Section 2: Syllogistic Forms

A **syllogism** is a putative argument consisting of three categorical propositions, two of which are premisses and one of which is the conclusion. It contains exactly three terms, each occurring twice but never twice in the same proposition. Aside from these restrictions, a syllogism may be made up of any combination of categorical propositions of any type. The following are *not* syllogisms:

argument form	*reason*
All M are D. No G are M. Some M are not D.	Because the M occurs three times, G only once.
Few A are I. Many I are not A. Some C are C.	Because C occurs twice in the conclusion.
Many W are B. All W are not C. Many B are not C.	Because 'All...are not...' is not a recognized canonical form for categorical propositions.
Most T are not G. Most M are I. Some I are G.	Because there are four terms: M, G, I, and T.
Many N have F. All F are X. Many N have X.	Because 'have' is not a permissible verb for a categorical proposition.
No Q are L. Many non-L are E. Many non-E are Q.	Because there are five terms: Q, L, E, non-L, and non-E, though in this case it can be made into a syllogism.

On the other hand, the following *are* syllogisms:

All A are B. All C are A. All C are B.	Most D are not E. Many D are G. Almost all E are G.	Many Y are not non-Z. Almost all non-W are non-Z. No Y are non-W.
Few H are I. No J are I. Some J are H.	All T are S. Most S are non-U. Some non-U are T.	Some non-M are not non-K. Some non-K are not non-L. Some non-M are not non-L.

The Anatomy of a Syllogism

The terms and propositions of a syllogistic argument have special names. These give us an easy way of referring to the structural pieces of a syllogism.

minor term - the subject of the conclusion. (Represented by the letter 'S'.)

major term - the predicate of the conclusion. (Represented by the letter 'P'.)

middle term - the term that does not appear in the conclusion. (Represented by the letter 'M'.)

major premiss - the premiss in which the major term occurs.

minor premiss - the premiss in which the minor term occurs.

Example:

		middle term
Major premiss:	All M are P.	
Minor premiss:	All S are M.	major term
Conclusion:	All S are P.	
	minor term	

Notice that the premisses are identified by their terms, and that terms are defined relative to the conclusion. Hence every part of the syllogism is ultimately defined in terms of the conclusion. Thus the most important lesson from the previous chapter was how to find the conclusion. You cannot even begin to dissect a syllogistic argument until you first know which proposition is the conclusion. In this chapter that will be easy: the conclusion is the proposition below the line.

Constants and Variables (Again)

The letters 'S', 'M', and 'P' are *variables*, typically used to represent the minor term, middle term, and major terms, respectively. These variables stand for any term whatsoever, again with the proviso that multiple occurrences of the variable must always stand for *the same term*, whatever that may be. When discussing argument forms (as opposed to specific arguments) it is customary to use variables. In this section we will be concerned primarily with syllogistic forms. However, you should not get in the habit of looking for the letters 'S', 'M', and 'P' to locate the minor term, middle term, and major term. In genuine arguments the terms are not labeled. It will be up to you to identify the terms based upon their location in the conclusion of the argument.

Standard Form

A syllogism is said to be in **standard form** when it is written in this order: major premiss first, minor premiss second, and conclusion last.

Examples:

In standard form:	Not in standard form:
Most M are P. No S are M. Most S are not P.	No S are M. Most M are P. Most S are not P.

Mood

Listing the letter names of the three propositions in the order in which they appear in standard form—major premiss, minor premiss, conclusion—gives the **mood** of the syllogism.

Examples:

In standard form:		Not in standard form:	
Almost all M are P.	P	All S are M.	D
Few S are M.	B	Many M are not P.	A
Most S are not P.	D	Many S are not P.	D

The letters beside each syllogistic form state the mood of that syllogistic form. The syllogistic form on the left has the mood 'PBD', since the major premiss is a P statement, the minor premiss is a B statement, and the conclusion is a D statement. The syllogistic form on the right has the mood 'DAD', since the major premiss (which, in this case, is the second premiss) is a D statement, while the minor premiss is an A statement, and the conclusion is another D statement. Remember that the mood does not necessarily list categorical propositions in the order in which they actually occur. Mood indicates the order in which they would occur in standard form.

