

IRT Analysis of CAHPS® 2.0 Report Items: Work in Progress

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Item Response Theory in Health Outcomes and
Cancer Care Research

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Presentation Outline

- CAHPS® Measures
- NCBD Database
- Dimensionality
- Model Fit
- Item Characteristics

What is CAHPS®?

- Consumer Assessments of Health Plan Study (CAHPS®) was a study that resulted in a patient survey designed to capture patients' experience with care.
- Purposes of survey include:
 - Performance Measurement and Reporting
 - Quality Improvement

CAHPS® is Widely Used



- 90 million in 1999:
 - 39 million Medicare
 - 9 million federal employees (OPM)
 - 40 million in Health Plans (NCQA)
 - Other CAHPS® users

CAHPS® Design Principles

- Reliable and valid survey instruments.
- Collect information for which consumers are the best or only source.
- Adult and pediatric (by proxy) populations.
- Applicable in multiple settings: FFS, PPO, Managed Care, Medicaid.
- Flexible design: core and supplemental item sets.

Data Source

- 2000 National CAHPS® Benchmarking Database (NCBD)
- Main Purposes
 - Benchmarking
 - Research
- Contents
 - CAHPS 2.0 Survey Results
 - Adult and Pediatric
 - Commercial and Medicaid

Adult Commercial Sample

- Total Number of Respondents = 135,479
- Number of Health Plans = 282
- Number of Sponsors = 15
- Average Response Rate Among Sponsors = 48% (range 21% to 64%)

Characteristics of Sample

SAMPLE CHARACTERISTIC	COMPLETES (N=15,807)	INCOMPLETES (N=119,672)	TOTAL (N=135,479)
Age			
18-34	18	21	20
35-55	75	73	73
>55	7	7	7
Gender			
Male	33	40	39
Female	67	60	61
Education			
<HS	4	6	6
HS	23	28	27
>HS	72	67	67
Health Status			
Very Good or Excellent	45	59	57
Poor, Fair, Good	55	41	43

CAHPS® Core Reports and Ratings

- Reports:
 - Access (4 items)**
 - Timeliness (4 items)**
 - Communication (4 items)**
 - Office Staff (2 items)**
 - Health Plan (3 items)
- Ratings:
 - Personal Doctor
 - Specialist
 - Health Care
 - Health Plan

**14 items used in this analysis.

Medical Care Experience Scale - 1

How much of a problem was it?	
06. To find a personal doctor?	
10. To get a referral to see specialists?	A Big Problem
22. To get needed care?	A Small Problem
23. To get approval from health plan for care?	Not A Problem

Medical Care Experience Scale - 2

How often?	
15. Did you get an appointment for routine care as soon as you wanted?	Never Sometimes Usually Always
17. Did you get care for an urgent illness or injury as soon as you wanted?	
19. Did you get phone help or advice you needed?	
24. Did you wait more than 15 minutes past your appointment time?	
27. Did your doctors explain things in a way you could understand?	
28. Did your doctors listen carefully to you?	
29. Did your doctors show respect for what you had to say?	
30. Did your doctors spend enough time with you?	
25. Office staff as helpful as you thought they should be?	
26. Office staff courteous and respectful?	

Item Descriptive Statistics

(n=15,807)

Item	Mean	SD	Distribution of Scores (%)			
			Category 1	Category 2	Category 3	Category 4
06	2.48	0.73	14	24	62	
10	2.59	0.69	12	18	71	
22	2.62	0.64	9	20	71	
23	2.61	0.66	10	20	70	
15	3.26	0.82	2	17	33	47
17	3.09	0.89	6	17	38	39
19	3.35	0.86	5	12	27	56
24	2.57	0.97	19	20	45	16
27	3.34	0.75	1	13	36	50
28	3.45	0.70	1	9	35	56
29	3.49	0.74	1	11	35	53
30	3.18	0.82	4	15	40	41
25	3.58	0.65	1	7	26	67
26	3.31	0.76	2	13	38	48

Analysis Plan

- Assess Dimensionality
 - Factor Analysis Using Polychoric Correlations
 - Microfact 2.0
- Assess Model Fit
 - Graded Response Model (GRM)
 - General Partial Credit Model (GPCM)
 - Parscale 3.5
- Review Results
 - Item and Test Characteristics

Dimensionality - 1

- Cronbach's Alpha =0.90
- Results of 1-Factor Solution Using Polychoric Correlations
 - Ratio of first (7.6) to second (1.6) eigenvalues=4.8
 - Mean residual=0.04
 - SD of residuals=0.10
 - GFI=0.98

