

# Software Alternatives for IRT Analyses

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HealthMeasures User Conference

Track D: Driving the Science

10:00-10:20 am

Prentice Women's Hospital Conference Center

250 E. Superior Street, Chicago, Illinois

# 8-item Acting with Awareness Scale

FFMQ\_5. *When I do things, my mind wanders off and I'm easily distracted.*

FFMQ\_8. *I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.*

FFMQ\_13. *I am easily distracted.*

FFMQ\_18. *I find it difficult to stay focused on what's happening in the present.*

FFMQ\_23. *It seems I am "running on automatic" without much awareness of what I'm doing.*

FFMQ\_28. *I rush through activities without being really attentive to them.*

FFMQ\_34. *I do jobs or tasks automatically without being aware of what I'm doing.*

FFMQ\_38. *I find myself doing things without paying attention.*

**1. Very often or always true/2. Often true/ 3. Sometimes true/  
4. Rarely true/ 5. Never or very rarely true**

# Amanda Shallcross

## Sample (n = 240)

- 75% Female
- 56% White, 31% Black, 8% Hispanic
- Mean age = 36 (range: 19-71)
- 70% college education
- Acting with Awareness Scale
  - Possible range: 8-40
  - Observed range: 9-40
  - Mean = 24, SD = 6

<http://self-compassion.org/wp-content/uploads/publications/FFMQ.SCS.FactprStructure.pdf>

# SAS Code (1)

```
PROC IRT DATA=TEMP PLOTS=ALL rorder=internal;  
VAR  
FFMQ_5 FFMQ_8 FFMQ_13 FFMQ_18 FFMQ_23  
FFMQ_28 FFMQ_34 FFMQ_38;  
TITLE "ACT5";  
RUN;
```

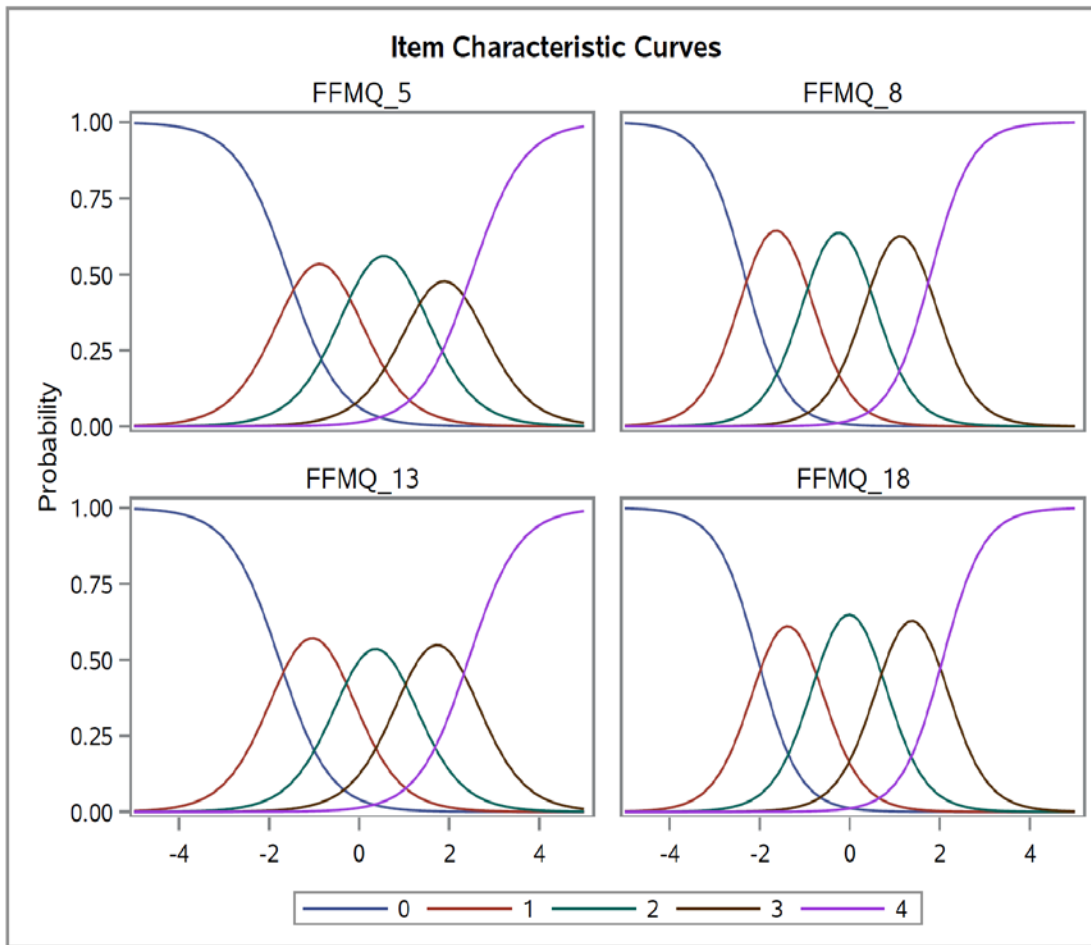
[http://support.sas.com/documentation/cdl/en/statug/67523/HTML/default/viewer.htm#statug\\_irt\\_syntax01.htm](http://support.sas.com/documentation/cdl/en/statug/67523/HTML/default/viewer.htm#statug_irt_syntax01.htm)

