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Generalized Quantifiers and the Square of Opposition

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1 Introduction Work by Rescher and Gallagher [11], and more recently by Geach [5], Peterson [9], Thompson [12], and Peterson and Carnes [10], provides strong evidence that syllogistic logic and the method of Venn diagrams can be extended to accommodate sentences of such forms as

(1.1) Almost all *S* are *P*
Most *S* are *P*
Many *S* are *P*
Few *S* are *P*.

This suggests that we should be able to modify the first-order predicate calculus to provide for renderings of such sentences, and of arguments involving such sentences. Recently Barwise and Cooper [2] have given the formal syntax and semantics for a family of such modifications. In this family of languages, as in the other works cited above, 'almost all', 'most', 'many', and 'few' are treated as quantifiers analogous in certain important respects to 'all' and 'some'. But Barwise and Cooper, unlike the other authors cited, do not treat these as mere ad hoc additions to our stock of quantifiers. Instead they treat them as merely a few from among an indefinitely large class of quantifiers, including 'the' (in its use in definite descriptions), 'both', 'at least seven', 'infinitely many', 'all but three', 'with at most three exceptions', and a host of others.

The generality of the treatment given by Barwise and Cooper suggests that if we are to continue to explore the logical properties of generalized quantifiers as viewed from a perspective like that of traditional logic then we should no longer be content to do so piecemeal. There are, in fact, strong reasons for studying generalized quantifiers from a traditional perspective, for (as we shall

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