NOTES ON THE NEW SYLLOGISTIC

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One of the most exciting events in the logical studies of recent years has been F. Sommers' development of an extended and strengthened syllogistic logic of terms [1]. This work deserves to be examined by every philosopher interested in the field of logic regardless of his own «philosophy of logic.» In this essay we will look at two traditional problem areas for syllogistic — the doctrine of term distribution and the notion of existential import. A preliminary brief look at the law of identity will help us in getting clear in both these areas.

The Law of Identity

Aristotle nowhere formulated, as far as we know, the «law of identity.» If he had, however, it is likely that he would have offered several versions (as he did for the «laws of non-contradiction and excluded middle»). It could be: everything is what it is. Or: everything is identical with itself; or: every proposition is logically equivalent to itself. The most helpful versions of the so-called laws of thought are those which take them as metalogical statements. They state special truth conditions for simple propositions or simple propositional pairs *solely on the basis of their logical forms.* We will say something about the form of a proposition in Sommer's logic and then offer an appropriate formulation of the law.

(1) See: «On a Fregean Dogma,» *Problems in the Philosophy of Mathematics,* ed. I. Lakatos (Amsterdam, 1967); «Do We need Identity ?» *Journal of Philosophy* 66 (1969); «The Calculus of Terms,» *Mind* 79 (1970); «Existence and Predication,» *Logic and Ontology,* ed. M. K. Munitz (N. Y., 1973); «Distribution Matters,» *Mind* 84 (1975); «The Logical and the Extra-Logical,» *Boston Studies in the Philosophy of Science,* 14 (1973); «Logical Syntax in Natural Language,» *Issues in the Philosophy of Language,* ed. A. MacKay and D. Merrill (Oberlin, 1976).

With Aristotle, Sommers holds that all propositions are either categorical or translatable into categoricals. Such propositions have exactly one subject and one predicate. A subject is a term (simple or complex) modified by quantity. A predicate is a term (simple or complex) modified by one of two modes of predication. The two modes of quantification are universal and particular. The two modes of predication are affirmation and denial. Any term may be negated or unregated. Any term may be found in either the subject or the predicate. Terms outside of subjects and predicates are logically homogenous. Individual terms are terms. An individual (singular) proposition is one whose subject term is an individual term. Such terms may be quantified either universally or particularly, since in such cases the two quantifications are logically indiscernible. A proposition whose subject and predicate terms are both individual is one of identity or nonidentity.

Here are some examples:

1. *All men are animals.*

Here the subject is 'all men'; the predicate is 'are animals'; the subject term is 'men'; the predicate term is 'animals'; the quantifier is the universal 'all'; and the mark of predication is the affirmative 'are'. The entire proposition is a universal affirmation.

2. *Some boys are unclean.*

Here the subject is 'some boys'; the predicate is 'are unclean'; the subject term is 'boys'; the predicate term is 'unclean' (the negation of 'clean'); the quantifier is the particular 'some'; and the mark of predication is 'are'. It is a particular affirmation.

3. *Whales aren't fish.*

The quantifier here is understood as 'all'; the subject then, is 'all whales'; the predicate is 'aren't fish'; the subject term is 'whales'; the predicate term is 'fish'; and the mark of predication is 'aren't'. It is a universal denial.

4. *Dogs do not fly.*

Again the quantifier is understood as 'all'. Here the mark of predication is 'do not'. It is a universal denial.

5. *Babies are crying.*

In this particular affirmation the quantifier, 'some', is understood.

6. *Socrates is wise.*

Since the subject term here is the singular 'Socrates', the hidden quantifier is arbitrary ('all or some'). It is a singular affirmation.

7. *Jones runs.*

In this singular affirmation the mark of predication is the hidden 'does'.

8. *Shakespeare is Bacon.*

Here the predicate is 'is Bacon'. Since both subject and predicate terms are individual it is a proposition of identity. (Identities are affirmations; nonidentities are denials).

Sommers has developed an ingeniously simple symbolization for categoricals. Terms are symbolized by letters. Negative terms are preceded by '—'. The subject term of an affirmation is followed by '+'. The subject term of a denial is followed by '—'. Universal quantification is indicated by '—'. Particular quantification is indicated by '+'. We can formulate the general form of any categorical, then as

$$\pm (—)S \pm (—)P$$

Where '±' means '+ or —' and parenthetical marks may be omitted. The formula reads: 'All or some (non)S are or aren't (non)P'.