Dimensionality - 2

ITEM	FACTOR LOADINGS
06	0.65
10	0.66
22	0.76
23	0.58
15	0.79
17	0.69
19	0.75
24	0.53
27	0.85
28	0.77
29	0.84
30	0.80
25	0.77
26	0.82

Model Fit

- Model Chi-Square:
 - GRM= 4,235.15 (285 d.f., $p < 0.001$)
 - GPCM= 5,421.29 (272 d.f., $p < 0.001$)
- -2 Log Likelihood:
 - GRM = 362,945.2
 - GPCM = 364,835.7

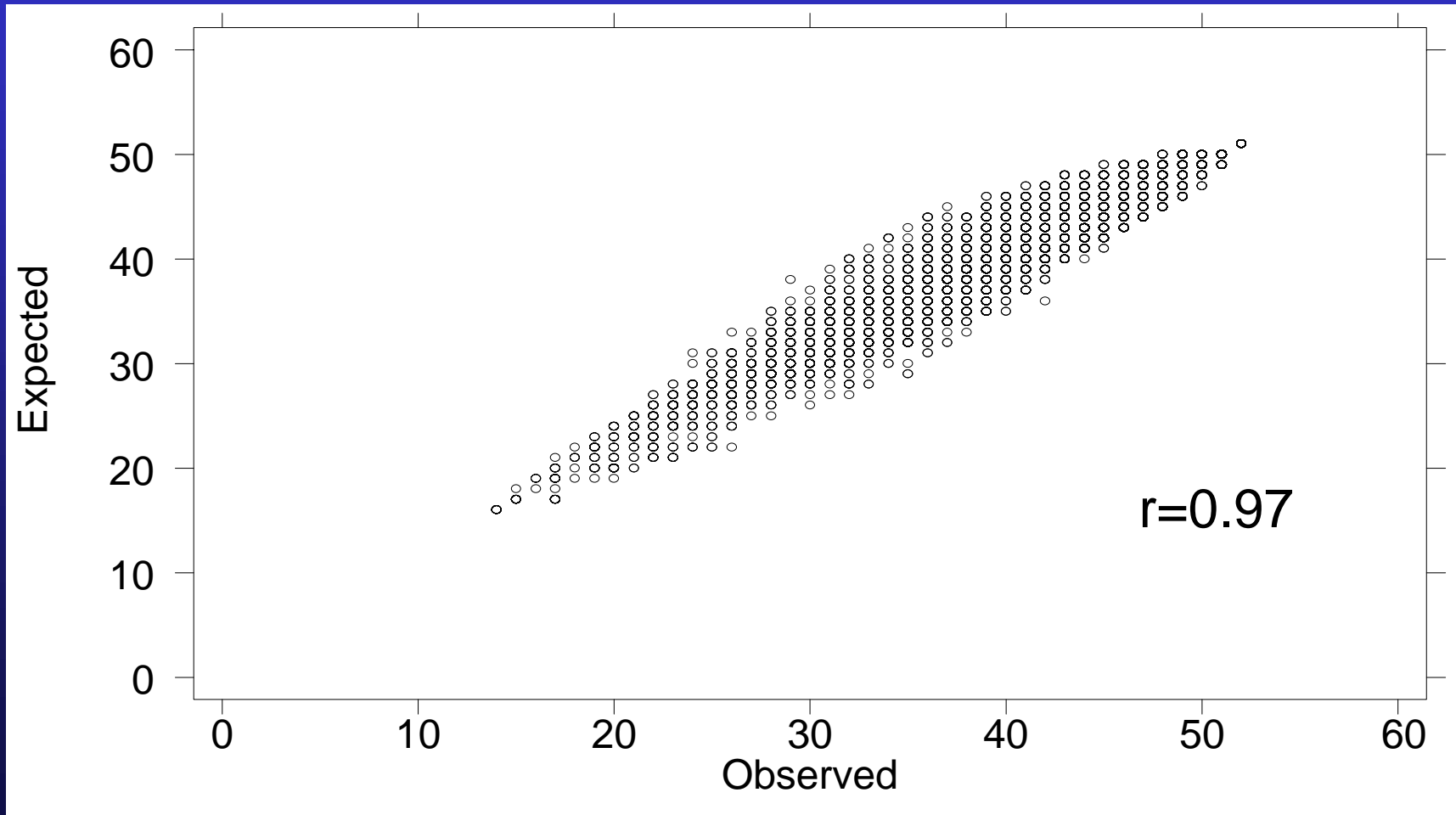
Model Fit

Root Mean Square Residual

