Logic 08 Reading - Quantitative Rules for Categorical Syllogisms

_____ **Introduction**. As we said at the beginning of the last chapter, there are seven rules of validity for categorical syllogisms. In the last chapter, we discussed the first two, which we called ***terminological*** rules, since they are concerned with the proper use of terms in a syllogism. In this chapter, we will discuss the second group of rules, which we call ***quantitative*** rules.

Let us first review all seven of the rules:

Terminological Rules:

I. There must be three and only three terms.
II. The middle term must not occur in the conclusion

Quantitative Rules:

III. If a term is distributed in the conclusion, then it must be distributed in the premises.
IV. The middle term must be distributed at least once.

Qualitative Rules:

V. No conclusion can follow from two negative premises.
VI. If the two premises are affirmative, the conclusion must also be affirmative.
VII. If either premise is negative, the conclusion must be negative.

As we said, a syllogism must comply with all of these rules in order for it to be considered valid. The two rules we discuss in this chapter are called ***quantitative*** because they have to do with the quantity of the statements in a syllogism. The quantity of a statement, remember, has to do with whether the statement is universal or particular.

Let us begin, then, with Rule III:

_____ Rule Ill: If a Term is Distributed in the Conclusion, Then It Must be Distributed in the Premises. This rule prevents us from trying to say more in the conclusion than is contained in the premises. In order to understand this, we must first recall what it means to say that a term is distributed.

Let us go back to our definition of ***distribution***:

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

Extension, remember, has to do with how much a term refers to. When we talked about extension in Part I, we said, for example, that the concept **man** referred to all possible men; the concept animal referred to all possible **animals**; etc.

When we say that a term is distributed, we mean that it has full extension. It refers to all possible members of a class. The concept, in other words, ***extends*** to all the members of a class. When we use the concept **man**, for example, to refer to all men, we say it is distributed. When we use the concept **animal**, to refer to all animals, we say that it is ***distributed.*** If, on the other hand, a term does not refer to all members of the class it denotes, then we say that it is ***undistributed***.

Take the following syllogism as an example:

All angels are spiritual beings.
No men are angels.
Therefore, no men are spiritual beings.

What the conclusion of the argument assumes is that all spiritual beings are angels; that is the only way the conclusion could logically follow from the premises. But that assumption is nowhere stated in the premises. The conclusion of this argument assumes something that is not in the premises. To say that the terms in the conclusion should both be distributed in the premises is just another way to say this. In other words, the conclusion says more than what the premises say; it goes further than the premises allow. Logically, we can show this by showing that there is a term in the conclusion which is distributed that is not distributed in the premises.

In fact, we know there is something wrong with syllogism, since we know that men are (at least in part) spiritual beings, and the conclu-sion denies this, making it false. Yet both the premises are true. How can this be? In fact, any syllogism in which the premises are true and the conclusion false we know is invalid. We know, then, that the syllo-gism is invalid, but we still have not yet pinpointed why.

How to mark a syllogism: Let us try to show what is wrong with the above syllogism. Let us indicate which terms in the premise are distrib-uted and undistributed by writing a lower case d next to the term when it is distributed and a lower case u if it is undistributed. We will place these letters next to the letter (S, P or M) that indicates what kind of term it is.

All angels^{Md} are spiritual beings^{Pu}
No men^{Sd} are angels^{Md}
Therefore, no men^{Sd} are spiritual beings^{Pd}

Remember that we said earlier, that there were four basic categorical propositions which take the following form:

A: All S is P
I: Some S is P
E: No S is P
O: Some S is not P

Then, we said that terms were distributed in different ways in each of these statements. Distribution, we said, has to do with whether a term is used universally or particularly. And we said that in each of these statements, there are two terms: the subject-term and the predicate-term. How did we know which terms were distributed in each of these statements? An easy way to find out would be to look back at the ***Diagram of the Distribution of Terms***:

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
0	Undistributed	Distributed

We can now look at the syllogism above and determine how terms are distributed in it. The first premise in the syllogism above is an A statement; therefore, while the subject-term (angels) is distributed, the predicate-term (spiritual beings) is not. The second premise, on the other hand, is an E statement; therefore, both the subject-term (men) and the predicate-term (angels) are distributed. The conclusion, as you see, is an E statement, therefore, again, both the subject-term (men) and the predicate-term (spiritual beings) are distributed. If you look at how we have labelled each term, you will see that it complies with the diagram.