## The IRT Procedure

Item Parameter Estimates					
Item	Label	Parameter	Estimate	Standard Error	Pr >  t
FFMQ_5	When I do things, my mind wanders off and I'm easily distracted.	Threshold 1	-1.57523	0.19165	<.0001
		Threshold 2	-0.18825	0.11301	0.0479
		Threshold 3	1.28708	0.16381	<.0001
		Threshold 4	2.49580	0.30132	<.0001
		Slope	1.71906	0.22096	<.0001
FFMQ_8	I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.	Threshold 1	-2.33849	0.25031	<.0001
		Threshold 2	-0.93406	0.12750	<.0001
		Threshold 3	0.44868	0.10598	<.0001
		Threshold 4	1.79770	0.19153	<.0001
		Slope	2.17876	0.26789	<.0001
FFMQ_13	I am easily distracted.	Threshold 1	-1.77117	0.20606	<.0001
		Threshold 2	-0.30779	0.11305	0.0032
		Threshold 3	1.03945	0.14364	<.0001
		Threshold 4	2.42898	0.29056	<.0001

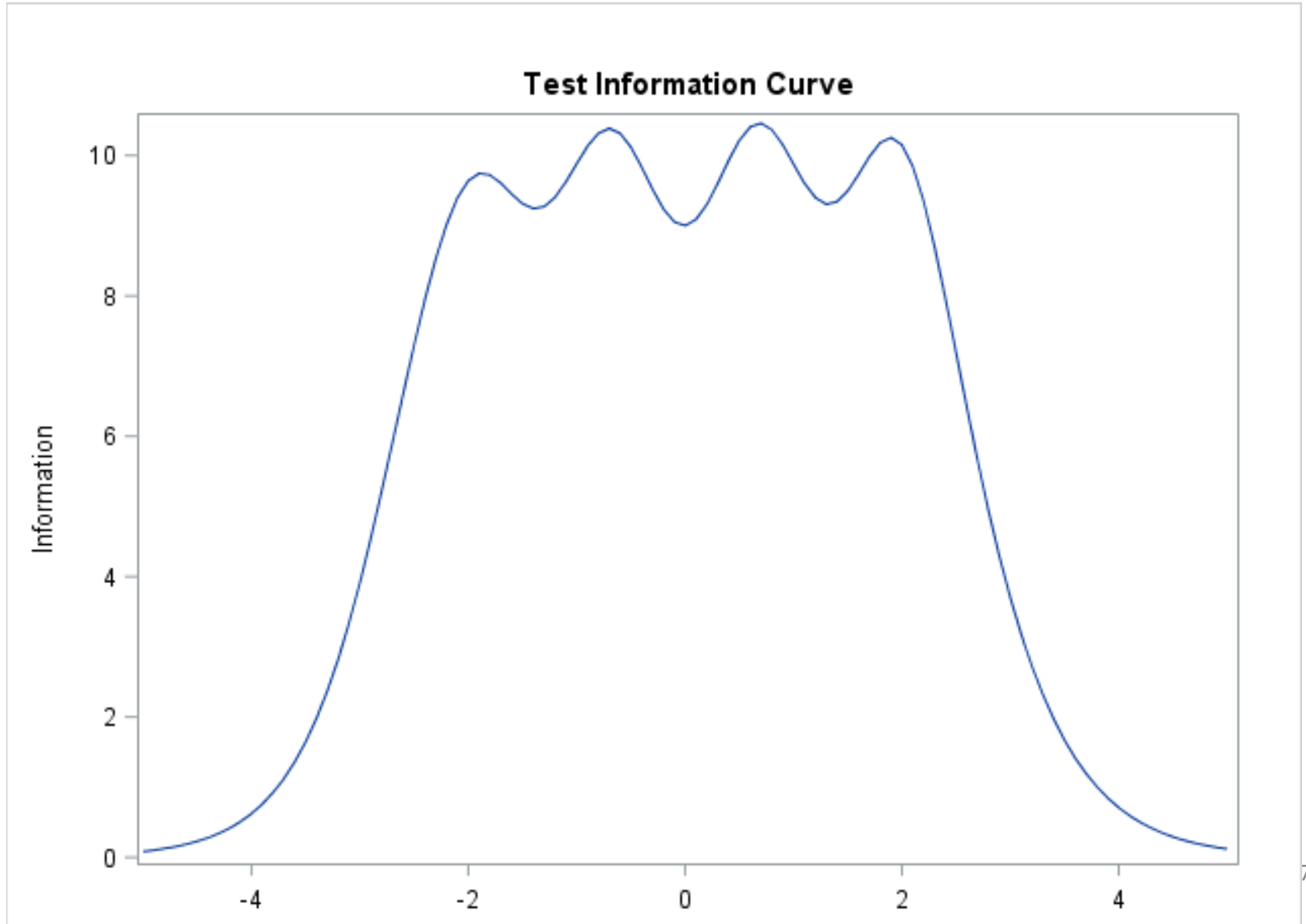
*Very often or always true/Often true/Sometimes true/Rarely true/Never or very rarely true*

The IRT Procedure



*Very often or always true/Often true/Sometimes true/Rarely true/Never or very rarely true*

$$\text{Reliability} = (\text{Info} - 1) / \text{Info}$$



## SAS Code (2)

```
PROC IRT DATA=TEMP OUT=THETA8 rorder=internal  
SCOREMETHOD=EAP PLOTS=ICC (XVIEWMAX=3  
XVIEWMIN=-3);  
VAR  
FFMQ_5 FFMQ_8 FFMQ_13 FFMQ_18 FFMQ_23  
FFMQ_28 FFMQ_34 FFMQ_38;  
TITLE "ACT5";  
RUN;
```

