# EPSY 6637 Assignment #4 Fall 2024

*This assignment is due on November18*

1) In the most recent (week10) class workspace, you will find a dataset called **theories** which represents data from a theories of intelligence scale. The items are at the end of this assignment.

Fit the **partial credit model** to these data.

a) Which item do you think is the most “difficult”. Why? Check to see if it has the lowest raw rating of the 8 items.

b) Plot the overall score as a function of theta. (Hint –this the default for plot(model)) What is the approximate scale score for someone with a theta score of 0?

c) Here’s some code to find the 20 worst fitting people to the model:

order(personfit(gpctheory)[,5])[1:20]

What is the likely issue with the data from the very worst fitting people?

d) Rerun the model, now eliminating these cases:

mirt(theories[-order(personfit(gpctheory)[,5])[1:20],],1,”gpcm”)

Give an overall comparison to the results from your previous model. Consider the following: model coefficients, information plot, item fit statistics, residual correlations.

You don’t have to exhaustively reproduce all these tables/figures. Just say where you did and didn’t see a major difference after eliminating these cases.

e) For kicks, what was the *best fitting* response pattern from the first model.

2) Fit the nominal model to the fci data (Force Concept Inventory). To use the post-test items only, fit the nominal model this way: mirt(fci[,34:63],1,’nominal’).

a) Plot the information function for your model. What is the approximate peak of the information curve.

b) Show the result of plot(model). What pattern do you see - does this make sense? Explain what you think is going on.

c) On this version of the FCI – items 5 and 18 are actually almost identical in the specific concept they assess. They also have the same correct response (choice 2 for both) and same main distractor (choice 4 for both). Examine the data and your model diagnostics to find evidence consistent with the claim that they are highly similar items.

d) Compare the information function from the standard 2PLfit to the fcirw (correct/incorrect) dataset to the information function from the nominal model above.

3) The textbook describes the **condom** dataset, a 6 item questionnaire on condom attitudes. Fit a **generalized partial credit model** to the condom data. We can also fit a standard one dimension factor analysis model.

a) Conduct a factor analysis of the data. Using the psych package, you can do

fa(condom,1)->famodel

The factor model loadings are found by: famodel$loadings

Compare to the slopes from the **gpcm**.

b) Compare the factor scores from the two models. (For fa take famodel$scores )

What pattern do you see?

c) Discuss the information available in var(condom) and unique(condom).

The factor model and **gpcm** each use one of what you just calculated. Explain.