CONCOURSE: COMPUTER PROGRAM FOR THE Q METHODOLOGIST

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Perhaps the greatest challenge facing the Q methodologist is convincing the scientific community that Q offers theoretical and methodological foundations for a science of subjectivity. Of course, in recent years there are indications that Q methodology and the idea of subjectivity are gaining acceptance. This is reflected in an increasing number of dissertations, papers, articles, and books which variously utilize Q not merely as a factor analytic device, but as a systematic approach to the study of subjectivity. Despite these efforts, however, Q methodology has not yet attained widespread acceptance, though it is surely forthcoming. For sometime to come, Q methodologists will continue to explain and defend such terms as operant subjectivity, self, and concourse, to name a few.

Another issue which is more technological than ideological, though nonetheless critical to a science of subjectivity, concerns the availability of a computer program designed specifically for the analysis of Q data. Computer programs have been used for the analysis of Q data, of course, but many of them have

Operant Subjectivity, 1980(Oct), *4*(1), 17-22.

shortcomings: Generally they either do not provide sufficient user control and are difficult to use, or they are meant to serve the purposes of both R and Q, which results in an unsatisfactory compromise.

Consequently, with the cooperation of William Stephenson we have developed CONCOURSE, a computer program that complies with the aims of Q methodology and in all essential respects satisfies the computational needs of the Q methodologist. Also, the program offers considerable control and is easy to use even for those who are unfamiliar with computers.

Students of William Stephenson may recall the ROSETTA program which performed the proper analysis of Q data, but was neither flexible nor easy to use. CONCOURSE in part draws upon ROSETTA, retaining the centroid factor method and incorporating part of the factor scoring procedure. Beyond this, CONCOURSE greatly improves upon ROSETTA to achieve greater user control and ease in operation, efficiency, and statistical accuracy.

CONCOURSE is written to compile in standard Fortran IV. There are four main routines and two utility routines executed by the program. CONCOURSE can be overlayed if desired, and the table below indicates the required core in bytes for both overlayed and non-overlayed versions using three different size requirements. The number in parentheses indicates the required core in words.

CONCOURSE is furnished in the 80 X 80 format, but can be adjusted for other size requirements. Furthermore, it is available in card form (approximately

Number of Q sorts and Statements	Overlayed	Non-overlayed
100 X 100	148 (37)	192 (48)
80 X 80	112 (28)	152 (38)
40 X 40	56 (14)	96 (24)

2000) or on tape (9 track, 800 BPI, EBCDIC, unlabeled). Six input and output devices are used by the program, three of which are used during the execution of the program as scratch disk files or tapes. A fourth is used for input, either card or disk file, and the remaining two are used for output to the line printer and cards or a disk file.

In addition to JCL cards and customary format cards, CONCOURSE requires only three command cards. The first is a Title card that permits a title to be printed on each page of output. Pages are numbered consecutively and a date routine can be used in connection with the program to print the day, month, and year on each page of output. The second command card is the Dimension card on which is specified the number of Q sorts, Q statements, factors, and the distribution of statements used in Q sorting. The third card is the Options card on which the user specifies various input, print, and punch options. Below is a brief description of some of the features CONCOURSE offers.

Variable Labels The user may input an eight character label for each variable (Q sort). Labels are used throughout all phases of the analysis. If labels are not input, the program labels variables consecutively as VAR001, VAR002, VAR003, etc.

Q Data If forced-distribution Q data are input, the program computes the mean and standard deviation all Q sorts should have. Q sorts differing from the expected mean and standard deviation are reported in an error message. If unforced data are input, the mean and standard deviation are reported for each Q sort. The data for each Q sort can be printed, which is useful for record keeping purposes and for comparison with factor scores.

Correlation Pearson product-moment correlation coefficients are computed between Q sorts; however, the major diagonal of the matrix is left blank. If desired, correlations can be separately input, there-

by avoiding the program's computational procedure. Correlations can also be provided in punched output.

