

John P. Cleave, *A Study of Logics*. Oxford Logic Guides 18, Clarendon Press, Oxford, 1991. xiii + 417 pp.

Reviewed by

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There is much to learn and to enjoy in Cleave's *A Study of Logic*. It is a rich source of mathematical results useful in the study of systems of formal logic, and a good introduction to a particular view of formal logic. In this review article, I will give an overview of the material covered in the book, placing it in the context of other work in the area; then I shall comment more critically on some of it. None of these criticisms cast doubt on Cleave's general project, but rather, indicate directions in which it could be pursued, and made more general.

1. Scope.

In this book Cleave seeks to find unity in the diverse landscape of systems of logic. The unifying theme of the work is the claim that the consequence relation (between sets of formulæ and formulæ) is central in the study of systems of logic. So, the work stands firmly in the tradition of Tarski's original work in axiomatising consequence relations and developing logic from that standpoint [Tar56, Chapter 5].

Cleave starts with a discussion designed to motivate the plural nature of logic. He gives a clear exposition of the place of logical systems in science. He is critical of positivism, which takes scientific theories to be simple applied axiomatic theories. On the contrary, Cleave argues, scientific theories are much richer and more varied, involving an observation language (which he takes to be naturally associated with a three-valued logic, because not all observation is definite), correlative definitions which relate observation to theoretical entities, and an abstract calculus which gives structure to the theoretical entities. At this abstract stage many different logical calculi may be useful. Theories of necessity or many-valued logics (or formalisms such as quantum logic) may be important in manipulating theoretical entities.