
Plotting

In unidimensional IRT, graphs (e.g., tracelines and information curves) form an integral component of item analysis in practice. flexMIRTTM 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 we chose to provide a set of R programs. We implemented the provided graphing functions in R because it is incredibly powerful, allows maximal customizability, and is a free program.

While flexMIRTTM does not have an internal plotting function, supplemental R code to read-in flexMIRTTM parameter files and plot item characteristic curves (ICCs), test characteristic curves (TCCs), item information functions (IIFs), and test information functions (TIFs) is available on the Support webpage (<http://www.flexMIRT.com/Support>) in a folder labeled “flexMIRT plotting examples”. Please note that the provided code is usable with single factor models only.

1.1. Plotting ICCs, TCCs, and Information Functions

The provided R code reads item parameters from a flexMIRTTM parameter output file (with the extension *-prm.txt). For information functions, the code reads the needed values from a flexMIRTTM information output file (which has the extension *-inf.txt). flexMIRTTM *does not generate these files by default, so it is necessary to explicitly request that the parameters and information values be saved from the calibration run using the SavePRM = Yes; and the SaveInf = Yes; commands in the <Options> section, respectively. Additionally, by default the Information Function output file will only contain the Information value for a single point at the theta value of 0. To change the number of points and the range over which they are spaced, one uses*

the `FisherInf = 21, 3.0;` command in the `<Options>` section. This specific command requests that information values at 21 points, spaced evenly between -3.0 and 3.0, be written to the generated `*-inf.txt` file; the choice of 21 and 3.0 are used as placeholders and both values can be modified by the user.

The entirety of the example plotting code (found in the file “Draw-ICCs_Infs.R” in the available “flexMIRT plotting examples” folder) is presented below. Because we don’t wish to assume that users are familiar with R, we will briefly discuss the main points of the R syntax.

Example 1.1: R plotting code

```
##calls the pre-defined plotting functions - REQUIRED AS FIRST STEP
#ALTER THE PATH SO IT DIRECTS TO WHERE flexmirt.R IS SAVED ON YOUR COMPUTER
source("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/flexmirt.R")

##For plotting ICCs and TCCs, use the function call flexmirt.icc("parameter file name")

#PROVIDE THE FULL PATH TO THE -prm FILE TO BE PLOTTED

##1PL example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/SM3-prm.txt")

##2PL example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/Preschool.2PL-prm.txt")
##3PL example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/Preschool.3PL-prm.txt")
##Nominal Model Example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/PreschoolNum_Nom-prm.txt")

##Graded Example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/LiberalConservative-prm.txt")
##GPC Example
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/LiberalConservative-GPC-prm.txt")

##For plotting IIFs AND TIFs, use the function call flexmirt.inf("inf file name")

#NOTE: THE INF PLOTTING FUNCTION PULLS INFORMATION FROM THE *.flexmirt CALIBRATION FILE
#THAT CREATED THE *.inf FILE.
##IT IS ASSUMED THAT THE *-inf FILE and the *.flexmirt FILE ARE IN THE SAME LOCATION

##information function example

flexmirt.inf("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/LiberalConservative-inf.txt")

##information function example - multiple grp

flexmirt.inf("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/fit2-inf.txt")
```

As may be seen, there are brief explanations provided in the R code for those less familiar with the program and its language. Although we have provided numerous examples, these are primarily to demonstrate that the provided plotting functions work with a variety of models. There are actually only two commands that are needed to plot any given set of parameters. First, R needs to load the pre-defined plotting functions we have provided - these are found in the file “flexmirt.R” and the file is loaded

into R using the “source” call seen on the first non-comment line (the first line without a # sign at the beginning).

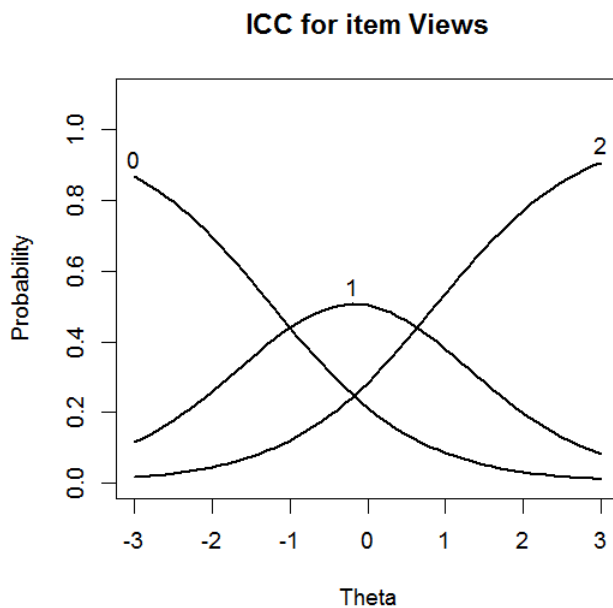
Once the functions have been loaded into R, the next step is to provide the functions with the location and file name of the values one wishes to plot. For obtaining ICCs and TCCs, the function call used is “flexmirt.icc()” and within the parentheses, the user supplies the *-prm file name, with location path, that contains the parameters that will define the ICCs and TCCs. For instance, the line

```
flexmirt.icc("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/Preschool.2PL-prm.txt")
```

calls the trace line plotting function and tells the function to create plots based on the parameter values found in the file “Preschool.2PL-prm.txt”.

The graph presented here is representative of the plot output that will be obtained from the ICC/TCC plotting function.

Figure 1.1: GRM ICC produced by provided R code



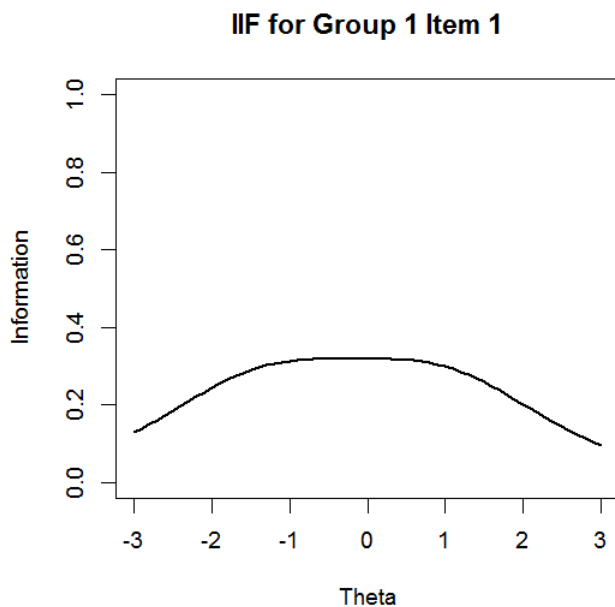
Similarly, for obtaining information function plots, the function call of “flexmirt.inf()” is used and the name and location of an *-inf file is provided in the parentheses. So, the example syntax line

```
flexmirt.inf("C:/Users/laptop/Documents/flexMIRT/flexMIRT plotting/fit2-inf.txt")
```

is telling R to use the information plotting function (`flexmirt.inf`) to plot the information values found in the file "fit2-inf.txt." As noted in the comments in the R code file, the information plotting function pulls information from the calibration file that created the *-inf.txt file. The program assumes that the *-inf file and the original calibration syntax file (*.flexmirt) will be in same folder. If, for some reason, the *.flexmirt file is not in the same folder as the information file, the plotting function will return an error and is unable to run.

The provided plot gives a representative of the graphics produced by the IIF/TIF plotting function.

Figure 1.2: IIF produced by provided R code



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