Figure

Syllogisms with the same mood may not, however, be exactly the same, since their terms may not appear in exactly the same place. The location of the terms in a syllogism is called the figure of the syllogism. There are four possible arrangements of terms, and so four possible figures. These are most accurately and conveniently defined by using the concept of proper place.

> A term is in its **proper place** if it occupies the same place (subject or predicate) in the premisses as it does in the conclusion. [Thus the concept of proper place applies to the major and minor terms, but not to the middle term.][1]

1st Figure - the major and minor terms are each in their proper place.

2nd Figure - the minor term is in its proper place, but the major term is not.

3rd Figure - the major term is in its proper place, but the minor term is not.

4th Figure - neither the major term nor the minor term is in its proper place.

1st FIGURE	2nd FIGURE	3rd FIGURE	4th FIGURE
M - P S - M S – P	P - M S - M S – P	M - P M - S S - P	P - M M - S S - P

Examples:

In standard form:			
All M are P. All S are M. All S are P.	AAA - 1	Some P are M. Some S are not M. Most S are not P.	IOD - 2
Not in standard form:			
No M are S. Most M are P. Many S are not P.	TEG - 3	Few M are S. Almost all P are M. Many S are P.	PBK - 4

The letters and number to the right of each syllogistic form state the mood and figure of that syllogistic form.

Exercises:

A. Identify the mood and figure of the following standard form syllogistic forms.

1. All M are P.
   Most M are S.
   Almost all S are P.

2. Many P are M.
   No S are M.
   Most S are not P.

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

4. Most M are P.
   Almost all S are M.
   Few S are P.

5. Few P are M.
   Some M are S.
   Some S are P.

6. Many M are not P.
   Most M are not S.
   Many S are not P.

B. Identify the mood and figure of each of the following syllogistic forms (which are not necessarily in standard form).

1. All M are P.
   Few M are S.
   Most S are P.

2. Many M are not P.
   Some S are M.
   All S are P.

3. No M are S.
   No P are M.
   Many S are P.

4. Most S are not M.
   Many P are M.
   Some S are not P.

5. Most P are M.
   All M are S.
   Most S are P.

6. Almost all M are S.
   Some M are not P.
   No S are P.

C. Using the letters 'S', 'M', and 'P', write out (in standard form) the syllogistic form named by the following moods and figures.

1. PEA - 1
2. KEO - 2
3. IAI - 3
4. TDG - 4
5. PTK - 3
6. AOO - 2
7. ETD - 1
8. GPB - 4
9. KEG - 3
10. IBD - 1
11. AAA - 4
12. BEP - 2

Validity of Syllogistic Forms

We speak of arguments as either 'valid' or 'invalid'. Syllogistic forms are not arguments. They are only argument *forms*. Hence it is not altogether appropriate to speak of syllogistic forms as 'valid'. But, on the other hand, an argument is said to be valid in virtue of *having a certain form*. So if argument forms are not valid, certain argument forms are at least validity-endowing. An argument is said to be valid when the truth of the premisses would provide sufficient grounds for also accepting the truth of the conclusion. An argument form is validity-endowing if that form is such that any argument following that form is valid. However, the phrase 'validity-endowing argument form' is ugly, awkward, and not in current use among logicians in any case. Let us, therefore, adopt the standard custom of referring to a syllogistic form as 'valid' if it is validity-endowing, and 'invalid' if it fails to be validity-endowing.

Using the ordinary language quantifiers, it is possible to construct 4000 logically possible syllogistic forms.[2] However, only 105 of them are valid.[3] We need to have some means of determining whether a syllogistic form is one of the 105 valid forms, or whether it is one of the other 3895. The method for distinguishing between valid and invalid syllogistic forms depends upon the concept of distribution.