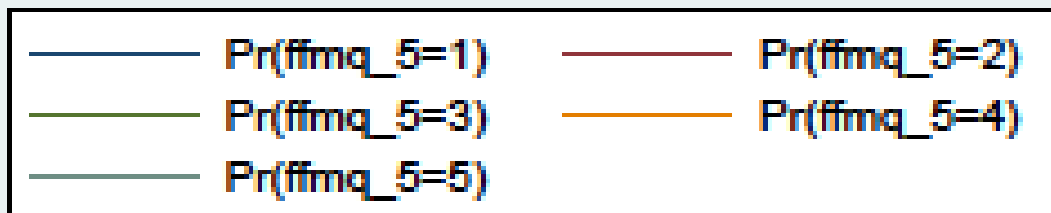
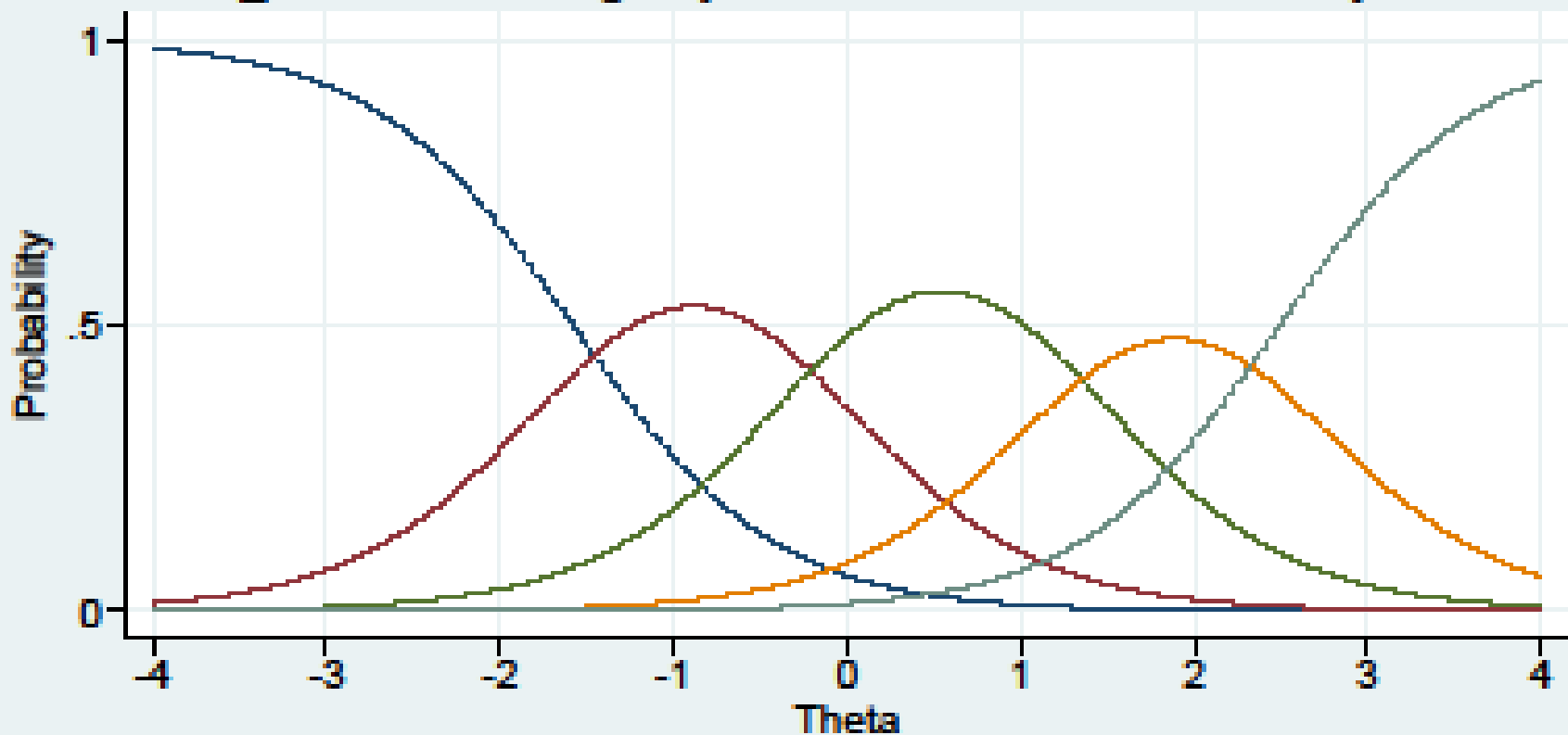


# STATA Code (*do file*)

- clear
- set more off
- cap log close
- log using c:\RCMAR\irt\_grm,text replace
- use c:\RCMAR\temp
- irt grm ffmq\_5 ffmq\_8 ffmq\_13 ffmq\_18 ffmq\_23 ffmq\_28  
ffmq\_34 ffmq\_38
- irtgraph icc ffmq\_5, xlabel(-4 -3 -2 -1 0 1 2 3 4, grid)  
subtitle("FFMQ\_5: when I do things my mind wanders off and  
I'm easily distracted") saving("ffmq\_5.gph", replace)
- graph export ffmq\_5.pdf, replace
- irtgraph tcc, thetalines(-3 -2 -1 0 1 2 3) saving("tcc.gph",replace)
- graph export tcc.pdf, replace

