

Common Item Program for Equating (CIPE)

Michael J. Kolen

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Program **CIPE** for the Macintosh performs mean, linear, and unsmoothed equipercentile equating, as well as equipercentile equating with cubic spline smoothing, for data collected using the common item nonequivalent groups design. The program was written in *FORTRAN*. **CIPE** uses numerical methods described by Kolen and Brennan (1995). Specifically, the program implements the following equating methods: Tucker mean (TMEAN), Levine mean for internal common items (LMEAN), Braun/Holland mean (BMEAN), Tucker linear (TLIN), Levine linear for internal common items (LLIN), Braun/Holland linear (BLIN), unsmoothed frequency estimation equipercentile (UNSMOOTHED), and smoothed frequency estimation equipercentile, with up to 8 different degrees of cubic spline smoothing. **CIPE** also calculates standard errors of equating for the Tucker linear, Levine linear, and unsmoothed equipercentile methods.

Program Operation

Files Needed

All files must reside in the folder containing the **CIPE** program. In addition to the program, a control file, a new form data file, and old form data file are needed. The control file contains 9 required records. The first five records contain names of files for reading and writing. The file names can be up to ten characters long and listed in columns 1-10.

- Record 1. The filename of the output file for printed output.
- Record 2. The filename of the input file containing the new form data.
- Record 3. The filename of the input file containing the old form data.
- Record 4. The filename of an output file that can be used to pass results to other programs.
- Record 5. The filename of the output file that can be used directly by *Cricket Graph*.

The next four records define parameters for the run.

- Record 6. Title. Any title for the run up to 80 characters long.
- Record 7. *FORTRAN* format for reading data. Note that the scores must be entered in integer format.
- Record 8. Col. 1-5. Number of items on new form in *FORTRAN* I5 format.
Col. 6-10. Number of items on old form in *FORTRAN* I5 format.
Col. 11-15. Number of common items in *FORTRAN* I5 format.
Col. 16-20. Number of smoothing (*S*) parameters
Col. 21-25. A zero in Col. 25 (A nonzero numerical value will result in supplemental output being produced).
Col. 26-35. Proportional weight for the group taking the new test in forming the synthetic group. 1.0 will define the synthetic group as the group taking the new form. -1.0 will result in groups being weighted proportionally by sample size. Using 0.5 will weight the groups equally. Must be entered with a decimal point.
Col. 36-45. Smoothing limits parameter in *FORTRAN* real format. Must be entered with a decimal point.
- Record 9. Up to 8 degree of smoothing (*S*) parameters, each taking up 10 columns and entered with a decimal point.

The following sample control file, named **CIPE_C**, is distributed along with the program:

```

OUT1
mondatx
mondaty
OUT2
OUT3
EQUATE x to y  com it monograph example  w1=1
(36X,I2,I2)
      36      36      12      5      0      1.0000      0.005
      0.10      0.25      0.50      0.75      1.00

```

In this file, 5 smoothing parameters are given. This file can be used to reproduce some of the results in Chapters 4 and 5 of Kolen and Brennan (1995)

The data files are set up based on the format record in the control records. There is one examinee per record and all data are entered as integers. For the example, the new form data file *mondatx* is distributed along with **CIPE**. The first three records of the file are as follows:

```

1010011100000000000001100000000000010 8 3
10101110110111011111001010110011000021 6
11111011111111111111101110110111110113110

```

Here the data are read in using format (36X,I2,I2), as indicated in the control file. The first 36 columns represent 0/1 item responses, and are skipped over. Columns 37-38 contain the total score and columns 39-40 contain the score on the common items. Note that the program expects the total score first on the record followed by the score on the common items. As can be seen, the first examinee earned a score of 8 on the new form and a score of 3 on the common items. An old form file, *mondaty*, is also distributed along with the program. The files *mondatx* and *mondaty* contain the data that were used for the numerical example in Chapters 4, 5, and 6 of Kolen and Brennan (1995).

Running the Program

After double-clicking on the **CIPE** icon, the program will ask for the name of the control file. Enter it (*CIPE_C* for the example). After the program runs, close the *CIPE* window.

Viewing and Printing the Results

The results can be viewed using an editing program, like Microsoft Word 5.1, by opening the output file by the filename you gave it (*OUT1* in the example). The output may be wider than the window on the computer. To better view and print the results it might be helpful to use a font size of 9 or 7 and to print with the page horizontal. If the columns are not lined up properly try a different font, like Monaco or Courier.

The notation on the output is similar to that used in Kolen and Brennan (1995). The first output page contains parameters read in and summary statistics. The next pages contain regression analyses, which are used to examine the linearity of the *X* on *V* and *Y* on *V* regressions. The following pages, labeled RELATIVE CUMULATIVE FREQUENCY DISTRIBUTIONS FOR *X* AND *V*, contain these distributions. The relative cumulative distributions for *V* follow. Then come the raw score equivalents and standard errors. The last page of the output contains synthetic group summary statistics and slopes and intercepts for the mean and linear methods.

Graphing the Results

If you have *Cricket Graph*, the results can be graphed by reading the output file for graphing directly into *Cricket Graph* (*OUT3* in the example). The program automatically provides column

headings. Note that standard error bands can be used by selecting error bands from the *Cricket Graph* menus.

Running Your Own Data

To run your own data, it is suggested that you enter the frequency distributions into files with unique names using a word processing program, modify a copy of the control file in the subsequent example to get the spacing correct and save under a new name, and use meaningful unique file names in the control file.

Program Requirements

There are two versions of this program - one for Macintosh computers with a 680X0 processor and a math coprocessor, and another version that will run on an Macintosh. The following are some limitations: The program does NOT perform calculations for the Levine method with external common items. This version can be used with tests of 150 items or fewer in length and with 50 or fewer common items.

If you have any problems using the program or find any bugs, the author can be contacted at the address listed below.

Michael J. Kolen
American College Testing
P. O. Box 168
Iowa City, IA 52243

Reference

Kolen, M. J. & Brennan, R. L. (1995). *Test equating method and practices*. New York: Springer-Verlag.