Distribution of Terms

_____ **Introduction.** In the last two chapters, we studied the ways in which propositions are different from (or **opposed to**) one another; in other words, how these propositions are logically different. In the next chapter, we will discuss the different ways in which they are equivalent to one another—in other words, the ways in which they are logically the same. But before we discuss in what ways statements are equivalent, we need to familiarize ourselves with what is called **distribution**.

_____ **What is Distribution?** Distribution may be defined as follows:

> *Distribution is the status of a term in regard to extension.*

All of the categorical statements we have learned about (A, I, E and O) have a subject. The subject of a statement is the term the statement is about. In the statement, "All S is P," **S** is the subject. In the statement, "All men are mortal," **men** is the subject.

In addition, all of the statements we have learned about have a predicate. A predicate is the term we use to say something about the subject. In the statement, "All S is P," P is the predicate. In the statement, "All men are mortal," **mortal** is the predicate.

We will be asking whether the terms used as subject and predicate in each one of the four statements we have learned are **distributed**. When we say that a term is distributed, we mean that the term refers to all the members of the class of things denoted by the term. When we use the term **man** in a statement, for example, are we referring to it universally—in other words, are we referring to all men? Or are we referring to it particularly—are we referring to only some men? If we are using it universally, we say it is distributed.

When we use the term **mortal** in a statement, are we using it universally—are we referring to all mortal things? Or are we using it particularly—are we referring only to some mortal things?

Distribution is the status of a term in regard to its extension.

We say that a term is distributed when it is used universally—if it refers to all the members of the class denoted by the term. If it is used particularly—if it only refers to some members of the class denoted by the term—then we say it is *undistributed*.

_____ **Distribution of the Subject-Term.** It is fairly easy to determine whether the subject-term is distributed. The rule for the determining the distribution of the subject-term is as follows:

> *The subject-term is distributed in statements whose quantity is universal and undistributed in statements whose quantity is particular.*

Determining the distribution of the subject-term is easy because the quantifier (*All*, *Some*, *No* and *Some ... not*) tells us all we need to know. If it says, "All S is P", we know it refers to *all* S's. It refers to all the members of the class it denotes. If we say, "All men are mortal," we know it means *all* men. It refers to all the members of the class it denotes. A subject-term in an A statement, then, is taken universally, and is therefore distributed.

The same goes for the E statement. It says, "No S is P." To how many members of the class denoted by S does this E statement refer? To all of them. To say, "No S is P" is the same as saying, "All S is not P." In other words, the subject-term of the E statement is taken universally and is therefore distributed.

Likewise, when we say, "Some S is P," we are obviously not referring to all S's, only some of them. And when we say, "Some men are mortal," we are referring only to some men, not all of them. In both of these cases, the subject-terms are undistributed.

The O statement too, "Some S is not P," obviously has a subject term that is not universal and therefore is undistributed.

In the case of the subject-term, the quantifier tells us all we need to know.

We can see how distribution works with the subject-term in the following diagram:

DIAGRAM OF THE DISTRIBUTION OF
TERMS IN A, I, E, AND O STATEMENTS

Type of sentence	Subject-Term
A	Distributed
I	Undistributed
E	Distributed
O	Undistributed

_____ **Distribution of the Predicate-Term.** The rule for determining the distribution of the predicate-term is not quite as straightforward as for the subject:

> *In affirmative propositions the predicate-term is always taken particularly (and therefore undistributed) and in negative propositions the predicate is always taken universally (and therefore distributed).*

The subject-term is distributed in statements whose quantity is universal and undistributed in statements whose quantity is particular.

In affirmative propositions, the predicate-term is always undistributed and in negative propositions, the predicate is always taken universally.

Distribution of the Predicate-Term in A Statements. Let us take A statements first. When we say, "All S is P," is P taken universally? Are we talking about all P's? To make it a little clearer, let's take a real statement. When we say, "All men are animals," we know we are talking about all men: the sentence says so quite plainly. But are we talking about all animals? We know, if the statement is true, that all men are animals, but are all animals men? Obviously not. Although the statement is about all men, it is only about those animals who are men. We are talking about all men, but only some animals, since only some animals are men. The predicate-term is therefore taken particularly, and is therefore undistributed.