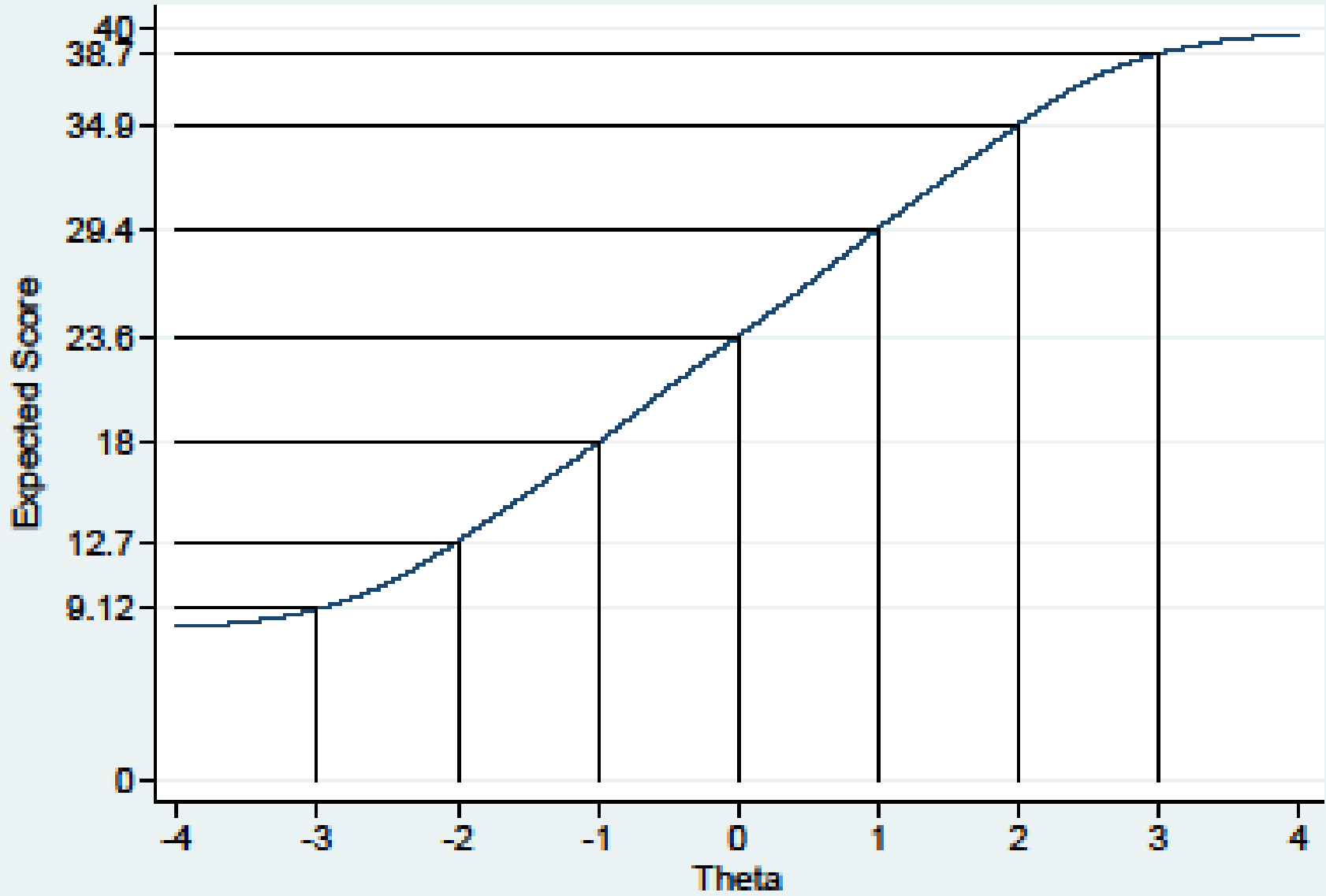
## Category Characteristic Curves

FFMQ\_5: when I do things my mind wanders off and I'm easily distracted



*Very often or always true/Often true/Sometimes true/Rarely true/Never or very rarely true*