	Graded Response Model	General Partial Credit Model
<u>Overall</u>	0.576	0.631
<u>Item-Specific</u>		
06	0.629	1.046
10	0.605	0.632
22	0.509	0.529
23	0.596	0.623
15	0.594	0.605
17	0.713	0.729
19	0.676	0.698
24	0.864	0.875
27	0.388	0.403
28	0.445	0.459
29	0.384	0.399
30	0.482	0.495
25	0.472	0.484
26	0.495	0.502

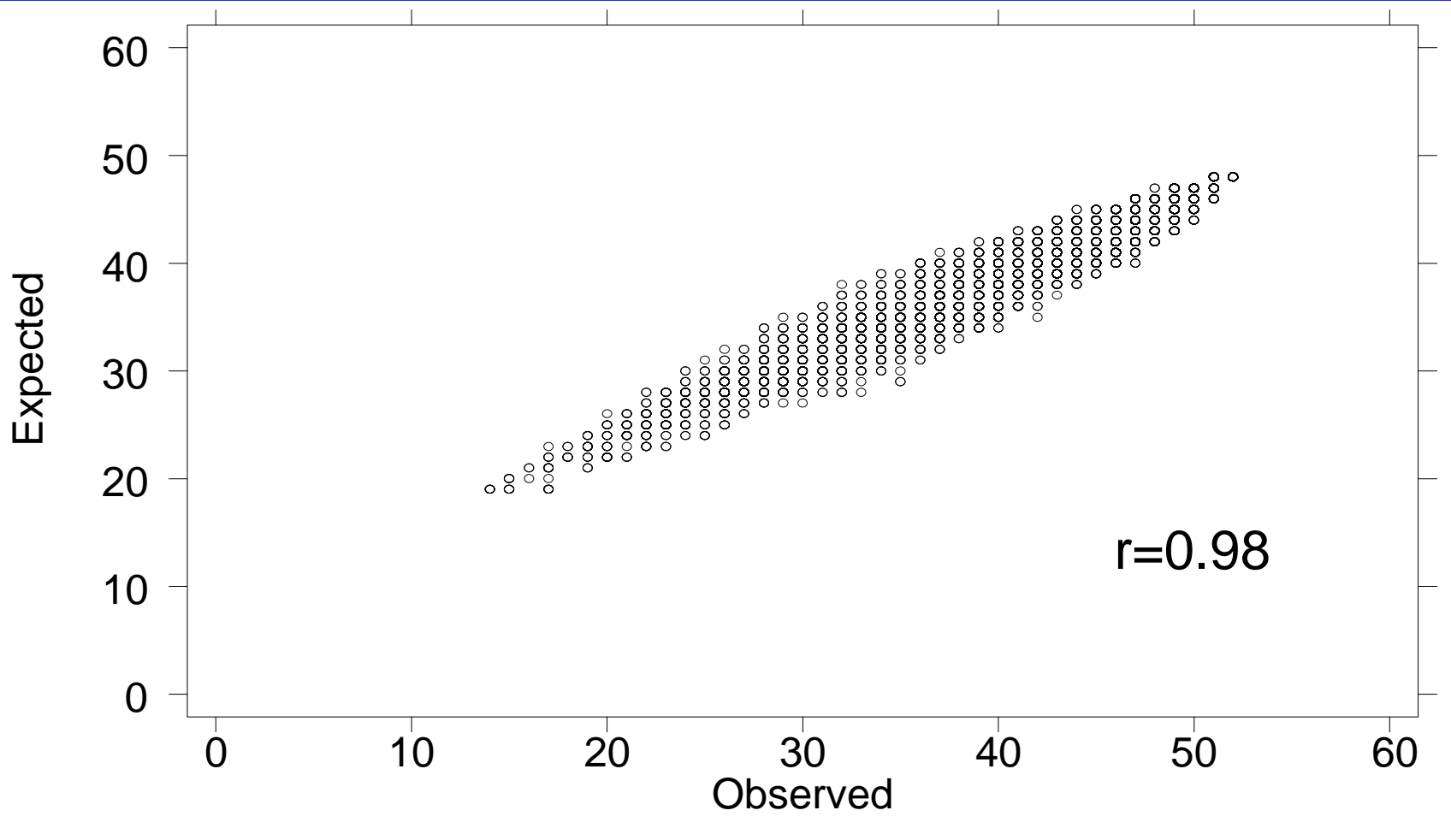
Observed Versus Expected Scores

GRM (n=15,807)