We can use a diagram invented by a Swiss mathematician named Euler to visually show how this works. In Euler's diagram (see Diagram 8-1 to the left), we represent each term, *man* and *animal* by a circle. Remember in chapter 2, when we were discussing extension that we concluded that the concept *animal* h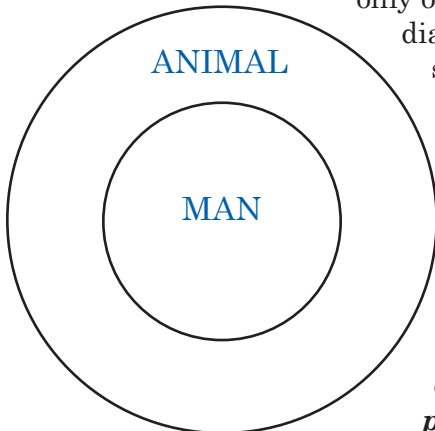ad greater extension that the concept *man*. Man was only one of many kinds of animals. Using Euler's diagram, we show a concept with greater extension with a larger circle than a concept with lesser extension.

The smaller circle, representing man, takes up only some of the area of the larger circle, representing animals. Our statement, "All men are animals" is saying something only about rational animals (that is what men are) but not about those animals who are not men. We are saying, essentially, that S (man) is identical with a *part of* P (animal). Our statement, "All men are animals" is talking about all men, but it is not talking about all animals, since some animals are not men. We say, therefore, that although *man* is distributed, *animal* is not.

ANIMAL

MAN

DIAGRAM 8-1

In A statements, then, the predicate-term is undistributed.

Distribution of the predicate-term in I statements: In I statements, "Some S is P," we can also see that, not only are we talking about some S's, but we are also only talking about some P's. When we say, "Some dogs are vicious things," we are only talking about some dogs, not all, and some vicious things (the ones that are dogs), not all vicious things. There are other dogs that are not vicious. And there are other vicious things (wolverines, tasmanian devils, etc.) that are not dogs. Euler would show this as in Diagram 8-2 on the next page.

Here you see a shaded area which represents what the I statement, "Some dogs are vicious things," is referring to. As you can see, the shaded area does not take up all the circle representing dogs nor does it take up all the area of the circle representing vicious things. It is saying that *some dogs* (the ones in the shaded area) are *vicious things* (the ones in the shaded area). And we are talking about only some vicious things as well. The predicate, *vicious things,* is particular and therefore undistributed.

In A statements, the predicate-term is undistributed.

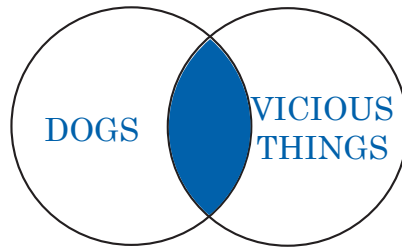**The predicate-term in I statements is undistributed.**

DIAGRAM 8-2

Distribution of the Predicate-Term in E statements: As in A statements, the subject of an E statement is universal and therefore is distributed. But what about the predicate? When we say, "No man is a reptile," we are, in fact, talking about all men. We are saying that "All men are not reptiles." But are we saying something about all reptiles? Can we infer from the statement, "No man is a reptile" that "All reptiles are not men?" We certainly can. We *are* talking about all reptiles. We are taking reptiles universally, and therefore it is distributed.
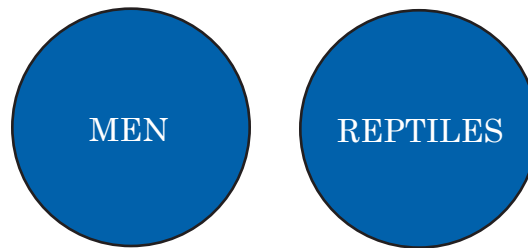

DIAGRAM 8-3

You can see this in Diagram 8-3 to the left.

As you can see, the circles do not overlap at all. This illustrates the fact that no men are reptiles. There are men and there are reptiles, but there is nothing in this world that is both: there are no *reptile-men*. They are two completely different things, represented by two circles that do not overlap.