# Test Characteristic Curve



# EQSIRT Code

```
/TITLE  
Acting with Awareness  
/SPECIFICATIONS  
DATA = 'temp.dss';  
VARIABLES = 8;  
CASES = 240;  
USE = 'ID'-'FFMQ_38';  
/MODEL  
GRM = 'FFMQ_5'-'FFMQ38';  
PARAMETER = 2PL;  
ESTIMATION = MML;  
FACTOR = 1;  
PLOTFILE = 'grm_8_irtplot.dss';  
/TECHNICAL  
ITERATIONS = 100;  
OPTIMIZATION = opt1;  
QUADRATURE = (4.0,15);  
OUTPUT = TEXT;  
/PRINT  
/END
```

# IRTPRO Code (1)

## Project:

Name = act5;

## Data:

File = .\temp.ssig;

## Analysis:

Name = act5;

Mode = Calibration;

Title: act5

Comments:

## Estimation:

Method = BAEM;

E-Step = 500, 1e-005;

SE = S-EM;

M-Step = 50, 1e-006;

Quadrature = 49, 6;

SEM = 0.001;

SS = 1e-005;

## Saves:

PRM, IRT

## Scoring:

Mean = 0;

SD = 1;

# IRTPRO Code (2)

Miscellaneous:

Decimal = 2;

Processors = 8;

Print CTLD, P-Nums, Diagnostic;

Min Exp = 1;

Groups:

Group :

Dimension = 1;

Items = ffmq\_5, ffmq\_8, ffmq\_13, ffmq\_18, ffmq\_23, ffmq\_28, ffmq\_34, ffmq\_38;

Codes(ffmq\_5) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_8) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_13) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_18) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_23) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_28) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_34) = 1(0), 2(1), 3(2), 4(3), 5(4);

Codes(ffmq\_38) = 1(0), 2(1), 3(2), 4(3), 5(4);

Model(ffmq\_5) = Graded;

Model(ffmq\_8) = Graded;

Model(ffmq\_13) = Graded;

Model(ffmq\_18) = Graded;

Model(ffmq\_23) = Graded;

Model(ffmq\_28) = Graded;

Model(ffmq\_34) = Graded;

Model(ffmq\_38) = Graded;

Mean = 0.0;

Covariance = 1.0;

Constraints:

# R code

- `library(mirt)`
- `library(latticeExtra)`

*(8 items imported into “temp” and brought into RSE)*

- `RSE<-temp[,1:8]`
- `nitems <- 8`
- `itemtype <- rep('graded',nitems)`
- `RSEGRM <- mirt(RSE, 1, itemtype=itemtype)`
- `param <- coef(RSEGRM, IRTpars=TRUE)`
- `RSEGRMpar <- do.call(rbind,param[1:nitems])`
- `print(RSEGRMpar,digits=4)`
  
- `plot(RSEGRM) # test response curve`
- `plot(RSEGRM, type="infoSE")`
- `plot(RSEGRM, type="infotrace")`

# flexMIRT code

- See *Pattern\_scoring\_example.pdf*
  - <http://gim.med.ucla.edu/FacultyPages/Hays/IRT/>





# Multidimensional IRT

- Parameter recovery with simulation found high level of estimation accuracy for
  - IRTPRO2.1, EQSIRT 1.0, flexMIRT 2.0, and Mplus 7.1
- Differences in user interface
  - e.g., IRTPRO and EQSIRT point-and-click
- EQSIRT 1.0
  - MCEM and MCMC estimation failed to finish
  - Program often stopped running without displaying any error messages
  - Took longest time to run
  - Error message in dialog boxed not helpful

Han, K. T., & Paek, I. (2014). A review of commercial software packages for multidimensional IRT modeling. *Applied Psychological Measurement*, 38 (6), 486-498.



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Powerpoint file available at:

<http://gim.med.ucla.edu/FacultyPages/Hays/present/>



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