164
Notre Dame Journal of Formal Logic
Volume XVIII, Number 1, January 1977
NDJFAM

CLASSICAL LOGICAL RELATIONS

A. J. BAKER

The logical relations of classical logic—i.e., the five relations based on the square of opposition together with equivalence and independence—are usually assumed, in logic textbooks and elsewhere, to be familiar and easily defined, but in fact standard discussions of these relations are always imprecise on vital points. I want to illustrate this and then go on to discuss the precise nature of the relations.

David H. Sanford has recently drawn attention to one source of difficulty.[1] Many textbooks, he argues, are inconsistent in their treatment of contraries and subcontraries in that they fail to allow for the distinction between contingent and noncontingent propositions. For example, two propositions are said to be contraries if and only if they cannot both be true but can both be false. If, however, we happen to have a necessarily true proposition of the form "All *a* are *b*", it appears that this proposition and its contrary cannot *both* be false, which goes against the stated conditions for the relation.

But textbook formulations of the other relations also create problems. As an example I will refer to M. R. Cohen and E. Nagel's well-known work, *An Introduction to Logic and Scientific Method*, which contains (Chapter III) the fullest account of logical relations I have been able to locate. Later books, so far as I can discover, have not cleared up the problems that arise. Cohen and Nagel list nine possible relations and in each case specify *two* conditions for the relation. For example, the conditions for contradictory relation are given as "If *p* is true *q* is false. If *p* is false *q* is true", and the conditions for contrary relation as "If *p* is true *q* is false. If *p* is false *q* is undetermined". Cohen and Nagel's list contains two more relations than the standard seven and in explanation of this they claim that three of their relations are of the same type, independence. The sets of conditions they give for these three relations are as follows (pp. 55-56):

1. "Contraries and subcontraries," *Noûs*, vol. II (1968), pp. 95-96.

Received February 4, 1974