In this syllogism, we see that the minor term (S) is distributed (d) in the minor premise (S) and also distributed (d) in the conclusion. Therefore, there is no problem with the minor term. But look at the major term (P). It is undistributed (u) in the first premise, but distrib-uted (d) in the conclusion. This violates Rule III, since there is a term that is distributed in the conclusion that is not distributed in either of the premises. This means that the conclusion is going beyond the premises by stating more than the premises justify. You can't conclude anything about all spiritual beings (which is what the predicate of the conclusion refers to, since it is the predicate of an E statement, and therefore distributed), since the premise only refers to ***some*** spiritual beings (which is what the predicate of the first premise refers to, since it is the predicate of an A statement and therefore undistributed).

Syllogisms that violate Rule III are said to commit the ***Fallacy of Illicit Process***, and are, as a result, invalid. There are two ways this fallacy is committed. The first is called the ***Fallacy of Illicit Major***. The second is called the ***Fallacy of Illicit Minor***.

The Fallacy of Illicit Major occurs when the major term (the predicate of the conclusion) is distributed in the conclusion, but not in the major premise. The syllogism we just discussed is an example of the Fallacy of Illicit Major, since the major term, ***spiritual beings***, is distributed in the conclusion, but not in the major premise. It is therefore invalid.

The Fallacy of Illicit Minor occurs when the minor term (the subject of the conclusion) is distributed in the conclusion, but not in the minor premise. An example of the Fallacy of Illicit Minor is as follows:

All men^{Md} are animalsP^{u}
All men^{Md} are mortal^{Su}
Therefore, all mortals^{Sd} are animals^{Pu}

Here we see that the major term (animal) is undistributed (u) in both the conclusion and in the major premise. So far, so good. But the minor term (mortal), although it is undistributed (u) in the minor premise, is distributed (d) in the conclusion. This violates Rule III. You cannot conclude anything about ***all*** mortals, because the second premise refers only to ***some*** mortals. In other words, mortals has greater extension in the conclusion than in the premises, violating Rule III. Since it is the minor term that is distributed in the conclusion but not in the premises, we say it is an example of the Fallacy of Illicit Minor, and therefore invalid.

_____ Rule IV: The Middle Term Must Be Distributed at Least Once. Rule IV ensures that the major and minor terms get connected in the premises. Let us look at the following argument:

All angels^{Sd} are spiritual beings^{Mu}
All men^{Pd} are spiritual beings^{Mu}
Therefore, all men^{Sd} are angels^{Pu}

We see that this argument complies with Rule I, since there are three and only three terms; it complies with Rule II, since the middle term does not occur in the conclusion; and it complies with Rule III, since there are no terms distributed in the conclusion that are not distributed in one of the premises. But there is something else wrong with it. Although both premises are true, we know the conclusion to be false. What is wrong?

Since the middle term, ***spiritual beings***, is not distributed in either premise, it cannot serve to connect the minor and major terms, as is necessary in order to come to a conclusion. In other words, as in Rule III, the premises are insufficient to justify the conclusion.

When we violate this rule, we say that we have committed the ***Fallacy of Undistributed Middle***.

_____ Summary. This chapter concerns the second two of the seven rules with which syllogisms must comply in order to be considered valid. These second two rules are called ***quantitative*** rules.

Rule III says that ***if a term is not distributed in the premises, it cannot be distributed in the conclusion.*** When we violate this rule we commit the ***Fallacy of Illicit Process***. There are two forms of this fallacy. The first is called the ***Fallacy of Illicit Major***. This fallacy is committed when the term that is distributed in the conclusion but not in the premises is the major term. The

second is called the ***Fallacy of Illicit Minor***. This fallacy is committed when the term that is distributed in the conclusion but not in the premises is the minor term.

Rule IV says that ***the middle term must be distributed at least once***. When we violate this rule we are said to have committed the ***Fallacy of Undistributed Middle***.