

***RAGE-RGEQUATE* Manual**
(Console version)

October 5, 2005

Disclaimer of Warranty

No warranties are made, express or implied, that **RAGE-RGEQUATE** is free of error, that it is consistent with any particular standard, or that it will meet the requirements of any particular application. The author disclaims any direct or consequential damages resulting from use of this program.

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Introduction

This manual describes how to run the computer program *RAGE-RGEQUATE*. This program conducts random groups equipercentile equating using cubic spline postsMOOTHing, log-linear presMOOTHing and beta-4 presMOOTHing. Kolen and Brennan (2004) give descriptions of these methods.

The original version of *RAGE* was written in the *C* programming language by Lingjia Zeng for Macintosh computers. The original version of *RGEQUATE* was written in the *C* programming language by Bradley Hanson for Macintosh computers. Both of these programs have extensive graphical output.

Under the supervision of Michael Kolen, Zhongmin Cui merged the *C*-code from the *RAGE* and *RGEQUATE* into a single *RAGE-RGEQUATE* program, eliminating all of the graphical output. The graphical output was eliminated because there was a desire to have a program that would function on both PC and Macintosh computers with minimal maintenance. We may consider adding graphical output in the future. Yueh-Mei Chien created graphical user interfaces for running the program under Windows 2000 and Windows XP and Mac OS X.

Currently this program works under Macintosh (OS 9, OS X), DOS, and Windows(95/98, 2000, and XP). Both the console version is available under Mac OS 9, DOS and Windows, while the GUI version available under Mac OS X and Windows.

This manual is for the Console version.

Please direct any questions about these programs to

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Downloading and Running the Program

In the folder that was downloaded, there is a control file and data file as described below. The data file and control file should be in the same folder as the program. These files can be used to reproduce many of the equating results in Chapters 2 and 3 of Kolen and Brennan (2004). These sample data and control files are given as follows.

Console version

The program is run by double-clicking on the program icon (the name of the program should look like “RAGE-RGEQUATE_M9(V3.22)” for Macintosh or “RAGE-RGEQUATE_WC(V3.22).exe” for Windows). A console window will come up. The prompt is asking for control file name. Type the name of the file as prompts (be sure to include the extension of the file name if any, e.g., “.ctl”).

Notes to DOS users

The program is run by typing the name which should look like “RAGE-RGEQUATE_WC(V3.22).exe”. A prompt will be asking for control file name. Type the name of the file as prompts (be sure to include the extension of the file name if any, e.g., “.ctl”). Should the user needs to run a simulation with this program, it is useful to put the name of the control file after the program name as an argument.

Notes to MAC OS9 users

If the program runs successfully, a prompt will remind you to close the console window and open the output to review the results. Upon closing the console window, a system alert will ask you to save the content in the window or not. The user does not have to save it.

Input Data

A sample input data file is given below. For each line: the first entry is the raw score; the second entry is the frequency for the new form; the third entry is the frequency for the old form; and the fourth entry is the raw-to-scale score equivalent for the old form.

0	0	0	0.5
1	1	1	0.5
2	1	3	0.5
3	3	13	0.5
4	9	42	0.5
5	18	59	0.69
6	59	95	1.6562
7	67	131	3.1082
8	91	158	4.6971
9	144	161	6.1207
10	149	194	7.4732
11	192	164	8.9007
12	192	166	10.3392
13	192	197	11.6388
14	201	177	12.8254
15	204	158	14.0157
16	217	169	15.2127
17	181	132	16.3528
18	184	158	17.3824
19	170	151	18.3403
20	201	134	19.2844
21	147	137	20.1839
22	163	122	20.9947
23	147	110	21.7
24	140	116	22.322
25	147	132	22.9178
26	126	104	23.5183
27	113	104	24.1314
28	100	114	24.7525
29	106	97	25.2915
30	107	107	25.7287
31	91	88	26.1534
32	83	80	26.648
33	73	79	27.2385
34	72	70	27.9081
35	75	61	28.6925
36	50	48	29.7486
37	37	47	31.201
38	38	29	32.6914
39	23	32	34.1952
40	15	12	35.4615

