
Plotting

In unidimensional IRT, graphs (e.g., tracelines and information curves) form an integral component of item analysis in practice. flexMIRT® is built to handle multilevel and multidimensional IRT models. In this context, there currently exists no universally accepted consensus with regards to graphical procedures. We do realize, however, that there is a need for publication quality graphics and to meet that need flexMIRT® will now produce upon request, for unidimensional models only, a separate output file, the *-icc.txt, which contains the values necessary to construct tracelines in the user's preferred plotting program. **Please note that the -icc output file is only available for single factor models.**

1. Plotting ICCs and TCCs

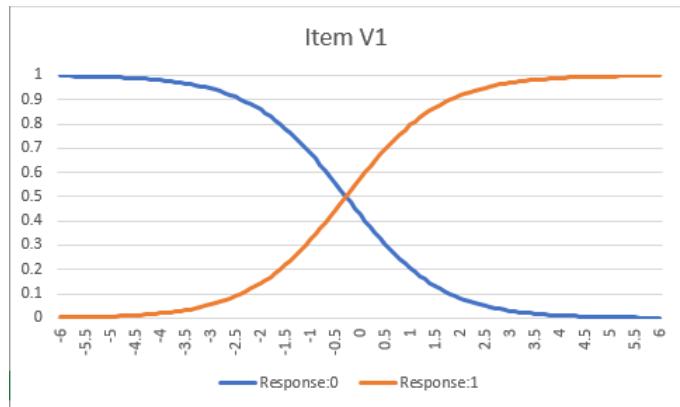
By including SaveICC = Yes; in the <Options> section of your syntax, users may request that the -icc.txt file be saved. The available -icc file contains values for each item and the overall test/scale which may be used to construct traceline plots. These values are calculated at 121 points over theta value ranging from -6 to 6 (and are evenly spaced 0.1 apart: -6.0, -5.9, -5.8, ..., 6.0); the range and number of points reported in the -icc output file is not able to modified by users.

We provide a labeled -icc file from the first example (2PLM_example.flexmirt) to demonstrate the meaning of each column.

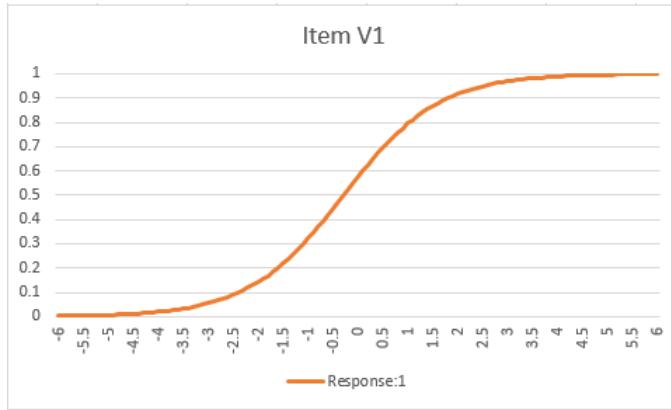
Table 1: Labeled -icc file (excerpt)

| Grp # | Item # | Label | Response Category | -6.0 | -5.9 | ... |
|-------|--------|--------|-------------------|------|--------|--------|
| 1 | 1 | v1 | | 0 | 0.9975 | 0.9973 |
| 1 | 1 | v1 | | 1 | 0.0025 | 0.0027 |
| 1 | 2 | v2 | | 0 | 0.9887 | 0.9873 |
| 1 | 2 | v2 | | 1 | 0.0113 | 0.0127 |
| 1 | 3 | v3 | | 0 | 0.9938 | 0.9933 |
| 1 | 3 | v3 | | 1 | 0.0062 | 0.0067 |
| 1 | 4 | v4 | | 0 | 0.9951 | 0.9946 |
| 1 | 4 | v4 | | 1 | 0.0049 | 0.0054 |
| ... | | | | | | |
| 1 | 10 | v10 | | 0 | 0.996 | 0.9954 |
| 1 | 10 | v10 | | 1 | 0.004 | 0.0046 |
| 1 | 11 | v11 | | 0 | 0.9958 | 0.9954 |
| 1 | 11 | v11 | | 1 | 0.0042 | 0.0046 |
| 1 | 12 | v12 | | 0 | 0.9973 | 0.997 |
| 1 | 12 | v12 | | 1 | 0.0027 | 0.003 |
| 1 | TCC | Group1 | | 0 | 0.0613 | 0.068 |