Distribution in O statements: When we look at the O statement, "Some S is not P," we see that the subject-term is not distributed (we are only talking about *some*, not *all*, S's.) But what about P's? If we said, for example, "Some men are not blind," we know we can't say that all men are not blind (only some of them are not blind.) But these *some men* who are *not blind*—are they excluded from only part of the class of blind things or are they excluded from the entire class? The some men who are not blind are, of course, excluded from the whole class of blind things. Therefore, in the O statement, we are taking P universally. It is therefore distributed.
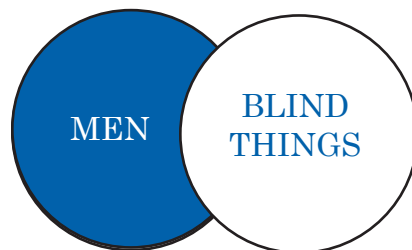
The predicate-term in O statements is distributed.

DIAGRAM 8-4

In Diagram 8-4 to the left, you see that, although the darkened part of the circle represents *some men*, it obviously does not represent all men, and is therefore undistributed. But the predicate represents the whole circle which represents all blind things and is therefore distributed.

We know, then, that in E and O statements, the predicate is distributed. But in A and I statements the predicate is undistributed. Let us then reformulate our diagram to show the distribution of both the subject and the predicate in all four of our categorical statements:

DIAGRAM OF THE DISTRIBUTION OF
TERMS IN A, I, E, AND O STATEMENTS

Type of sentence	Subject-Term	Predicate-Term
A	Distributed	Undistributed
I	Undistributed	Undistributed
E	Distributed	Distributed
O	Undistributed	Distributed

_____ **Different Ways to Diagram I and O Statements.** When we discussed distribution in I and O statements earlier in this chapter, we left a few things out. When we discussed I statements, for example, we used this statement to illustrate distribution: "Some dogs are vicious things." And we illustrated this with one like 8-5below (which is the same as 8-2):
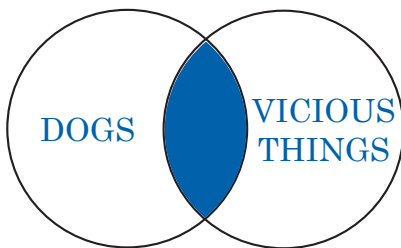

DIAGRAM 8-5

But what we didn't mention when we were discussing this statement is that there are other kinds of I statements that require another kind of diagram.

Let's take, for example, the following statement:

Some men are carpenters.

This is different from the first I statement we looked at for this reason: Although there are some vicious things that are not dogs, there are no carpenters who are not men. This means that we need another kind of diagram to represent this statement.

To represent an I statement like, "Some men are carpenters," we will need Diagram 8-6. The broken lines of the circle representing carpenters indicates that there is nothing in that part of the circle.
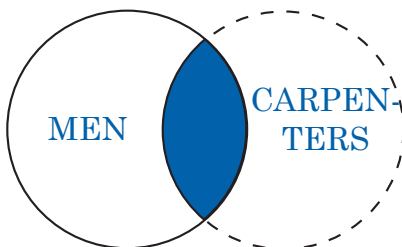

DIAGRAM 8-6

This is a visual way of saying that there are no carpenters who are not men. Not all men are carpenters: only some of them are. But all carpenters are men.

The same goes for O statements. We used the example, "Some men are not blind." We know that there are some creatures besides men who are blind. Some kinds of cave-dwelling creatures, for example, are blind. So we used a diagram like that in Diagram 8-7 on the next page.

But what if we used this example: "Some men are not carpenters?" In this case, we would have to use a different diagram altogether. It would have to look like Diagram 8-8 on the next page.

Here we see a broken line on the white circle that we do not see in Diagram 8-7. This is because, although there are some blind things that are not men, there are no carpenters who are not men. We used a broken line to indicate that there are no carpenters outside the class of men.

There is another kind of I statement that requires another kind of diagram.

DIAGRAM 8-7

If there is any member of the predicate class in an I statement that is not a member of the subject class, then you use the diagram with the solid line. If not, then you use the broken line.
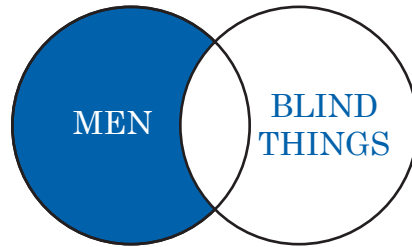
When you are working with I and O statements, you will need to determine which kind they are: Are they like "Some men are not blind?" Or are they like "Some men are not carpenters?" Just ask whether there is any member of the predi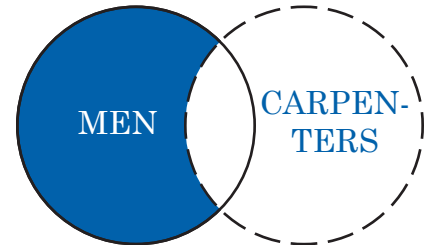cate class that is not a member of the subject class. If there is, then you use the diagram with the solid line. If there is not, then you use a diagram with a broken line.