Centroid Factors In *The Study of Behavior*, Stephenson discusses the appropriateness of centroid factor analysis for Q methodology and the inappropriateness of principal components and principal axes factor analysis. CONCOURSE offers only centroid factors which are computed using an iterative method of communality estimation. The iterative approach is particularly important if a small number of variables is analyzed, such as in the analysis of "single case" Q data. A maximum of nine centroid factors can be extracted. If the user does not specify a number, the number of centroids to be extracted is determined by the Guilford-Lacey criterion which is a guide to statistically significant centroid factors. Unrotated factors can be separately input, thus bypassing the program's centroid algorithm. Centroid factors can also be requested as punched output.

Residuals If desired, the program will print the last residual matrix which indicates the amount of variance remaining in the original correlations after factor extraction. In some rare situations, an analysis may require more than nine factors, such as in complex single case studies. In these situations, it would be possible to have the last residual matrix punched and resubmitted for further centroid factor analysis.

Factor Rotation Most often, Q methodologists will choose to rotate factors graphically to achieve simple structure. Thus, the program allows hand rotated factors to be input and used in the estimation of factor scores. However, CONCOURSE also incorporates varimax rotation. A maximum of nine factors can be rotated, either centroids computed by the program or unrotated factors supplied by the user. Furthermore, CONCOURSE permits multiple rotations to be performed. For example, if seven centroids are to be extracted, it is possible to receive rotations for seven-, six-, five-, four-, three- and

two-factor solutions. If multiple rotations are requested, the program does not compute factor scores for each solution. Rather, the user must decide which of the varimax rotations, if any, best represents the data and then resubmit the data for analysis and factor score estimation.

Factor Scores Factor scores are estimated using Spearman weights, which indicate the relative influence each Q sort has in determining factor scores. Unlike other programs, CONCOURSE does not split off negatively loaded variables to form separate types. Rather, negatively loaded variables contribute to the factor scores and must be interpreted in light of the positively loaded variables. Factor scores are provided in two forms: The first table gives *z* scores and ranks for each statement across all factors; the second table translates the *z* scores into pile scores (e.g., from +5 to -5). Of course, if unforced data are input, pile scores cannot be computed.

Variables are assigned to factors using a ± 0.40 rule, i.e., a Q sort is used in the estimation of factor scores only if it achieves a loading greater than or equal to ± 0.40 on one factor and less than this amount on all other factors. If a Q sort is split-loaded (i.e., achieves loadings greater than or equal to ± 0.40 on two or more factors), it is left unassigned and does not contribute to the estimation of factor scores. However, this criterion can be bypassed. A selection matrix can be input, permitting users to assign Q sorts to factors using their own criteria. Q sorts assigned to factors are designated with an asterisk in the varimax factor matrix or the rotated factor matrix supplied by the user. Factor *z* scores can be punched. Factor scores are followed by the factor correlation matrix.

Statement Arrays CONCOURSE provides the opportunity to print the Q statements arrayed in descending order for each factor. The user has the option to have either *z* scores or pile scores printed with the statements. A table is also produced in which

factor scores are given in order of statement number across all factors. To receive statement arrays, the user must input the original data, rotated factor loadings, and a deck of Q statements. The user is permitted four cards per statement. The program automatically skips a line between statements in the output.

Special care has been taken to make sure that the output is graphically simple and easy to read. On the first page of output, CONCOURSE summarizes all input, print, and punch options as well as dimensions --number of Q sorts, Q statements, factors, and distribution of statements. All computations are printed to three decimal places and are offered in punched form to eight decimal places. CONCOURSE also reports a variety of error messages which are summarized at the end of the program run.

Much more can be said about CONCOURSE; however, the above pages describe its basic features. The program has been designed to provide the Q methodologist with considerable control and flexibility in the analysis of Q data. In all respects, CONCOURSE is easy to use and should present no difficulties operating on large or small computer systems. CONCOURSE is accompanied by a user's manual describing the program in detail and offering many example deck setups. CONCOURSE will be ready for distribution by November 15, 1980, at a cost of $175, and can be ordered through the following address: CONCOURSE, P.O. Box 4356, Tulsa, OK 74104.

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Until there are experiments, I take no notice of anything that's done. (William Stephenson)