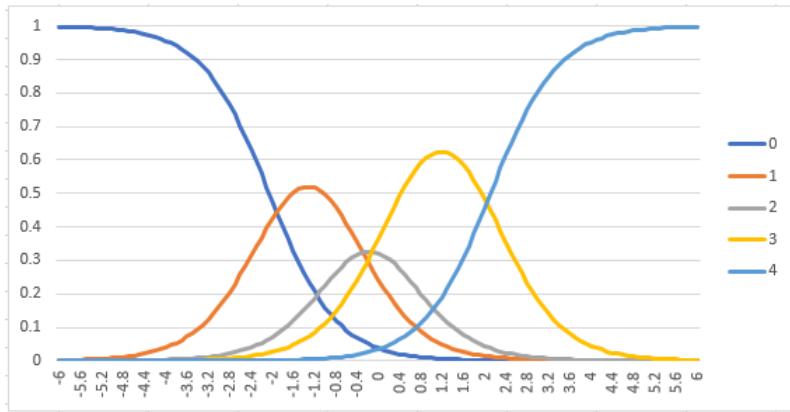
These values can be directly exported to the graphing program of your choice and item characteristic curves (ICCs)/traceline plots are easily constructed, with no additional calculations needed for standard plots. Using the full set of values provided for the dichotomous item V1, the below plot was made in Excel.



To obtain a more typical trace line plot for V1, we can exclude the 0-response category line such as below.



When requested in conjunction with polytomous models, the values in the -icc output file may also be used directly to create category response function plots, such as below (using item V1 of the previous NCS example that used the GRM).



Test characteristic curves are made by plotting the values in the line labeled "TCC" in a similar fashion.

2. Plotting IIFs and TIFs

Upon request, flexMIRT® will also output item and test information function values to a separate *-inf.txt output file. To request information be saved, users must include SaveINF = Yes; in the <Options> section of their syntax. The default number of points to be written to the -inf is a

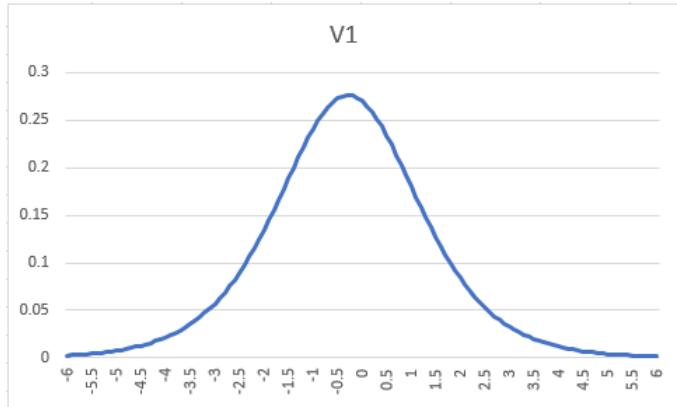
single point at theta = 0; to construct a comprehensive information function plot, users will need to also include the FisherInf = (?, ?); statement, which will tell flexMIRT at how many points and spread across what range of theta information should be calculated. For instance, to match the theta values used in the -icc file, the user would specify FisherInf = (121,6); Because flexMIRT® will not label the theta values in the -inf file, it is important for users to know how they are determined: Regardless of the number of points and the minimum/maximum value specified, flexMIRT® will always place the theta points evenly across the range - note that many choices can result in theta values that are spaced at non-round intervals. For instance, FisherInf = (14,4); would result in the 14 points being spaced from -4 to 4 at intervals of $(4+4)/(14-1) = 0.61538$.

We present a labeled version of the -inf from the first syntax example below. Note that "P" is the label used for the test information values.

Table 2: Labeled -inf file (excerpt)

| Grp # | Item # | theta1 | theta2 | ... |
|-------|--------|--------|--------|-----|
| 1 | 1 | 0.0027 | 0.003 | |
| 1 | 2 | 0.0167 | 0.0188 | |
| 1 | 3 | 0.0043 | 0.0047 | |
| 1 | 4 | 0.0053 | 0.0059 | |
| ... | | | | |
| 1 | 9 | 0.0012 | 0.0015 | |
| 1 | 10 | 0.0069 | 0.0079 | |
| 1 | 11 | 0.0032 | 0.0034 | |
| 1 | 12 | 0.0028 | 0.0031 | |
| 1 | P | 1.0691 | 1.0773 | |

With the -inf obtained from flexMIRT®, the information function values transferred into the plotting program of choice, and the theta values determined, item information functions (IIFs) and the test information function (TIF) may be easily plotted. Porting the -inf values from the first example into Excel, we are able to produce the below IIF for item V1 without requiring any additional calculations.



The TIF plot may be created in a similar manner, using the values from the line labeled "P" of the -inf output file.