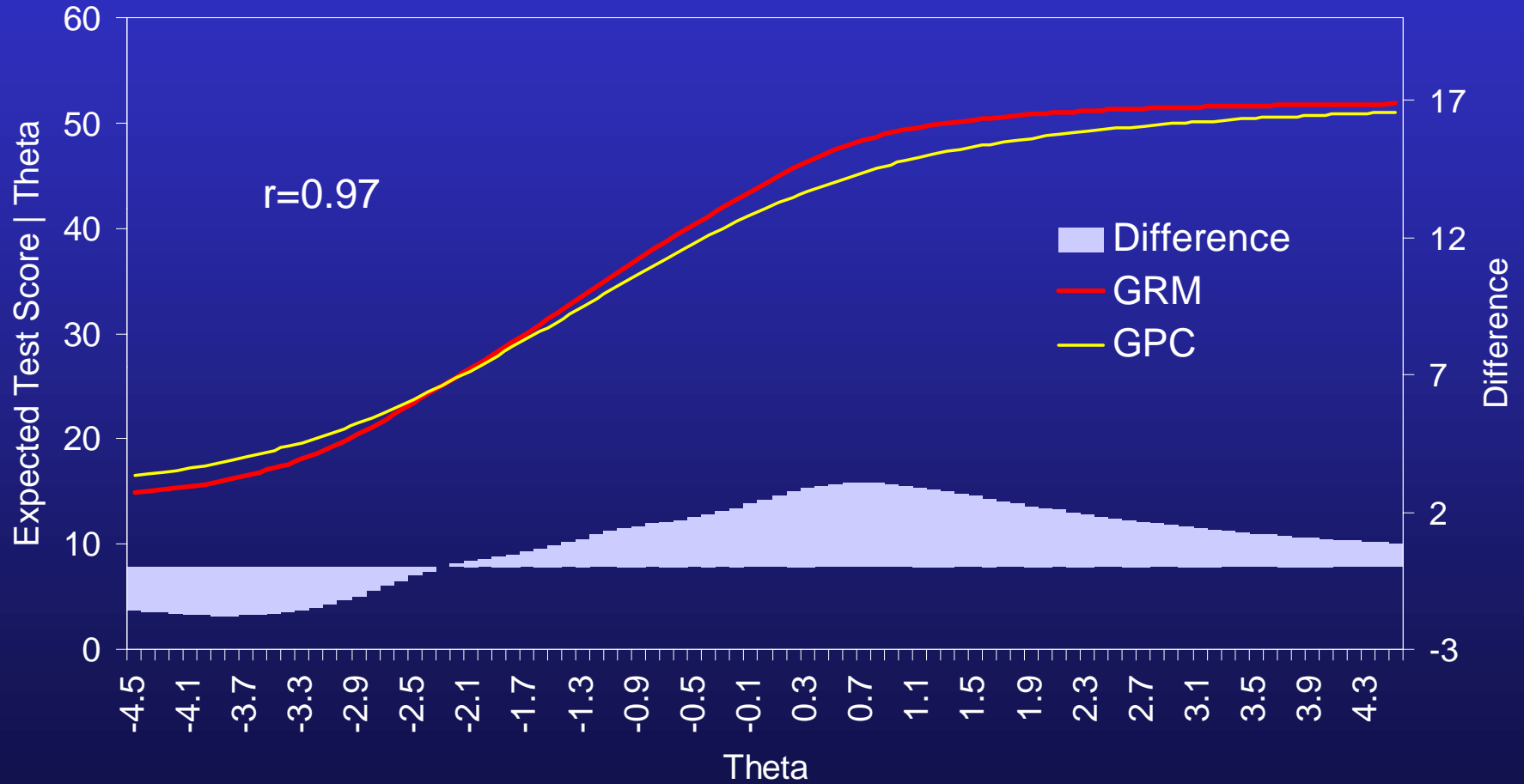


Observed Versus Expected Score

GPCM (n=15,807)



