COMPOSITE: A FORTRAN IV program to rearrange, standardize, transform, or code randomized or Ross-ordered paired comparison data

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It is generally desirable, when using paired comparison data collection methods, to present the stimulus pairs in some random order. Jones and Wilkinson (1973) have written a computer program, REARRANGE, which will rearrange similarity or dissimilarity judgments obtained from a randomized or counterbalanced order (Ross, 1934; Torgerson, 1958) into a standard matrix form that can be used as input to multidimensional scaling programs (e.g., TORSCA, INDSCAL, MDSCALE). COMPOSITE is an extension and refinement of this program in that it can be used for different kinds of paired comparison data—either (dis)similarities or preference data.

Options for (dis)similarities data. For (dis)similarities data, COMPOSITE can be used to rearrange the raw judgments in a manner identical to that of the REARRANGE program. That is, the judgments will be rearranged as a full symmetric matrix, the lower triangular portion of the full matrix, or in ordered vector form strung out row-wise for either the upper triangular or lower triangular portion of the full matrix. A master coordinate deck which references each paired comparison judgment by its appropriate row and column coordinates is input along with the judgments. COMPOSITE has an important addition in that the (dis)similarities matrix for each individual subject may be standardized to have a standard deviation of one and a mean equal to a value specified by the user. Such a standardization will reduce the effect of scale bias when using these data in multidimensional scaling programs. By allowing the user to specify a value of the mean for the standardized data, the program can insure the user that all cell entries in the matrix will have positive values—a necessary requirement for some multidimensional scaling programs. If data from more than one subject is input, the user can obtain an average (dis)similarities matrix based on either the raw data or the standardized values. If an average matrix from the standardized data is desired, it will have the same specified mean and a standard deviation of one.

Options for preference data. For preference data, COMPOSITE can be used to rearrange the data, transform it to skew symmetric form, or code it. These options were designed for preference strength measures obtained from paired comparison rating scale data, although other paired comparison preference data may be used. The idea is that if the preferences are measured, for example, on a 9-point rating scale and the cell entry $Data(i,j)$ in the rearranged data matrix is an eight (i.e., stimulus i has a rating of eight over stimulus j), then the transformed value for cell $Data(j,i)$ would become a two (equal to $9 + 1 - 8$). Since initially, the rearranged data takes the form of a symmetric matrix which has the same preference value in both $Data(i,j)$ and $Data(j,i)$ cells, a master

code for all $n(n - 1)/2$ stimulus pairs in the lower triangular portion of the matrix must be input as a single row in ordered vector mode [i.e., pairs (2,1), (3,1), (3,2), (4,1), ..., (n,1), ..., (n,n - 1)]. The code consists of zeros if the scale value for $Data(i,j)$ is to remain the same and $Data(j,i)$ is to be transformed, or ones if just the reverse is desired. The resultant matrix is then skew symmetric. A mean preference strength can then be obtained for each subject by averaging each column of his data matrix.

Sometimes it may be desirable to have an indifference point on the scale. For scales with an odd number of values, the indifference point may be already present—the middle point. For scales with an even number of values, the program allows the user the option of leaving the scale as it is or reducing it to the next lower odd-numbered value. Thus, if one had an 8-point scale and wished to change it to a 7-point scale, data values of 1, 2, and 3 would remain the same; 4s and 5s would become 4s; and 6s, 7s, and 8s would become 5s, 6s, and 7s, respectively.

Finally, at the user's request, a coded matrix can be obtained from the skew symmetric matrix. This coded matrix reduces the preference scale to a trichotomous variable, a form which is used in several preference scaling programs. The user specifies a numerical value for each of the following three codes: (1) column stimulus preferred to row stimulus, (2) row stimulus preferred to column stimulus, and (3) no preference.

Other options. Several other options are available in the program in that (1) the rearrange portion can deal with repeated judgments of stimulus pairs and (2) numeric subject identification fields can be used in both input and output data.

Output. Depending on the options used, the following data matrices will be printed or punched at the user's request: (1) the rearranged raw data matrices for each subject, (2) the standardized matrices for each subject, (3) the averaged data matrix—either from the raw data or the standardized data, (4) the transformed skew symmetric preference matrix for each subject, (5) the coded preference matrix for each subject, and (6) the mean stimulus scale values from the transformed matrices of each subject. All output formats for punching these matrices are specified by the user. All program parameters, input and output formats, the master coordinate deck for rearranging the data, and the master code for transforming to skew symmetric form are also printed.

Limits. The program is dimensioned to handle up to 50 subjects, 300 stimulus pairs or 24 stimuli, and two repetitions of judgments for each stimulus pair. These limits can be easily increased by the user as documented on comment cards at the beginning of the program.

Availability. A source deck may be obtained from SOUPAC Office, University of Illinois, Urbana, Illinois 61801. Complete documentation for the program is included on comments cards at the beginning of the program.

REFERENCES

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