ANCOM: A BASIC program for analytical comparisons among means

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Researchers frequently follow up an analysis of variance by performing analytical comparisons among means, such as trend analysis, planned or post hoc contrasts, and simple effects of an interaction. Analysis of variance programs in a number of statistical packages do not provide for the partitioning of effects into single degree of freedom terms or, at most, do so in a limited way. The program described here can perform a complete breakdown of source terms into component sums of squares and thus should serve as a useful adjunct to analysis of variance programs.

Program Description. The program is written according to the syntax of TRS-80 Level II BASIC. Differences between this and other BASIC languages are the allowable variable names and the permissibility of multiple statement lines. The program can be easily modified to conform to other BASIC language versions. The program is 160 statements long and requires 16K bytes of memory.

The program works with group means and accommodates designs with unequal group sizes. The computational formulas can be found in Keppel (1973).

Input/Output. The program is interactive and requests the specific information needed at each step. The user must input information regarding the group sizes (either a single value or individual group sizes when they vary), the group means, and up to 10 contrasts (coefficient sets) for each variable. The program will handle designs with up to four independent variables. The user is first asked to specify the variables used in the design, and he or she may later include or exclude variables from consideration in the contrast routine. Variables included in a contrast determine the variance source term to be partitioned. For example, in a four-factor design in which variables A, B, C, and D are used, including variables A, B, and C in a contrast (or set of contrasts) will partition

the variance attributable to the A by B by C interaction, whereas including all four variables will partition variance due to the A by B by C by D interaction. In a like manner, including a single variable will break down the variance due to the main effect of that variable. By recycling through the include/exclude routine, the user can break down each source term in the analysis of variance summary without the need to reenter means or coefficient sets. Each cycle provides all possible combinations of contrasts for included variables. Thus, if variables A and B are included in the source term (i.e., the A by B interaction) and the user has provided three sets of contrasts for each, a total of nine contrasts will be made (A_1B_2 , A_1B_2 , A_1B_3 , . . . , A_3B_3).

For each contrast, the output provides the coefficient set being used for each variable and a mean square value for the contrast. Next, the user is prompted to enter the appropriate error term, which may change with each contrast on terms including within-subjects variables (or one may use the last error term again, by default).¹ When the error term is entered, it is printed with the F value, and then the next contrast is begun. Finally, the user may choose to recycle and change the variables included, to alter the coefficient sets for one or more variables, or to begin a new problem, changing the means and, optionally, the coefficients. The latter feature should prove particularly useful when a design provides for more than one dependent measure.

Availability. A program listing and sample run can be obtained from either author at the following address: Psychology Department, State University of New York, Albany, New York 12222. Due to mailing and reproduction costs, please include a \$2 fee to cover the cost of copying and postage.

REFERENCE

KEPPEL, G. *Design and analysis: A researcher's handbook*. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

NOTE

1. A discussion of the appropriate error terms for various comparisons involving factors with repeated measures or for analysis of simple main effects can be found in Keppel (1973, pp. 442-455).

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