Of course, what we have offered is only a rough and ready, incomplete sketch of Sommers' theory of propositional form. But, it will suffice to allow us now to formulate the law of identity. The law says: any affirmation whose subject and predicate terms are indiscernible is true. Thus, any proposition of the following general form is true by virtue of that form (i.e. is formally true).

$$\pm A + A$$

Any proposition whose form is given by the above formula is true. Examples are: 'All men are men', 'Some men are men', 'Men are Men', 'Fliers, fly', 'All nonconformists are nonconformists', and 'Socrates is Socrates' ([2]).

([2]) Both the universal and particular forms here were taken as axiomatic by Jan Lukasiewicz in his *Aristotle's Syllogistic* (London, 1957). Sommers (in «Distribution Matters») rejects the axiomatic status of the particular form. However, he goes on to admit that they may be used as the suppressed premises of weakened inferences. Thus, using traditional syllogistic rules, we can derive 'some A is B' from 'all A is B' by admitting the hidden premise 'some A is A'. But since 'some A is A' is not a logical truth, such weakened inferences are not, according to Sommers, universally valid. Sommers provides the following counter-argument to show this.

1. some A and B is A and B	premise
2. some A and B is B	from 1
3. some A is B	from 2

Since 3 is not a logical truth, what it is derived from, 1, cannot be a logical truth. But 1 is an instance of 'some A is A'. So 'some A is A' is not a logical truth.

Nevertheless, this argument against the logical truth of 'some A is A' will not work. While it is easy to justify the move from 1 to 2, there is no justification at all for the move from 2 to 3. For example, we can say that something which is a square and round is round, but not that some square is round. There seems to be no sound reason against taking 'some A is A' to be a logical truth. Since, from the traditional logical point of view 'some' carries no «existential import» there could never be a false instance of a sentence having the form 'some A is A'. Indeed, we could say that according to the traditional «law of identity» any affirmation whose subject and predicate terms are identical is logically true.

Distribution

The theory of distribution, incorporated in both the classical syllogistic and Sommers' newer logic of terms, says that in a given proposition a term, T, is distributed if and only if a universal proposition with T as its subject term can be derived from that given proposition. The subject terms of all universal propositions are distributed. The predicate terms of all denials are distributed. Terms not distributed are said to be undistributed.

The notion of distribution gives rise to certain validity rules for inferences: (1) the middle term must be distributed in at least one premise and (2) a term distributed in the conclusion must be distributed in a premise. However, the doctrine of distribution has its enemies. A variety of arguments against distribution have been employed, not the least effective of which has been the following counterexample.

All S is P
Therefore: some nonS isn't P

This is well known te be a valid inference. By a brief series of easy conversions, obversions, etc. we can pass from the premise to the conclusion. Yet one of our validity rules based on distribution is broken. The term P is distributed in the conclusion, since it is the predicate term of a denial; but it is undistributed in the premise, since there it is the predicate term of an affirmation. It seems that we must reject either the validity of this inference or the doctrine of distribution.

Since the argument depends upon allowing the introduction of a negative term (the 'nonS' of the conclusion), N. Rescher has tried to argue that we can keep distribution but must restrict a logic of categoricals to propositions without any negative terms (3). P. Geach, on the other hand, has chosen to accept the validity of the argument and reject distribution (4).

(3) *Essays in Philosophical Analysis* (Pittsburgh, 1969), pp. 65-71.
(4) *Logic Matters* (Oxford, 1972), pp. 62-64.

In *Formal Logic* Keynes [5] had tried to argue that we could have both the validity of such inferences and distribution as well by taking those inferences to have a tacit premise: 'Not everything is P'. I think Keynes was correct insofar as we can have both the validity of such inferences and distribution by taking those inferences to have a certain hidden premise. But I think he got that premise wrong.

From a formal point of view, no proposition should be admitted as a hidden, assumed premise unless it is formally true. Indeed, in ordinary discourse we leave out certain premises only when we take them to be so obviously true that they need not be explicitly stated. Keynes' tacit premise is not a formal truth. In fact, if in our argument we let P be 'self-identical', then Keynes' premise says 'Not everything is self-identical'. If this is not false its formal truth at least, is questionable.