Input Control

Listed on the next page is a sample control file. Note, the user does not have to have a control file if working with the GUI version. In entering control files, a “#” is used to indicate a comment. The lines that are not comments are required. The “Limit” line is used to control the range of postsMOOTHING. Setting it at “.005” indicates the smoothing is conducted between the .5th and 99.5th percentiles. The line labeled “Parameter” gives the postsMOOTHING “S” parameters.

In the line labeled “New” the maximum value of the “C” parameter is listed for presMOOTHING for the new form. In the line labeled “Old” list the maximum value of the “C” parameter for

presmoothing for the old form. If other values are listed in the “Old” or “New” lines, the program will pair these with values in the “Old” form parameters listed to create supplemental output. This supplemental output will be of interest when after an initial run, it is decided to use a value of “C” for the new form and a different value of C for the old form. The program, by default, calculates presmoothing results for n pairs of “C” values (“C”=1 through n with the same “C” values for both new form and old form; n = the maximum value of the “C” parameter in “New” and “Old” parameters list). The lines labeled "New" and "Old" parameters allow researchers to get supplemental output with any desired pairs of “C” values. If the number of “C” values listed is smaller for one form than the other, the last C value will be replicated to make the numbers match. For example, if as in the example that follows, the following “New” and “Old” lines are used:

```
New 1 2 4 6 8 10
Old 1 2 3
```

then the pairs of C values (new, old) are:

```
1,1
2,2
4,3
6,3
8,3
10,3
```

This is helpful when the researcher wants to fix one “C” value for one form and change “C” values for the other.

The “Columns” line gives the columns in the input file for the new form frequencies, the old form frequencies, and the raw-to-scale score equivalents for the old form. The “Scale” line indicates the minimum, maximum, and increment value for scale scores. The “input” line lists the filename for the input file. The “Output” line lists the filename for the output file.

```

#Example data from Kolen and Brennan equating book Table 2.5
# Results should be close to results in Table 7.1

# postsmoothlimit
Limit                0.005

# Postsmooth Parameter (Maximum number is 15)
Parameter    0.01    0.05    0.10    0.20    0.30    0.40    0.50    0.75    1.00

#New form degree parameter for presmoothing
#Maximum number is 15
#Maximum value is 10
New                1 2 2 6 8 10

#Old form degree parameter for presmoothing (Maximum number is 15)
#Maximum number is 15
#Maximum value is 10
Old                1 2 3

# columns to be read
Columns          2 3 4

# scale: min, max, increment
Scale            1.0 36.0 1.0

#input file
Input            win_in.dat

#output file
Output           win_out.txt

```

Creating Input File

We recommend the user use a plain text editor (e.g., Notepad in Windows system and BBEdit in Macintosh system) to create the input file for this software. If you use Excel, Word or other software, please make sure that you save your file as a tab or blank delimited text file. This software does not recognize the file extension, so you don't have to change it.

Output

The output is divided into sections as listed below. The Table numbers given below indicate where the output can be found in Kolen and Brennan (2004). Note that the values from this program can differ slightly from those in the examples in the Kolen and Brennan (2004) text.

- Run Parameters set by control file and sample sizes.
- Raw-to-Raw Score Conversion for Postsmoothing.
 - Standard errors from Table 3.2
 - Unsmoothed equipercentile equivalents (labeled "NoSmooth") from Table 2.7
 - Linear equivalents from Table 2.7
 - Postsmoothed equipercentile equivalents from Table 3.7

Note: unsmoothed equivalent for raw score of zero is .5 in output and 0 in book.

