

The work of Pitman (1937, 1939) showed clearly that the practice of analysis of variance need not depend on Gaussian (normal) distributions, that it made sense in much broader circumstances than those “close to Gaussian.” In my experience, most applications of the practical analysis of variance are exploratory in nature, and deserve an inherently flexible approach. Informally, those who have made, or handled, many such analyses have learned to include flexibility in such matters as how many interactions to include—and when to combine two (or more) factors into a composite factor and when to leave them separate.

The formalization of such flexibility has lagged. Green and Tukey (1960) illustrated an approach that has not been widely followed. Johnson and Tukey (1987) have now taken this flexibility several steps further. (In his nearly completed Ph.D. thesis, Johnson is taking still further steps.)

There need be no conflict between Speed’s important improvements in the mathematical description of a narrower process and the clarification and exposition of a broader one. I trust there will be none.

REFERENCES

- GREEN, B. F., JR. and TUKEY, J. W. (1960). Complex analyses of variance—general problems. *Psychometrika* **25** 127–152.
- JOHNSON, E. J. and TUKEY, J. W. (1987). Graphical exploratory analysis of variance illustrated on a splitting of the Johnson and Tsao data. In *Design, Data and Analysis by Some Friends of Cuthbert Daniel*. Wiley, New York. To appear.
- PITMAN, E. J. G. (1937). Significance tests which may be applied to samples from any populations. *J. Roy. Statist. Soc. Suppl.* **4** 119–130.
- PITMAN, E. J. G. (1939). Significance tests which may be applied to samples from any populations. III. The analysis of variance test. *Biometrika* **29** 322–335.

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REJOINDER

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... I maintain that any writer of a book is fully authorised in attaching any meaning he likes to any word or phrase he intends to use. If I find an author saying, at the beginning of his book, “Let it be understood that by the word ‘black’ I shall always mean ‘white,’ and that by the word ‘white’ I shall always mean ‘black,’” I meekly accept his ruling, however injudicious I may think it.

Lewis Carroll [cited in Gardner (1960)]

In writing about models for the dispersion matrices of arrays of random variables, which are defined by equality constraints on the entries, and calling it anova, I tried to emphasise a unity between parts of theoretical statistics which I felt was not immediately apparent. Of course, the very wide variety of sums of