DIAGRAM 8-8

_____ **Summary.** In this chapter, we discuss *distribution*. *Distribution* is the status of a term in regard to its extension. When we say that a term is distributed, we mean that the term refers to all the members of the class of things denoted by the term. We said that the subject-term is distributed in statements whose quantity is universal and undistributed in statements whose quantity is particular. In regard to the predicate-term, we said that in affirmative propositions the predicate-term is always taken particularly (and therefore undistributed) and in negative propositions the predicate is always taken universally (and therefore distributed).

We showed how distribution works with both subject and predicate terms by using the following diagram:

The predicate-term in O statements is distributed.

DIAGRAM OF THE DISTRIBUTION OF TERMS IN A, I, E, AND O STATEMENTS

Type of sentence	Subject-Term	Predicate-Term
A	Distributed	Undistributed
I	Undistributed	Undistributed
E	Distributed	Distributed
O	Undistributed	Distributed

Finally, we showed how to use diagrams to display the distribution of various categorical statements.

_____ **Exercises for Day 1.** Peruse entire chapter. Then read the introductory section at the very beginning of chapter 8. Read this section carefully and try to understand it as best you can.

1. What are we discussing in this chapter?

2. What is the definition of *distribution*?

3. What is a subject?

4. In the statement, "All men are mortal," what is the subject?

5. In the statement, "All men are mortal," what is the predicate?

6. When we say that a term is *distributed*, what do we mean?

7. When a term is used universally, is it distributed or undistributed?

8. When a term is used particularly, is it distributed or undistributed?

_____ **Exercises for Day 2.** Read "Distribution of the Subject-Term." Read it carefully.

9. What is the rule for determining the distribution of the subject-term?

10. Why is it easy to determine whether the subject term is distributed?

11. In the A statement, "All S is P," is the subject-term distributed or undistributed?

12. In the E statement, "No S is P," is the subject-term distributed or undistributed?

13. In the I statement, "Some S is P," is the subject-term distributed or undistributed?

14. In the O statement, "Some S is not P," is the subject-term distributed or undistributed?

15. In determining whether the subject-term is distributed or undistributed the _____ tell us all we need to know.

16. Fill out the following diagram:

**DIAGRAM OF THE DISTRIBUTION OF
TERMS IN A, I, E, AND O STATEMENTS**

Type of sentence	Subject-Term
A	_____
I	_____
E	_____
O	_____

17. Tell whether the subjects in the following statements are distributed or undistributed.

All logic problems are difficult.	No men are white.
No logic problems are difficult.	All men are white.
Some logic problems are difficult.	Some men are not white.
Some logic problems are not difficult.	Some men are white.
All logic problems are difficult.	No men are white.
No logic problems are difficult.	All men are white.

_____ **Exercises for Day 3.** **Read "Distribution of the Predicate-Term." Read it carefully.**

18. What is the rule for determining the distribution of the predicate-term?

19. In the A statement, "All S is P," is the predicate-term distributed or undistributed?

20. In the E statement, "No S is P," is the predicate-term distributed or undistributed?

21. In the I statement, "Some S is P," is the predicate-term distributed or undistributed?

22. In the O statement, "Some S is not P," is the predicate-term distributed or undistributed?

23. Draw a Euler's diagram of this statement: "All ducks are birds."

24. Draw a Euler's diagram of this statement: "Some ducks are white."

25. Draw a Euler's diagram of this statement: "No ducks are criminals."

26. Draw a Euler's diagram of this statement: "Some ducks are not white."

27. Fill out the following diagram:

DIAGRAM OF THE DISTRIBUTION OF
TERMS IN A, I, E, AND O STATEMENTS

Type of sentence	Subject-Term	Predicate-Term
A	_____	_____
I	_____	_____
E	_____	_____
O	_____	_____

28. Tell whether the subject-terms and the predicate-terms in the following statements are distributed or undistributed (D=distributed; UnD=undistributed):