Expected Scores GRM and GPCM



Slope Parameters

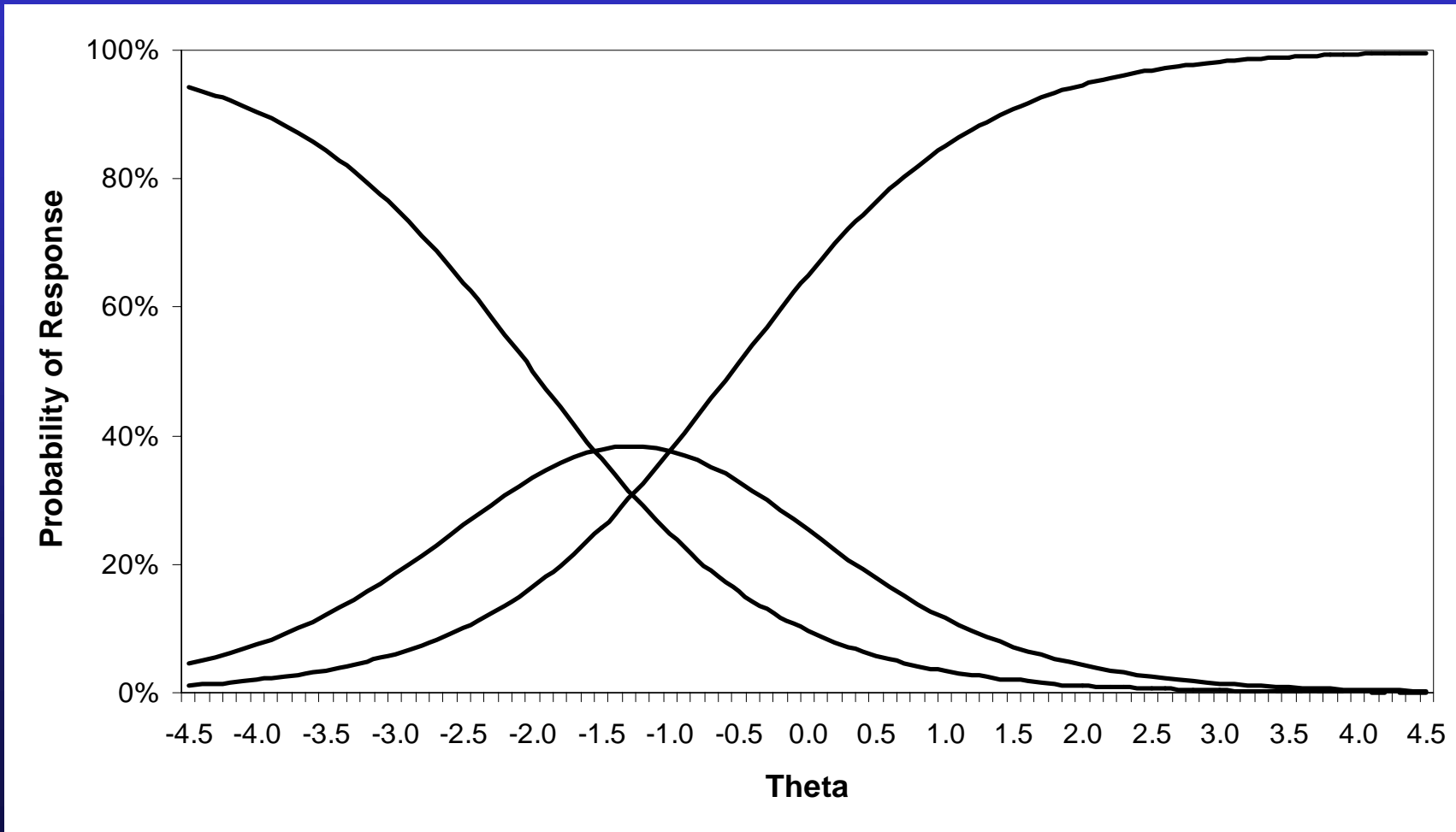
Item	Graded Response Model	General Partial Credit Model
06	0.69	0.52
10	0.69	0.51
22	1.00	0.82
23	0.60	0.46
15	1.10	0.88
17	0.83	0.59
19	0.94	0.67
24	0.53	0.33
27	2.07	1.93
28	1.50	1.35
29	2.06	1.93
30	1.61	1.40
25	1.24	1.09
26	1.41	1.24

