

(or inclusion) relations until a later stage of the inquiry. Generalizations of this kind are not considered in any other elementary text.

To sum up, we have in this book by Bennett and Baylis a textbook on logic, designed for presentation to beginners, and intended as an introduction to modern mathematical, as well as to traditional formal logic. This is a difficult expository problem; and one for which a thoroughly satisfactory solution has not yet been found by anyone. That the book should, under these circumstances, be something of a compromise, is perhaps inevitable. The reviewer has criticized it from an ideal point of view, with reference to the goal to be attained—which, by the way, is of some importance for mathematics; these criticisms are to be taken not as pointing out defects in this book but as suggesting ways in which the next approximation to the goal can be improved. The text is one of great merit; most of the criticisms here made would apply to any similar book the reviewer knows of.

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The Theory of Group Characters. By D. E. Littlewood. Oxford University Press, 1940. 8+292 pp.

The theory of group representations and group characters has already been treated very recently in the comprehensive expositions of Hermann Weyl's *The Classical Groups*,¹ and F. D. Murnaghan's *The Theory of Group Representations*. We now have a third treatment. All three differ not only in emphasis but also in the spirit² of their approach to the subject.

Littlewood's book is intended by him to give "a simple and self-contained exposition of the theory³ in relation to both finite and continuous groups, and to develop some of its contacts with other branches of pure mathematics such as invariant theory and the theory of symmetric functions." Thus the first fifty-two pages of his text are devoted to an exposition designed to make it self-contained. Chapter I consists mainly of a discussion of the classical canonical form of a matrix under similarity transformations, the properties of unitary, orthogonal and real orthogonal matrices, the reduction of Hermitian matrices under unitary transformations, and the definition of direct product. Chapter II presents the concept of an algebra and its regular representations, the consequent definition of trace, and the further topics necessary for an understanding of the property

¹ Reviewed in this Bulletin, vol. 46 (1940), pp. 592-595.

² Cf. Footnote 4.

³ Of group *characters*, not of group representations.