- Raw Score Moments for Postsmoothing.
 - Raw score moments for both forms from Table 2.6 and Table 3.8
 - Raw score moments for unsmoothed equipercentile equating from Tables 2.6 and 3.8
 - Moments of equated scores for linear equating from Table 2.6
 - Raw score moments for postsmoothed equipercentile equating from Table 3.8
- Unrounded Raw-to-Scale Score Conversion for Postsmoothing.
 - Unsmoothed equipercentile conversions from Tables 2.8 and 3.10
 - Linear conversions from Table 2.8
 - Postsmoothed conversions from Table 3.10
- Rounded Raw-to-Scale Score Conversion for Postsmoothing.
 - Unsmoothed equipercentile conversions from Tables 2.8 and 3.11
 - Linear conversions from Table 2.8
 - Postsmoothed conversions from Table 3.11
- Scale Score Moments for Postsmoothing:
 - Scale score moments for both forms from Table 2.9 and Table 3.9
 - Scale score moments for unsmoothed equipercentile equating from Tables 2.9 and 3.9
 - Moments of scale scores for linear equating from Table 2.9
 - Scale score moments for postsmoothed equipercentile equating from Table 3.9
- Data for Form Y and Form X:
 - Frequency distributions, percentile ranks, etc. from Table 2.5.
- Moments and Fit Statistics for Presmoothing.
 - Information from Table 3.1
- Raw-to-Raw Score Conversion for Presmoothing.
 - Values for C=6 are from Table 3.2
- Raw Score Moments for Presmoothing:
 - Moments for unsmoothed raw score distributions from Tables 2.6 3.3, 3.9
 - Moments for C=6 are from Table 3.3
- Unrounded Raw-to-Scale Score Conversion for Presmoothing.
 - Values for C=6 are from Table 3.5
- Rounded Raw-to-Scale Score Conversion for Presmoothing.
 - Values for C=6 are from Table 3.5
- Scale Score Moments for Presmoothing:
 - Scale score moments for both forms from Tables 2.9, 3.4, 3.9

Scale score moments for unsmoothed equipercentile equating from Tables 2.9, 2.4, 3.9
Scale score moments for presmoothed equipercentile equating from Table 3.4 for C=6

- Smoothed distribution Data for Form X:
Relative frequencies for unsmoothed (raw) and smoothed new form distributions
- Smoothed distribution Data for Form Y:
Relative frequencies for unsmoothed (raw) and smoothed old form distributions
- Raw-to-Raw Score Conversion for Presmoothing.
Results for selected combinations of C-values
- Raw Score Moments for Presmoothing:
Moments for unsmoothed raw score distributions from Tables 2.6 3.3, 3.9
Results for selected combinations of C-values
- Unrounded Raw-to-Scale Score Conversion for Presmoothing.
Results for selected combinations of C-values
- Rounded Raw-to-Scale Score Conversion for Presmoothing.
Results for selected combinations of C-values
- Scale Score Moments for Presmoothing:
Results for selected combinations of C-values

SAS Outputs

This program generates three SAS system files, namely graph_post.sas, graph_pre_x.sas, graph_pre_y.sas, graph_pre_eq.sas. These files are used to plot such graphs as in Figures 3.3, 3.4 and 3.6 (Kolen and Brennan, 2004). If the SAS software is available to the user, the user can just double click these files and run the codes.

Advanced SAS users can modify the template files (template_pre.sas, template_pre_eq.sas and template_post.sas) to get customized graphs, although we don't recommend users to do so.

Limitations

Some known limitations are as follows:

- The maximum number of parameters in Parameter, New, and Old is 15.
- The maximum value of parameters in New and Old is 10.
- The maximum number of data columns in input file is 26.

Acknowledgement

Thanks to Brett Foley for the original SAS codes adapted in the template files.

References

Kolen, M. J. & Brennan, R. L. (2004). *Test equating, Scaling, and Linking: Methods and practices*(2nd ed.). New York: Springer-Verlag.