Location and Intersection Parameters

Item	Graded Response Model				General Partial Credit Model			
	Loc	B1	B2	B3	Loc	B1	B2	B3
06	-1.22	-1.91	-0.53		-1.16	-1.23	-1.09	
10	-1.54	-2.12	-0.95		-1.43	-1.16	-1.69	
22	-1.38	-1.96	-0.79		-1.29	-1.53	-1.05	
23	-1.79	-2.56	-1.02		-1.64	-1.56	-1.72	
15	-1.31	-2.82	-1.19	0.08	-1.26	-2.53	-1.06	-0.09
17	-1.06	-2.49	-1.14	0.45	-0.98	-2.22	-1.17	0.23
19	-1.40	-2.55	-1.42	-0.23	-1.30	-1.41	-1.30	-0.59
24	-0.08	-1.87	-0.56	2.19	0.10	-2.91	-1.47	2.33
27	-1.24	-2.54	-1.19	0.00	-1.20	-2.34	-1.15	-0.05
28	-1.56	-2.94	-1.56	-0.17	-1.47	-2.44	-1.51	-0.24
29	-1.30	-2.53	-1.29	-0.08	-1.25	-2.24	-1.25	-0.13
30	-0.97	-2.16	-1.04	0.28	-0.93	-2.19	-1.04	0.22
25	-1.90	-3.27	-1.88	-0.55	-1.75	-2.20	-1.73	-0.66
26	-1.30	-2.64	-1.32	0.06	-1.22	-2.38	-1.28	0.00

