

Categorical Syllogisms

We now examine a very specific kind of argument, the categorical syllogism. A categorical syllogism consists of three categorical statements, two of which are premises and the third of which is the conclusion. There must be exactly three terms in the syllogism. Each of the three terms must appear exactly twice in the argument. The predicate term of the conclusion is the major term of the syllogism. It appears as one of the terms in the major premise. The subject term of the conclusion is the minor term of the syllogism. It appears as one of the terms in the minor premise. The third term, called the middle term, appears in each of the premises, but not in the conclusion. Standard form for a categorical syllogism is:

major premise
minor premise
conclusion.

The first step in identifying a categorical syllogism is to find the conclusion. The premise which contains the major term, the predicate term of the conclusion, is the major premise. It is listed first. The premise which contains the minor term, the subject term of the conclusion, is the minor premise. It is listed second. The conclusion is then listed third.

Exercise 12.1

For each of the following, (a) determine if a categorical syllogism is expressed; (b) if a categorical syllogism is expressed, determine if it is in standard form; and (c) if it is not in standard form, write it in standard form.

1. All carp are bottom feeders.
All catfish are bottom feeders.
All catfish are carp.
2. All goldfish are carp.
All carp are bottomfeeders.
All goldfish are bottomfeeders.

3. All carp are bottom feeders.
All catfish are bottom feeders.
All suckers are bottom feeders.
Some bottom feeders are not carp.
4. All carp are bottom feeders.
If a bottom feeder comes from a polluted stream, it will taste bad.
If a carp comes from a polluted stream, it will taste bad.
5. There are legal limits on all gamefish, but carp are not gamefish. So there are no legal limits on carp.
6. There are legal limits only on gamefish. There are no legal limits on carp, since carp are not gamefish.
7. There are legal limits on carp or carp are not gamefish. There are no legal limits on carp, so carp are not gamefish.
8. All gamefish are attractive, but some carp are not attractive. Therefore some gamefish are not carp.
9. While some carp are attractive, some carp are not attractive. No carp, however, are gamefish.
10. Some carp and some suckers are trash fish. No trash fish are gamefish. Therefore some carp are not gamefish.

Syllogistic Forms

In constructing schemata for categorical syllogisms, we will use the capital "S" as a variable for the minor term, the capital "P" for the major term, and the capital "M" for the middle term. Thus the syllogism

All logical engines are binary devices.
All computers are logical engines.
All computers are binary devices.

has the schema

All M are P.

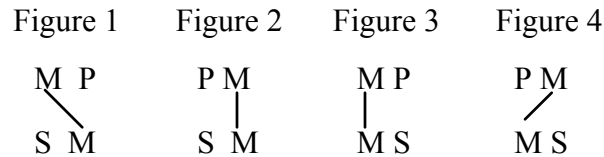
All S are M.
All S are P.

Every categorical schema is uniquely identifiable in terms of two characteristics, mood and figure. The mood of a schema is identified by listing the forms of the statements in the standard order of major premise, minor premise, conclusion. The schema above is an AAA. The schema

No P are M.
Some M are S.
Some S are not P.

is an EIO.

Figure is determined by the relative positions of the middle term in the premises. There are four different figures.



In figure 1, the middle term is the subject of the major premise and the predicate of the minor premise. In figure 2, the middle term is the predicate of both major and minor premise. In figure 3, the middle term is the subject of both major and minor premise. In figure 4, the middle term is the predicate of the major premise and the subject of the minor premise.

This combination of mood and figure uniquely identifies syllogistic forms. For example, the syllogism

All polliwogs are baby frogs.
All baby frogs are young croakers.
All young croakers are polliwogs.

is an AAA-4. Each of the statements is an A form, and the middle terms is the predicate of the major premise and the subject of the minor premise.

Given the mood and figure, it is easy to reconstruct the syllogistic form. Let's use EIO-3 as an example. The conclusion is an O form. Its schema is

Some S are not P.

The next step is to add the quantifiers and copulae of the premises, leaving

the terms blank. This gives us

No ___ are ____.
Some ___ are ____.
Some S are not P.

Since the figure is 3, we know the middle term will be in the subject position of both premises.

No M are ____.
Some M are ____.
Some S are not P.

"P" goes into the blank position in the major premise and "S" into the blank position in the minor premise. The completed schema is

No M are P.
Some M are S.
Some S are not P.

Exercise 12.2

Identify the mood and figure for each of the following syllogistic schemata.

1. Some M are P.
No S are M.
Some S are not P.
2. All M are P.
Some S are not M.
Some S are not P.
3. Some P are not M.
Some S are M.
Some S are not P.
4. Some M are P.
All S are M.
Some S are P.
5. No M are P.
All M are S.

Some S are not P.

Construct syllogistic schemata for the following.

1. IOA-3

3. AII-2

5. AEA-2

7. EEE-2

9. IAI-2

2. EAO-4

4. OAO-1

6. OAO-3

8. AII-3

10. EAE-1