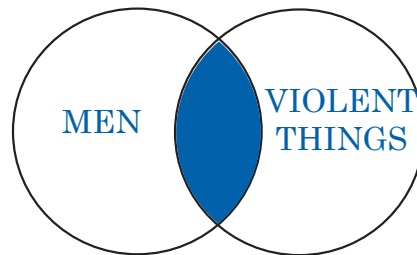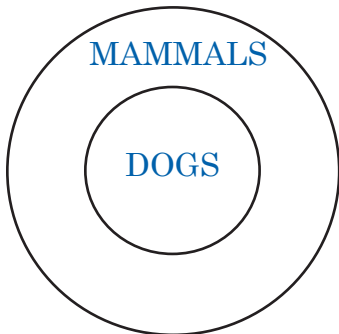|						
No cars are fast.	S:	D	UnD	P:	D	UnD
Some omelettes are tasty.	S:	D	UnD	P:	D	UnD
Some tomatoes are not red.	S:	D	UnD	P:	D	UnD
Michael Jordan is a good basketball player.	S:	D	UnD	P:	D	UnD
No guns are loud.	S:	D	UnD	P:	D	UnD
Some rocks are crystals.	S:	D	UnD	P:	D	UnD
Some men are sinners.	S:	D	UnD	P:	D	UnD

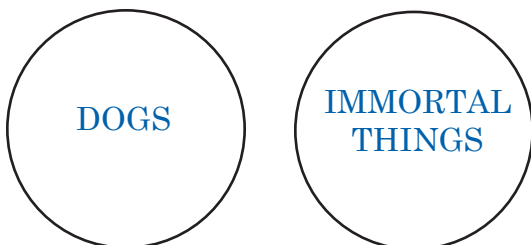|						
No men are saved.	S:	D	UnD	P:	D	UnD
All wars are bloody.	S:	D	UnD	P:	D	UnD
Some soldiers are not brave.	S:	D	UnD	P:	D	UnD
Some animals are amphibians.	S:	D	UnD	P:	D	UnD
No houses are well-built.	S:	D	UnD	P:	D	UnD
All storms are violent.	S:	D	UnD	P:	D	UnD
All machines are loud.	S:	D	UnD	P:	D	UnD

_____ **Exercises for Day 4.** **Read "Different Ways to Diagram I and O Statements." Read it carefully.**

29. In what way is the I statement, "Some dogs are vicious" different from the I statement, "Some men are carpenters?"

30. In what way is the O statement, "Some men are not blind" different from the O statement, "Some men are not carpenters"?

31. Draw a Euler's diagram representing the statement: "Some boys are boy scouts."

32. Draw a Euler's diagram representing the statement: "Some boys are fast."

33. Draw a Euler's diagram representing the statement: "Some boys are not Boy Scouts."

34. Draw a Euler's diagram representing "Some boys are not fast."

35. Write the statement represented by the following Euler's diagram.

MAMMALS

DOGS

36. Write the statement that goes along with the following diagram.

MEN   VIOLENT THINGS

37. Write the statement that goes along with the following diagram.

DOGS   IMMORTAL THINGS

38. Write the statement that goes along with the following diagram.

DOGS   LONG-HAIRED THINGS

39. Tell whether the following are true or false:

     T   F   The subject-term is distributed in statements whose quantity is universal.

     T   F   The subject-term is undistributed in statements whose quantity is universal.

     T   F   The subject-term in the I statement is undistributed.

     T   F   The subject-term in the E statement is undistributed.

     T   F   In affirmative propositions the predicate-term is always taken universally.

     T   F   In negative propositions, the predicate is always taken universally.

—————— Review Exercises for Day 4

40. Fill out the following chart. [Review]

—————

	Affirmative	Negative
Universal	_____	_____
Particular	_____	_____

—————

41. In the following chart, indicate, as in Figure 6-2, which two pairs of statements are contradictory, which two statements are contrary, which two statements are subcontrary and which two pairs of statements are subalternate. [Review]

          A   E

          I   O

42. Tell whether the following are true or false.

     T   F   The A statement and the E statement are not subcontrary because, although they differ in quality, they do not differ in quantity.

     T   F   The statement, "Just do it" and the statement, "All men are mortal" are subcontrary.

     T   F   The statements, "All football players are big" and "Some football players are big" are subalternate.

     T   F   Subalternate statements cannot at the same time be false, but they can both be true.