).

Under the modern interpretation, obversion is valid for all four proposition types:

- "All S are P" is logically equivalent to "No S are non-P."
- "No S are P" is logically equivalent to "All S are non-P."
- "Some S are P" is logically equivalent to "Some S are not non-P."
- "Some S are not P" is logically equivalent to "Some S are non-P."

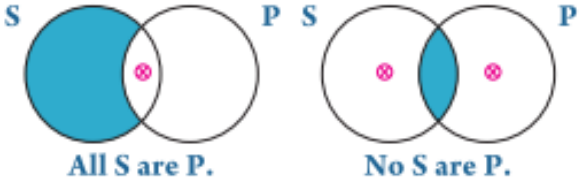
One more type of immediate argument, **contraposition**, is formed by replacing the subject term of a given proposition with the complement of its predicate term, and then replacing the predicate term of the given proposition with the complement of its subject term.

Under the modern interpretation, contraposition is valid only for **A-** and **O**-propositions:

- "All S are P" is logically equivalent to "All non-P are non-S."
- "Some S are not P" is logically equivalent to "Some non-P are not non-S."

F. The Traditional Square of Opposition and Venn Diagrams

Because the Traditional Square of Opposition assumes existential import, the Venn diagram for a universal claim will reflect the possible existence of at least one member in the subject class for an **A**-proposition, and at least one member if the subject or predicate class for an **E**-proposition (since, by conversion, "No S is P" is logically equivalent to "No P is S").



Venn diagrams for the particular propositions are the same as for the modern interpretation.

G. Conversion, Obversion, and Contrapositive in the Traditional Square

In the traditional square of opposition, as in the modern square, **Conversion** is valid for **E-** and **I**-propositions and never valid for **O**-propositions. However, under the assumption of existence, **Conversion by limitation** is valid for **A**-propositions in the traditional interpretation.

Obversion is valid for all four categorical proposition types, as in the modern interpretation.

Contraposition is valid for **A-** and **O**-propositions and never valid for **I**-propositions, as in the modern interpretation. However, under the assumption of existence, **Contraposition by limitation** is valid for **E**-propositions in the traditional interpretation.

H. Translating Ordinary Language into Categorical Propositions

Ordinary language rarely presents categorical propositions in standard-form. The following are ways to construct a standard-form categorical proposition (quantity, quality, subject class, copula, predicate class):

1. **Missing Plural Nouns**

- Since every categorical proposition involves two classes of objects, it is important to identify two nouns.

2. **Nonstandard Verbs**
    - Since every categorical proposition involves a copula, it is important to identify and replace the connecting verb with "are."
3. **Singular Propositions**
    - Propositions about individuals are always translated as universal propositions.
4. **Adverbs and Pronouns**
    - Since every categorical proposition involves a quantifier, it is important to identify and replace adverbs that describe places or times as reflecting quantity.
    - Since every categorical proposition involves two classes of objects, it is important to identify and replace unspecified nouns.
5. **"It Is False That…"**
    - Since there are two ways a categorical proposition can be negative ("No S are P," and "Some S are not P."), it is important to identify and rewrite phrases expressing negation.
6. **Implied Quantifiers**
    - Since every categorical proposition involves a quantifier (universal or particular), it is important to make quantifiers explicit.
7. **Nonstandard Quantifiers**

    Since every categorical proposition involves a quantifier (universal or particular), it is important to rewrite the quantifier in standard-form.
8. **Conditional Statements**
    - "If … then" statements should be rewritten as universal categorical propositions, with the phrase after "if" appearing on the left side of the copula, and the phrase after "then" (expressly stated or implied) appearing on the right side of the copula.
9. **Exclusive Propositions**
    - All exclusive propositions should be rewritten so that the exclusive category appears in the predicate position.
10. **"The Only"**
    - All expressions of "the only" should be rewritten so that the class appearing after "the only" is expressed as the subject class of the categorical proposition.
11. **Propositions Requiring Two Translations**
    - Since every categorical proposition contains two and only two classes of things, whenever an ordinary language proposition contains more than two classes of object, there will be more than one categorical proposition.