Distribution

The concept of distribution has been something of an embarrassment to logicians, since it is not entirely clear what it is supposed to be a concept of.[4] In classical syllogistic logic, terms were said to be distributed or undistributed. But the verb 'to distribute' is nowadays generally understood to be a transitive verb. We can distribute food to the poor, or we can distribute aid across the country. To speak of terms as if they could be "distributed" is bound to leave a few puzzled logic students wondering, "Distributed to whom?" or "Distributed across what?" The classical way of talking makes it sound either as if the term itself were being distributed (to someone or across something), or else as if the term were the recipient of some mysterious property called 'distribution'. Neither way of talking makes much sense.

The notion of distribution is somehow involved in the common distinction between distributive and collective reference. When we refer to a class distributively, we mean to be referring to the separate members of the class. The statement, 'Cows eat grass', for example, is a statement with distributive reference. The statement is true of *each* cow taken apart from all the rest. From the statement, 'Cows eat grass', it is valid to infer '*This* cow eats grass'. On the other hand, when we refer to a class collectively, we do not mean to be referring to the separate members of the class, but to the class taken as a whole. For example, the statement 'Cows are vital to the economy of Wisconsin', is a statement with collective reference. It is not a statement about each individual cow, but a statement about the class of cows taken together. It may be true that cows are vital to the economy of Wisconsin, but it would be nonsense to suppose that *each separate* cow is vital to Wisconsin's economy. This would be to suggest that the Governor of Wisconsin should call out the National Guard if even a single cow were to become ill or die!

In a categorical proposition, **distribution** is the measure of the extent to which the individual members of a class are being discussed, i.e. the extent to which the categorical proposition has distributive reference. This suggests what may be a helpful image. While it does not make sense to talk as if terms could be distributed, it does make sense to say that propositions have significance or import, and that when a proposition refers to its terms distributively it distributes that import across its terms, to the objects named by those terms.

The classical way of talking spoke of terms as either distributed or undistributed. But all categorical propositions are assumed to have distributive reference, and neither term is entirely left out of account. Moreover the proportional quantifiers suggest that distribution should be a matter of degrees. Hence we should not draw a distinction between distribution and non-distribution, but between full distribution and partial distribution, including various degrees of partial distribution. Therefore let us say that the import of the proposition may be distributed either fully or partially across each of the two terms.

Distribution Values

The distribution index[5] or, as I prefer to call it, the **distribution value** of a term is a numerical measure of the degree to which the import of a proposition is distributed across that term. Two factors affect the extent to which the import of a proposition is distributed across its terms: the quantity of the proposition and the quality of the proposition. Distribution by quantity affects the subject term; distribution by quality affects the predicate term.

DISTRIBUTION BY QUANTITY

A **Universal** proposition distributes its import to all of the subject.

A **Predominant** proposition distributes its import to almost all of the subject.

A **Majority** proposition distributes its import to most of the subject.

A **Common** proposition distributes its import to many of the subject.

A **Particular** proposition distributes it import to some of the subject.

DISTRIBUTION BY QUALITY

An **affirmative** proposition distributes its import to some of the predicate.

A **negative** proposition distributes its import to all of the predicate.

Distribution by quantity is not difficult to understand, and it is not difficult to see why distribution by quantity affects the subject term. The quantifier of any proposition tell us what proportion of the objects named by the subject term stand in (or fail to stand in) the relation of belonging to the predicate term. Thus the quantity of the statement (as determined by the quantifier) translates directly into the degree by which the import of the proposition is distributed across the subject.

Distribution by quality is a little trickier. The quality of a statement tells us whether members of the subject stand in an (affirmative) relation of belonging to the predicate, or in a (negative) relation of failing to belong to the predicate. If the specified members of the subject stand in a relation of belonging to the predicate, then there must be some (perhaps very small) proportion of the objects named by the predicate term which are those objects. Hence an affirmative proposition distributes its import across some portion of the predicate; but perhaps not across a very large portion, relative to the total size of the predicate.

