PROGRAM ABSTRACTS/ALGORITHMS

Computation of law of comparative judgment scales on a microcomputer

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The microcomputer program COMPJUDGE, described below, provides a fast and accurate means of performing CASE 3 and 5 law of comparative judgment computations (Thurstone, 1927) from raw paired-comparison or rank-order data. Tests of scale consistency and subject reliability are also given. The programs are interactive and self-documenting.

Hardware. The program was written for a Tandy Radio Shack Model I microcomputer using a TRS disk BASIC interpreter. System configuration must be a minimum 32K RAM, at least one disk drive, and the TRSDOS operating system. Hard-copy output is optional through either serial or parallel output ports. Enabling a printing option through either specialized disk-operating software or through insertion of special program statements is left to the user [e.g., insertion of the statements (POKE 16414,141:POKE 16415,5) will convert all PRINT statements to LPRINTs].

Programs. COMPJUDGE is actually a package composed of seven individual but chained programs that are menu driven. The programs permit the user to select from several input options, statistical tests, data partition alternatives, and output formats and types. All programs are written in TRS disk BASIC. A compiled machine language version is also available.

Input. Raw data may be input either from the keyboard or from a disk file created by COMPJUDGE. Data formats may include paired-comparison data (PC), rank-order data (RO), or previously computed proportion matrices (P_{jk}). In all cases, the stimuli are given identifier labels that permit rapid identification and comparison. All of the data-input routines have built-in error-trapping and correction loops.

The PC data are originally entered via the keyboard and a P_{jk} matrix is computed. Both the original raw data and the P_{jk} matrix may be saved to a sequential disk file. P_{jk} subsets may be selectively used in further computations based on a preselected level of Kendall's (1962) coefficient of consistence. Thus, the original data matrix can be adjusted for the presence of inordinate intransitivity (i.e., circular polyads).

RO data are input either from the keyboard or from a previously created sequential disk file. Again, the P_{jk} matrix is computed and can be saved. Additionally, Kendall's (1962) coefficient of concordance (W) is computed for the entire rank matrix.

Previously computed P_{jk} matrices can also be input. This program module automatically inserts decimal places in front of numerical inputs in order to speed data entering. These P_{jk} matrices may also be saved to disk files.

Output. The primary COMJUDGE output is the CASE 3 (where $r_{jk} = 0$ and $\sigma_j \neq \sigma_k$) scale values computed with and without a derived zero origin and the σ values for each stimulus (Guilford, 1954). Likewise, CASE 5 scale values (where $r_{jk} = 0$ and $\sigma_j = \sigma_k$) are derived and computed with and without a zero origin value and the associated chi-square test of goodness of fit (Mosteller, 1951). Besides the scale values, other statistics and indexes are also computed to aid in the selection of an appropriate subject subset. Besides the statistics noted above, Kendall's (1962) coefficient of agreement can be computed for any P_{jk} matrix entered or created by the program. This coefficient measures the degree to which subjects are similar in their expressed choices. However, there is no logical test of significance.

Finally, a file-merging routine permits the combination of either paired-comparison or rank-order raw data files. Merged data files may then be output as new disk files or input for scale computation.

Restrictions. The program is not dynamically dimensioned and has been predimensioned for 2,000 subjects and 22 stimuli for a 32K RAM system. Guilford (1954) and others note that not more than 20 stimuli should normally be used, however. With a few minor program statements changes, a 48K RAM system would be able to handle on the order of 22 stimuli and approximately 5,000 subjects. More stimuli can be scaled by dimensioning the number of subjects lower.

Availability. The listings of the source and/or object programs and user documentation are available from Gregory J. Buhyoff, Department of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061. Ready-to-run program requests should be accompanied by a blank 5.25-in. soft-sectored floppy disk.

REFERENCES

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- KENDALL, M. G. *Rank correlation methods*. New York: Hafner, 1962.
- MOSTELLER, F. Remarks on the method of paired comparisons: III. A test of significance for paired comparisons when equal standard deviations and equal correlations are assumed. *Psychometrika*, 1951, **16**, 207-218.
- THURSTONE, L. L. A law of comparative judgment. *Psychological Review*, 1927, **34**, 273-286.

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