BASIC language programs for one-, two-, three-, or four-factor within- and between-subjects ANOVAs for Apple II and Commodore PETs

L. HARTLEY

Murdoch University, Murdoch 6150, Western Australia

The following programs allow quite complex analyses to be carried out interactively on PET and Apple personal computers. The analyses are: (1) one-way between- and within-subjects ANOVAs; (2) two-factor between-subjects, within-subjects, or one factor between- and one factor within-subjects ANOVAs; (3) three-factor between-subjects, within-subjects, one factor between- and two within-subjects, or two factors between- and one factor within-subjects ANOVAs; and (4) four-factor between- or within-subjects ANOVAs. In all cases, computations are based on Bruning and Kintz (1977) or Winer (1971).

Program Input. The user first selects the analysis required and loads it from the magnetic tape cassette recorder in the case of PET or from the disk in the case of Apple II. Each analysis gives brief instruction on how to input data into the program. Data are stored as DATA statements in the program, enabling repeated analysis of the same data to be done with transformations and allowing data to be saved with the program on the storage device. Analysis dimensions are, however, input interactively at the start of the program, so that different parts of the data can be analyzed separately. The transformations of log, square root, and square are available interactively.

Data are stored in the conventional factorial fashion, with the lowest factor cycling fastest.

Output. Program output consists of means, mean squares, and F ratios suitably titled. Printing is conventionally to the screen, but output can be directed to an available printer as required. Computation typically takes 1 min for a 2 by 2 by 2 analysis.

Language and Computer. Programs are written in BASIC and Apple II. These dialects of BASIC are closely similar to the TANDY dialect.

Limitations. Limitations are determined by the machine memory. On the 16K PET, substantial four-way analyses can be performed, and larger ones can be carried out with more memory. Since most memory is utilized by storing and handling multidimensional arrays or matrices, this is the limiting factor. However, facilities exist on the Apple II microcomputer for clearing worked matrices without losing their results if stored in single variables. This technique can enormously extend computational facilities, although not speed. Information on this can be provided with programs if requested. Very large problems can be worked.

Availability. Complete program listings for Apple and PET are available from Laurence Hartley, Psychology, Murdoch University, Murdoch 6150, Western Australia. Prerecorded Apple disks or PET tapes are available if blank disks and tapes are forwarded to the author.

REFERENCES

- BRUNING, J. L., & KINTZ, B. L. *Computational handbook of statistics*. Glenview, Ill: Scott, Foresman, 1977.
WINER, B. J. *Statistics in experimental design* (2nd ed.). New York: McGraw-Hill, 1971.

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