On the other hand, if the specified members of the subject stand in a relation of failing to belong to the predicate, then every object named by the predicate term must fail to be those objects; for if even one object named by the predicate were identical to one of the specified objects named by the subject, that would destroy the negative relation. Hence a negative proposition distributes its import across the whole of the predicate.

In the five tiered system we may assign the following distribution indices:

Distribution to all members of the class	= 5
Distribution to almost all members of the class	= 4
Distribution to most members of the class	= 3
Distribution to many members of the class	= 2
Distribution to some members of the class	= 1

Distribution to all the members of a class may be referred to as **universal distribution**. In this system universal distribution is equal to a distribution index of 5. The above assignment results in the following distribution patterns for the ten forms of categorical propositions recognized in this system.

A:	All S (5) are P (1).	E:	No S (5) are P (5).
P:	Almost all S (4) are P (1).	B:	Few S (4) are P (5).
T:	Most S (3) are P (1).	D:	Most S (3) are not P (5).
K:	Many S (2) are P (1).	G:	Many S (2) are not P (5).
I:	Some S (1) are P (1).	O:	Some S (1) are not P (5).

These values are assigned solely for the purpose of making the system work. The mathematical relations among the values (that 3 + 3 > 5, etc.) are important for systematic reasons; but, there is no further rationale for assigning these values rather than some other values. Any similar assignment of values would work just as well for our present purposes.[6]

Rules of Deductive Validity

The concept of distribution allows us to state rules by which we may identify deductively valid syllogisms. In order to be deductively valid, a syllogism must meet all four of the following rules. Breaking even one rule is enough for us to dismiss the syllogism as not deductively valid.

RULE 1: The sum of the distribution values of the middle term in the two premisses must exceed universal distribution. (A syllogism that breaks this rule is said to have an **undistributed middle**.)

RULE 2: The distribution value of the minor term in the minor premiss must be at least equal to the distribution value of the minor term in the conclusion. (A syllogism that breaks this rule is said to have an **illicit minor**.)

RULE 3: The distribution value of the major term in the major premiss must be at least equal to the distribution value of the major term in the conclusion. (A syllogism that breaks this rule is said to have an **illicit major**.)[7]

RULE 4: The number of negative premisses must equal the number of negative conclusions.[8] (A syllogism that breaks this rule is said to have broken the **rule of negatives**.)

It may be enough to know simply that these rules work to pick out deductively valid syllogisms. However, the rules may be more satisfying if we could also offer some explanation to show *why* they are successful. Let us consider the rules one at a time to see if such an explanation can be found.

Rule 1: The Middle Term Rule

The premisses of any deductively valid syllogism bring at least some of the objects named by the minor term into a relation (affirmative or negative) with at least some of the objects named by the major term. The middle term is responsible for bringing the major and minor terms into this relation. Hence at least some of the objects named by the middle term must be related to objects named both by the major term and by the minor term. If a syllogism is to be valid it must therefore be the case that the objects named by the major term and the objects named by the minor term are each related to *so many* of the objects named by the middle term that they cannot help but overlap. Hence Rule 1 requires that distribution across the middle term, by both premisses taken together, must exceed the total size of the middle term. This is not to say that we must talk about *more than all* of the objects named by the middle term; but we must guarantee that we are talking about at least some of the objects named by the middle term *more than once*. A syllogism breaks Rule 1 if the two occurrences of the middle term do not have enough distribution index points to add up to more than 5.

Examples:

Most M (3) are P. All S are M (1). All S are P.	Breaks Rule 1 because 3 + 1 = 4, and 4 is not greater than 5.
Few M (4) are P. All S are M (1). No S are P.	Breaks Rule 1 because 4 + 1 = 5, and 5 is still not greater than 5.
All M (5) are P. Most S are M (1). Most S are P.	Meets Rule 1 because 5 + 1 = 6, and 6 *is* greater than 5.
No M (5) are P. Most M (3) are S. Some S are not P.	Meets Rule 1 because 5 + 3 = 8, and 8 is also greater than 5.