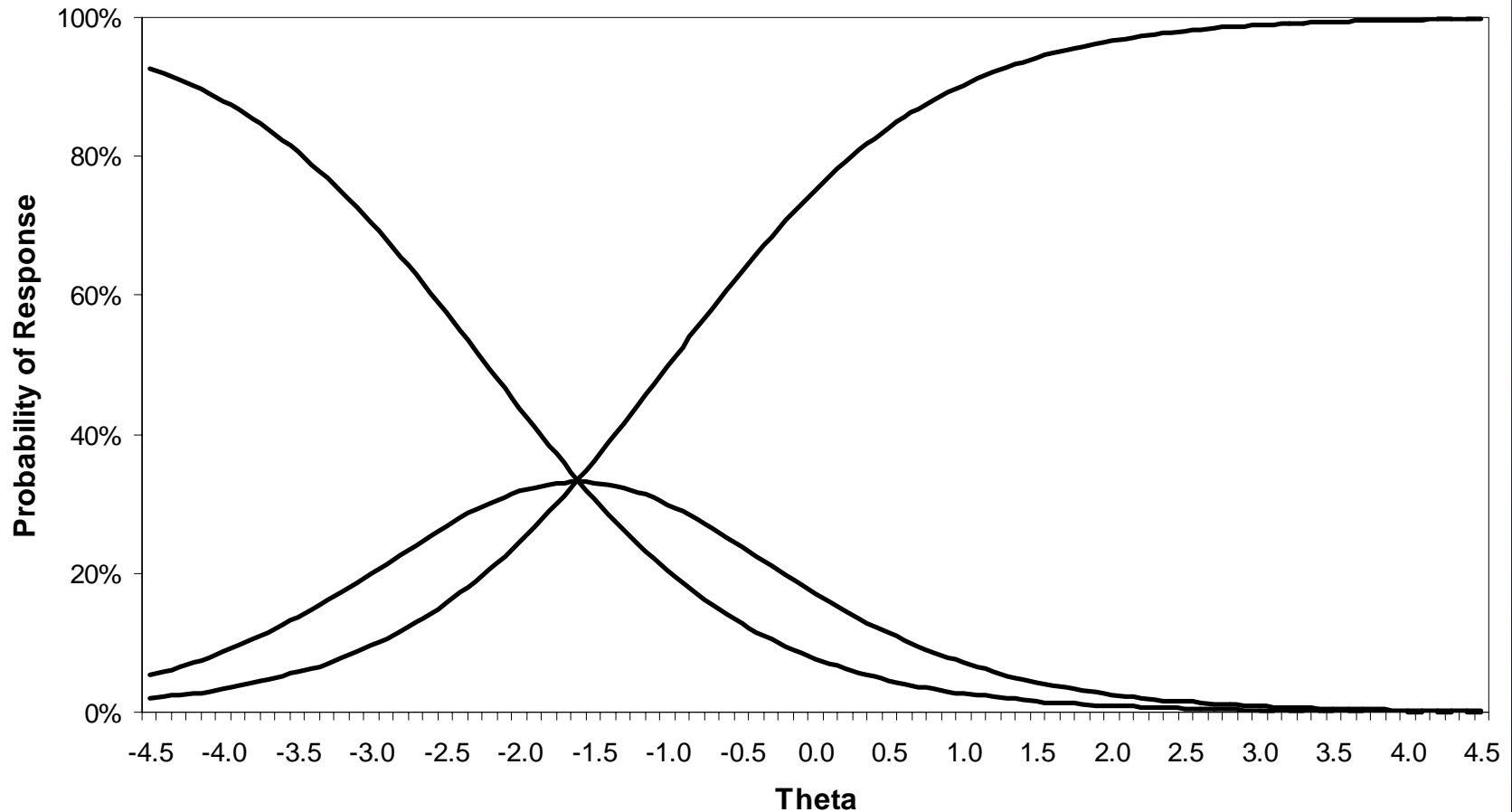
Item Category Probability Curves

Item 06: Finding a Personal Doctor



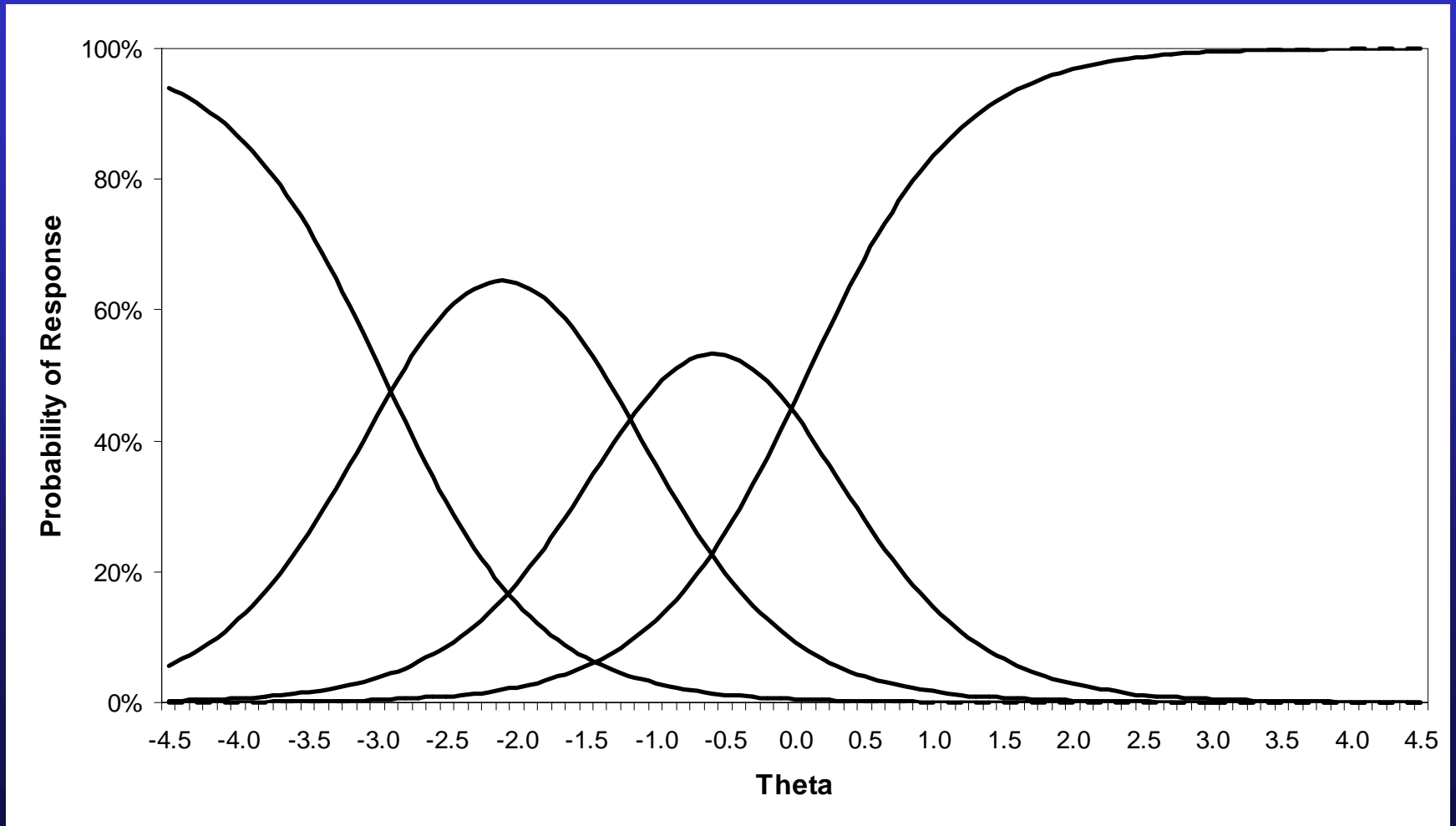
