

*1994 World Cultures 8(2):37-39*  
*Analytic Technologies*

## FISHER-B: A PROGRAM FOR AN EXACT SIGNIFICANCE TEST FOR THREE-WAY INTERACTION EFFECTS

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### 1. INTRODUCTION

Fisher-B is an interactive FORTRAN program that performs two functions. First, it calculates the Fisher's exact test and gamma measure of association for 2x2 tables. Second, it tests the null hypothesis of no three-way interaction among the variables in a 2x2x2 contingency table. White et al. (1983) discuss the mathematical logic of the tests. The program can be run from within WINDOWS or from the DOS command line. Since the data are entered from the terminal, the user must prepare the contingency tables before running the program. The results are displayed on the screen and can be output as an ASCII file. A series of tables can be evaluated within a single program session. A limitation of the program is that the total number of cases cannot exceed 300.

### 2. PROGRAM OPERATION

The program is started by typing "fisher-b" <ENTER> on the DOS command line or in the WINDOWS Program Manager run window. Two screens of preliminary information are provided, removed by pressing <ENTER>. The third screen asks if the user wants to save the output in a file, as well as having it displayed on the screen. If the output file option is selected, the program asks for a file name. If the file exists, the user is asked if he or she desires to overwrite it or to select another file name.

The fourth screen appears as follows:

Enter	2 for 2x2 Table
:	
	3 for 2x2x2 Table
	0 to Exit

Although the user can do a series of 2x2 tables or 2x2x2 tables in a single session, the two table types cannot be mixed in the same session. Thus, you cannot analyze a 2x2 table and then a 2x2x2 table in the same run. The 2x2x2 option provides the Fisher's exact tests for both component 2x2 tables. Since the program's main usefulness will be for 2x2x2 tables the remainder of this description will discuss the screens produced by option three. The screens produced by option two are similar.

After option three is selected the maximum number of cases, up to the limit of 300, is requested. If the user has several tables of differing sizes enter the size sufficient for the largest table. A notice that the program is calculating tables appears. On 286 machines this message may stay on the screen for several seconds if sample size is large. When this screen disappears, the input screen for a 2x2x2 table appears. The user enters cell values in the order cell A, cell B, cell C, cell D, cell E, cell F, cell G, cell H, hitting <Enter> after each cell:

Enter values for the cells, hit Enter after each value			
Cell A =	Cell B =	Cell E =	Cell F =
Cell C =	Cell D =	Cell G =	Cell H =

After the values are entered, the results screen appears. The following screen was obtained by entering the values in tables three and four in White et al. (1983). The data are from Brudner-White's (1978) analysis of occupational (ABCD table) and linguistic (EFGH table) endogamy in an Austrian village.

Enter values for the cells, hit Enter after each value									
Cell A = 80	Cell B = 7	Cell E = 98	Cell F = 16						
Cell C = 15	Cell D = 34	Cell G = 7	Cell H = 15						
1:	80	7	15	34	p = .00000000	gamma = .9257			
2:	98	16	7	15	p = .00000057	gamma = .8584			
3:	80	7	15	34	98	16	7	15	p = .46614692
Press Enter To Continue									

Line one provides the cell values, exact probability and gamma for table ABCD and line two does the same for table EFGH. Both tables exhibit a significant departure from independence. The third line tests whether the patterns in the two tables are significantly different. The p value indicates that although occupational endogamy is slightly stronger than linguistic endogamy, the difference does not reach the conventional 0.05 level of significance.

After pressing <Enter>, the user has the option of entering a new 2x2x2 table or exiting the program. Below is the results screen produced by entering a new table of values (table five in White et al. 1983) contrasting the association between patrilineal groups and bride wealth in Insular Pacific societies (ABCD table) with the association in the rest of the world (EFGH table). The first line indicates that

the association between patrilineal groups and bride wealth is not significant in the Insular Pacific sample, while the second line shows the variables are dependent in the rest of the world. The third line suggests that the relationship between the variables is significantly different in the two regions. As White et al. (1983:103) note, an obvious use of this program in cross-cultural research is to determine if associations replicate in regional subsamples.

Enter values for the cells, hit Enter after each value									
Cell A = 9	Cell B = 5			Cell E = 11			Cell F = 46		
Cell C = 9	Cell D = 9			Cell G = 76			Cell H = 22		
4:	8	5	9	9	p = .39416251		gamma = .2308		
5:	11	46	76	22	p = .00000000		gamma = -.8705		
6:	8	5	9	9	11	46	76	22	p = .00032761
Press Enter To Continue									

### 3. REFERENCES

Brudner-White, Lilyan

- 1978 Occupational concomitants of language variability in southern Austrian bilingual communities. In *Advances in the Study of Societal Multilingualism*, ed. J. Fishman. The Hague: Mouton. Pp. 153-184.

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