Exercises:

For each of the following syllogistic forms, state whether or not it breaks Rule 1.

1. All M are P.
   All M are S.
   All S are P.

2. Many M are P.
   Almost all M are S.
   Some S are not P.

3. Few M are P.
   Almost all S are M.
   Almost all S are P.

4. All P are M.
   Most S are M.
   Most S are P.

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

6. Most M are P.
   Most M are S.
   Most S are P.

Rule 2: The Minor Term Rule

Again, the premisses of any deductively valid syllogism bring at least some of the objects named by the minor term into a relation (affirmative or negative) with at least some of the objects named by the major term. The conclusion does no more than restate, or summarize, the premisses; though a conclusion may understate, or weaken, the premisses. If the conclusion is to be at most a restatement of the premisses, it cannot validly talk about more of the objects named by a term than the premisses do. Hence, to whatever extent the import of the premisses has been distributed across the minor term, so may the import of the conclusion be distributed across the minor term, *but not to any greater extent.*

Hence Rule 2 requires that distribution across the minor term in the minor premiss be at least as great as distribution across the minor term in the conclusion. A syllogism breaks Rule 2 if the distribution index of the minor term in the conclusion is greater than the distribution index of the minor term in the premisses.

Examples:

No M are P. Most S (3) are M. No S (5) are P.	Breaks Rule 2 because 5 is greater than 3.
No P are M. Most S (3) are M. Most S (3) are not P.	Meets Rule 2 because 3 is not greater than 3.
No M are P. All S (5) are M. Most S (3) are not P.	Meets Rule 2 because 3 is also not greater than 5.

Exercises:

For each of the following syllogistic forms, state whether or not it breaks Rule 2.

1. Most M are P.
   Most S are M.
   Some S are P.

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

3. Few M are P.
   Most M are S.
   Some S are P.

4. Many P are M.
   Almost all M are S.
   Many S are P.

5. All M are P.
   Most S are M.
   Almost all S are P.

6. No Pare M.
   Almost all S are M.
   Few S are P.

Rule 3: The Major Term Rule

The same explanation that applies to the minor term applies *mutatis mutandi* to the major term. A syllogism breaks Rule 3 if the distribution index of the major term in the conclusion is greater than the distribution index of the major term in the premisses.

Examples:

All M are P (1). Most S are not M. Most S are not P (5).	Breaks Rule 3 because 5 is greater than 1.
No M are P (5). Most S are M. Most S are not P (5).	Meets Rule 2 because 3 is not greater than 3.
All P (5) are M. All M are S. Some S are P (1).	Meets Rule 2 because 3 is also not greater than 5.

Exercises:
For each of the following syllogistic forms, state whether or not it breaks Rule 3.

1. Almost all M are P.
   Some M are not S.
   Some S are not P.

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

3. Most M are P.
   Some S are M.
   Some S are P.

4. Almost all P are M.
   No M are S.
   Few S are P.

5. Most M are not P.
   Most M are not S.
   Most S are not P.

6. Some P are not M.
   Many M are S.
   Some S are not P.

Rule 4: The Rule of Negatives

Rule 4 actually captures, in a single principle, three separate (but related) facts about valid syllogisms:

(1) A valid syllogism with an affirmative conclusion has no negative premisses (and a valid syllogism with no negative premisses must have an affirmative conclusion).

(2) A valid syllogism with a negative conclusion has one and only one negative premiss (and a valid syllogism with a negative premiss must have a negative conclusion).

(3) No valid syllogism has two negative premisses.

An affirmative proposition states that objects named by the subject term stand in the relation of belonging to the predicate term. A negative proposition states that objects named by the subject term stand in the relation of *failing* to belong to the predicate term. Of course, whichever relation is established in the premisses, that same relation must be restated in the conclusion. If the premisses establish only the relation of belonging (because both are affirmative) then the conclusion cannot assert the relation of failing to belong (by being negative). Hence a syllogism with affirmative premisses must have an affirmative conclusion; and vice versa, a syllogism with an affirmative conclusion must have only affirmative premisses.