I believe the hidden premise needed here is one which has a form governed by the law of identity. Sommers has said that an inference can be valid only if (a) all premises and the conclusion are universal or the conclusion and exactly one of the premises are particular, and (b) the sum of the premises is algebraically equal to the conclusion. For example, in

$$\begin{array}{r} -S+M \\ -M+P \\ \hline {}^{\ast}_{\ast\ast}\,-S+P \end{array} \qquad \begin{array}{r} +S+M \\ -M+P \\ \hline {}^{\ast}_{\ast\ast}\,+S+P \end{array} \qquad \text{and} \qquad \begin{array}{r} +S+M \\ -P-M \\ \hline {}^{\ast}_{\ast\ast}\,+S-P \end{array}$$

conditions (a) and (b) are both fulfilled so that the three arguments are formally valid. In

$$\begin{array}{r} +M+P \\ +S-M \\ \hline {}^{\ast}_{\ast\ast}\,+S+P \end{array}$$

condition (b), but not (a), is fulfilled. So it is not formally valid. And

(5) (London, 1906).

$$\begin{array}{l} -S+M \\ -P+M \\ \hline \therefore -S+P \end{array}$$

is formally invalid since (a) but not (b) is fulfilled.

We can formulate the counter-argument given earlier as follows:

$$\begin{array}{l} -S+P \\ \hline \therefore +(-S)-P \end{array}$$

By introducing the tacit premise 'Some nonP is nonP' we get

$$\begin{array}{l} -S+P \\ +(-P)+(-P) \\ \hline \therefore +(-S)-P \end{array}$$

This is a formally valid argument which satisfies both conditions (a) and (b) and our doctrine of distribution. The new premise is innocent (formally true) since it has one of the forms (viz. $+A+A$) governed by the law of identity. In the new argument the term distributed in the conclusion, P, is distributed in the new premise also. To show this we must add to our theory of distribution the simple, innocuous, and obvious rule that the negation of a distributed/undistributed term is itself undistributed/distributed. In '$+(-P+(-P)$', since $(-P)$ is undistributed, its negation, P, is distributed. So, while P is undistributed in the first premise, it can be distributed in the conclusion since there is a second (hidden) premise in which it is distributed.

Existential Import

The problem of existential import can be handled in a way very similar to the one just employed for the problem of distribution. From the point of view of most contemporary logicians, a universal proposition need not imply a corresponding particular proposition. For example, it is claimed that 'Some S are P' does not logically follow from 'All S is P'. Because classical logic allows immediate inferences such as

All S are P
Therefore: some S are P

and

No S are P
Therefore: some S aren't P

it is charged with making sense only on penalty of accepting the «existential import» of universal propositions. The charge is, in effect, that such inferences must assume that for the subject term of the premise of such an inference there must *exist* something satisfying that term. Thus, they say,

All S are P
Therefore: some S are P

holds only if we assume 'Some S exists'.

Now, as a matter of fact, given contemporary accounts of the logic of categoricals, such existential assumption are indeed required. I will only mention that this is due, partly at least, to the fact that such logicians give an *existential reading* to the particular quantifier but not to the universal quantifier. At any rate, no matter what assumption mathematical logicians need to make in accepting such inferences, I want to show that for a syllogistic such as Aristotle's or Sommers', while an assumption must be made, it is clearly not «existential».

The following argument (6) is meant to show that the syllogistic must accept existential import. The claim is that this

(6) See B. Russell, «Aristotle's Logic,» in *Essays in Logic*, ed. R. Jager (Englewood Cliffs, New Jersey, 1963).

argument is not valid unless 'There are Greeks' is assumed as a hidden premise.

All Greeks are men
All Greeks are white
Therefore: some men are white

With Sommers' system of formalization we can symbolize this to give us the general form

$$
\begin{array}{l}
-G+M \\
-G+W \\
\hline
\therefore +M+W
\end{array}
$$

As it stands the argument is indeed invalid. It fails to satisfy either condition (a) or condition (b) in Sommers' system. If such an argument is to be valid, and our ordinary intuitions at least tell us it is, then there must be a tacit premise. The critics of syllogistic claim that the assumption being made is 'Something is Greek' or 'Some Greek exists'. But, to repeat what I have said before, from a formal point of view, no premise should be admitted as a hidden, assumed premise unless it is formally true. Yet who among us will claim such existential propositions as 'Some Greek exists' to be formally true ?

The hidden premise must be one which is itself formally true and which makes the given argument formally valid (it must render an argument satisfying conditions (a) and (b)). There is one such proposition: '+ G + G', 'Some Greeks are Greeks'. With it our argument is

$$
\begin{array}{l}
-G+M \\
-G+W \\
+G+G \\
\hline
\therefore +M+W
\end{array}
$$

Our premises are algebraically equal to the conclusion. The conclusion and exactly one premise are particular. And the assumption is formally true by the law of identity.

Russell claimed that in modern times most scientific advances have been «made in the teeth of opposition from Aristotle's disciples.» I believe that further study of Sommers' new syllogistic will provide at least one example of progress because of one of Aristotle's disciples.

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