follow Fisher, ANOVA should be mainly concerned with a statistical analysis. The definition of models for which variances are to be analyzed should at least include what is often referred to as Eisenhart's models I, II and III, both "balanced" and "unbalanced," since they fit into the framework of analyzing variances, and are useful in modelling real world situations.

REFERENCES

FISHER, R. A. (1924). On a distribution yielding the error functions of several well known statistics. *Proc. Internat. Math. Congr., Toronto* 805–813.

FISHER, R. A. (1928). The general sampling distribution of the multiple correlation coefficient. *Proc. Roy. Soc. London Ser. A* **121** 654–673.

GRAYBILL, F. A. and HULTQUIST, R. A. (1961). Theorems concerning Eisenhart's model II. *Ann. Math. Statist.* **32** 261–269.

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Dr. Speed is to be congratulated on the work that is surveyed here. He has sought to describe the basic framework for balanced designs and, moreover, has, with collaborators, elucidated the complex structure consequent on nesting and the proper analysis following from that structure.

What one can argue about, however, is the appropriateneess of the title ANOVA for only this class of structures. Of course, once one begins to abstract it is difficult to know where to stop. Fourier methods provide an example. But in the present situation the position is somewhat reversed and cases are left out in the cold which to the people who regard analysis of variance as rather down to earth (and what could be more down to earth than a field experiment?) are near to the center of the idea. When a subset S of a full replication T is considered in Speed (1985), then it is assumed that the adjacency matrices when restricted to S continue to fulfill the requirements (4.1) in the discussion paper and, in particular, define a commutative algebra. It is interesting to observe that this algebra $\mathbf{A}$ of Section 4, is the same as that introduced in Bose and Mesner (1959) who did not, however, concern themselves with Γ but were instead concerned with the construction of partially balanced designs. (The class of objects for which the A_a are adjacency matrices are not the plots but, for Bose and Mesner, the varieties.) If the subset S is a subset constituting a partially balanced incomplete block and T corresponds to the fully replicated experiment, then the adjacency matrices of Section 4 for S will not produce a commutative algebra so that, in spite of Fisher and Yates (1948, page 19) the resulting analysis is not to be called ANOVA. The algebra $\mathbf{A}$ is often the commuting algebra of the representation of a group G by permutation of the points of T. The analysis of variance will be unique if that algebra is commutative, which is closely connected with the existence of a