On the other hand, when the relation of failing to belong has been established in one of the premisses, that relation can be extended (by an affirmative proposition) to a third class whose members also belong to one of the first two. A negative conclusion (asserting that objects named by the minor term fail to belong to the major term) must have one negative premiss (to establish the relation of 'failing to belong', and an affirmative premiss (to extend that relation to the other of the two terms). Hence a syllogism with a negative conclusion must have one and only one negative premiss; and vice versa, a syllogism with a negative premiss must have a negative conclusion.

Finally, while the relation of 'failing to belong' may be extended to objects in a third class that also belong to one of the first two, the relation of failing to belong cannot be extended to objects of a third class that *fails* to belong to either of the first two. Nor can two relations of 'failing to belong' be used to cancel each other out (to produce an affirmative relation). Hence no relation between major term and minor term (either affirmative or negative) can be established by noting that their members fail to belong to the middle term. Hence no valid syllogism has two negative premisses.

A syllogism breaks Rule 4 if (a) there is a negative conclusion, but no negative premiss; (b) there is one negative premiss, but the conclusion is affirmative; or (c) there are two negative premisses. But the easy way to use Rule 4 is simply to count the total number of negative conclusions. (The answer must be either 0 or 1, since there is only one conclusion to count.) Then count the total number of negative premisses. (The answer must be either 0, 1, or 2.) These two numbers must be exactly equal. (Close only counts in horseshoes.) If they are not, Rule 4 is broken.

By the way, students sometimes make the mistake of thinking that, just as negative premisses must be reflected in the conclusion, the same rule must also apply to affirmative premisses and conclusions. This is obviously a mistake. Rule 4 says nothing about *affirmative propositions*. However, it would be possible to give an alternative version of Rule 4 for affirmatives: the number of affirmative premisses must be one greater than the number of affirmative conclusions.

Examples:

No M are P. No S are M. No S are P.	Breaks Rule 4 because there are two negative premisses. 2 is not equal to 1.
No M are P. Most S are M. Most S are P.	Breaks Rule 4 because there is one negative premiss, but the conclusion is not negative.
All P are M. All M are S. Some S are not P.	Breaks Rule 4 because there are no negative premisses, but the conclusion is negative.
No P are M. All S are M. No S are P.	Meets Rule 4 because there is one negative premiss and one negative conclusion.
All M are P. Most S are M. Most S are P.	Meets Rule 4 because there are no negative premisses and no negative conclusion.

Exercises:
For each of the following syllogistic forms, state whether or not it breaks Rule 4.

1. All P are M.
   All S are M.
   All S are P.

2. No M are P.
   No M are S.
   No S are P.

3. Almost all M are P.
   Almost all M are S.
   Some S are not P.

4. Few Pare M.
   Many S are M.
   Some S are P.

5. Most P are M.
   Most S are not M.
   Some S are not P.

6. Many P are not M.
   Most M are not S.
   Many S are P.

Valid and Invalid Syllogistic Forms

Remember that a syllogism must meet all four rules to be counted as valid. Breaking even a single rule renders the syllogism invalid.

Examples:

All M are P. Most S are M. Most S are not P.	Invalid because it breaks Rule 3 and Rule 4.
No M are P. Many S are M. Most S are not P.	Invalid because it breaks Rule 2.
All P are M. Most S are not M. Most S are not P.	Valid because all four rules are met.

Exercises:
State whether the following syllogistic forms are valid or invalid. If they are invalid, state the rule or rules that they break.

