THE SYLLOGISM ON THE NEGATIVE-ENTAILING INTERPRETATION OF AFFIRMATIVE PROPOSITIONS

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In 1954 I published an article(¹) about the following two sets of rules for the syllogism:

1. If both premises are negative, then there is no conclusion.
2. If one premise is negative, then the conclusion is negative.
3. If both premises are universal, then the conclusion is universal.
4. The middle term must be distributed at least once.
5. Any term distributed in the conclusion must be distributed in the premises.

1'. If both premises are particular, then there is no conclusion.
2'. If one premise is particular, then the conclusion is particular.
3'. If both premises are affirmative, then the conclusion is affirmative (the converse of 2, above).
4'. The middle term must be undistributed at least once (i.e., it cannot be distributed twice).
5'. Any term undistributed in the conclusion must be undistributed in the premises. (Thus any term, other than the middle term, distributed in the premises must be distributed in the conclusion.)

These sets both presuppose that universal propositions are interpreted hypothetically. If we want a set of rules applicable to the existential interpretation of universal propositions, we may simply substitute 3' for 3; the result is pretty much the standard set for the existential interpretation.(²) But what happens when we substitute 3 for 3' in 1'-5'? The list of valid moods is expanded by the addition of some with two affirmative premises and a negative conclusion. Is there any interpretation of propositions on which such deviant moods are reasonable?

The essence of the existential interpretation of universal propositions is that $A \supset I$ and $E \supset O$, I and O being particular propositions, we could call this interpretation «the particular-entailing interpretation of universal propositions.» The entailments $A \supset I$ and $E \supset O$ follow from the extension of the relevant rules to «immediate inferences.» Thus «No S is P $\supset$ Some S is not P» satisfies Rule 5, although its converse does not.

The essence of the interpretation we now seek is that $A \supset E$ and $I \supset O$. Let us call this interpretation «the negative-entailing interpretation of affirmative propositions.» The entailments $A \supset E$ and $I \supset O$ follow from the extension of the relevant rules to «immediate inferences.» Thus «All S is P $\supset$ No S is P" satisfies Rule 5′, although its converse does not; on this interpretation it is false that $E \supset A$, and also that $O \supset I$.

The purpose of the two sets of rules in 1954 was to exhibit a group of dualities. «Undistributed» and «distributed» are thus duals one of the other; «affirmative» and «universal» are duals; so are «negative» and «particular.» We obtain one set of rules from the other and theorems from one set from theorems from the other by substituting duals for duals throughout. We now have ascertained the dual of «the existential (or particular-entailing) interpretation of universal propositions»; namely, «the negative-entailing interpretation of affirmative propositions.»

The existential interpretation of universal propositions adds 9 moods to the 15 which are valid on the hypothetical interpretation. The negative-entailing interpretation of affirmative propositions will likewise add 9 moods; e.g., AAE in the first figure and AIO in the fourth. None of the distribution rules stipulated in 4′ or 5′ is violated by any of these new moods, although of course 4 or 5 might be violated.

Euler diagrams suit better than Venns to model the relations among propositions on the negative-entailing interpretation. On this interpretation, no class includes another; classes can only intersect or exclude one another, as the following diagram shows:

Here we see that I(AB) implies O(AB) (and, for that matter, O(BA), since of course I(AB) ≡ I(BA).) Likewise for B and C. E(AC) is, as here depicted, true. Since all A-propositions are false, including

A(AC), we have the result that A(AC) implies E(AC), while $E \supset A$ is false, as likewise is $O \supset I$. This is a nightmare world in which the task of classification is impossible. It is the antithesis of Aristotle's world. (3)

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(1) «An Alternate Set of Rules for the Syllogism,» *Philosophy of Science*, Vol. 21, No. 4, October, 1954, pp. 348-351.

(2) Merely to drop 3 is insufficient, since in the absence of 3 we need to insure affirmative conclusions from pairs of affirmative premises. (In the presence of 3, we can derive this result as a theorem from 1-5; see *op. cit.*, p. 349.)

(3) For suggestions on this essay I am indebted to my colleagues Professors Robert G. Price and Carl G. Vaught.