1. All P are M.
   All M are S.
   All S are P.

2. Many M are not P.
   Almost all M are S.
   Some S are not P.

3. Many M are P.
   Many S are M.
   Some S are P.

4. Few Pare M.
   Many S are not M.
   Many S are not P.

5. Few M are P.
   Some M are S.
   Some S are not P.

6. Many P are M.
   All M are S.
   Some S are P.

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

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

9. All M are P.
   Some S are M.
   All S are P.

10. Many M are P.
    Many S are M.
    Most S are not P.

Notes

[1]This account of figure is defended in N. Rescher, *Galen and the Syllogism*, University of Pittsburgh Press, Pittsburgh (1966), pp. 24-25, and in D. J. Hadgopoulos, "The principle of the division into four figures in traditional logic," *The Notre Dame Journal of Formal Logic*, Vol. 20, No. 1 (January, 1979), pp. 92-94. However, the term 'proper place' is my own invention.

[2]The formula for calculating the number of possible syllogistic forms in any given system is as follows. Let 'n' be the number of permitted quantification levels in that system. (In the five-tiered system,

n = 5.) The number of possible categorical forms will, of course, be two times that number, since each level may be either affirmative or negative. The number of possible syllogistic forms = $(2n)^3 \cdot 4$. The cube comes from the fact that a syllogistic argument has precisely three propositions. The multiplication by four accounts for the four possible figures.

[3]There is also a formula for calculating the number of valid syllogistic forms in each system. Again, let 'n' be the number of permitted quantification levels in that system. The number of valid syllogistic forms = $6(n!) + 3n$.

[4]There has been some recent controversy over the concept of distribution. Some philosophers argue that distribution is a meaningless notion, though it may be used mechanically to give the right results. Others argue that the notion gives the right results and is meaningful. The chief critic of the classical doctrine has been P. T. Geach in *Reference and Generality*, Cornell University Press, Ithaca, N.Y., 1962, and in "Distribution: a last word?" *Logic Matters*, Blackwell, Oxford, 1972. Defending the classical doctrine we have F. Sommers, "Distribution matters," *Mind*, Vol. 84 (1975), pp. 27-46, B. Katz and A. P. Martinich, "The distribution of terms," *The Notre Dame Journal of Formal Logic*, Vol. 17, No. 27 (April, 1976), pp. 279-283, and F. Wilson, "The distribution of terms: a defense of the traditional doctrine," *The Notre Dame Journal of Formal Logic*, Vol. 28, No. 3 (July, 1987), pp. 439-454.

[5]The term 'distribution index' was coined by Robert Carnes and first used in Philip L. Peterson and Robert D. Carnes, *The Compleat Syllogistic*, an unpublished manuscript that was made available privately to interested scholars. Carnes also developed the system of assigning distribution values used here. At about the same time, I independently developed a functionally similar system, using the values 0 through 4, which I abandoned as soon as I became aware of Carnes' approach. The chief virtue of Carnes' system is that, by assigning '1' rather than '0' to Particular subjects (and affirmative predicates), his system recognizes the important idea that every term in every categorical proposition is distributed to at least *some* extent. My approach did not adequately capture this idea.

[6]George Englebretsen has suggested to me that the following system should be adopted:

distribution to all members of the class	= -1
distribution to almost all members of the class	= -1/2
distribution to most members of the class	= 0
distribution to many members of the class	= 1/2
distribution to some members of the class	= 1

This system has two important virtues. The first is that it would allow us to replace the first three Rules of Validity (see below) with a single rule: After multiplying each term by its distribution value, the algebraic sum of the premisses must be less than or equal to the conclusion. The second, and more important virtue, is that this should eventually allow the system of proportional quantifiers to be extended to relational logic. See George Englebretsen, ed., *The New Syllogistic*, Peter Lang Publishers, New York, 1987.

[7]Rules 2 and 3 are so similar to each other that most modern authors simply combine them into a single rule. I prefer to keep them separate, both because this conforms more closely to the medieval terminology of 'illicit minor' and 'illicit major', and also because there really are, in my mind at least, two psychologically distinct activities involved, namely, 'checking the minor term' and 'checking the major term'.

[8]This formulation of the Rule of Negatives can apparently be credited to James T. Culbertson, *Mathematics and Logic of Digital Devices*, Van Nostrand Company, Princeton, N.J., 1958, p. 99. A number of other authors have also adopted this formulation.