Item Category Probability Curves

Item 10: Getting Referrals to Specialists



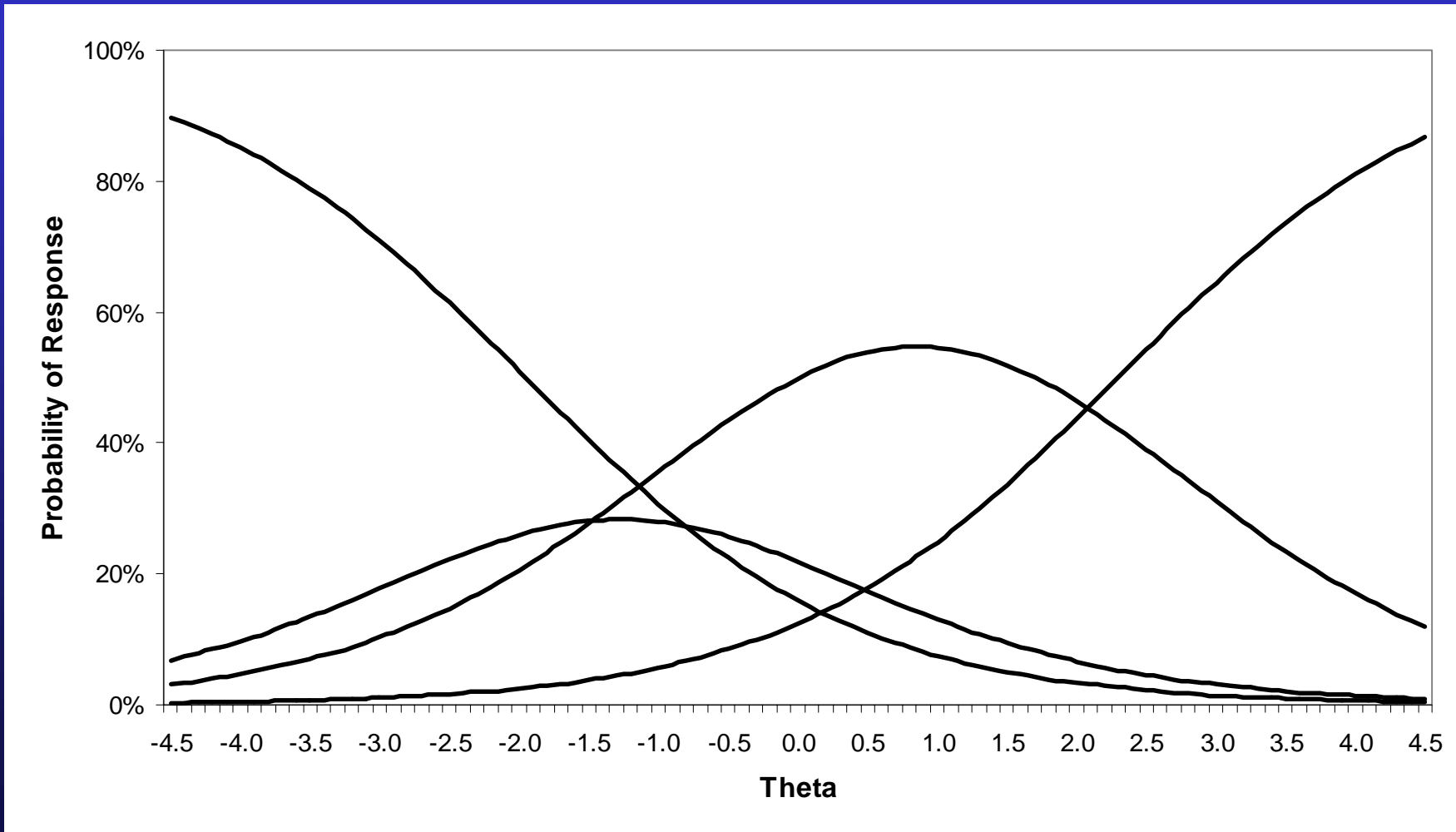
Item Category Probability Curves

Item 15: Getting Phone Advice



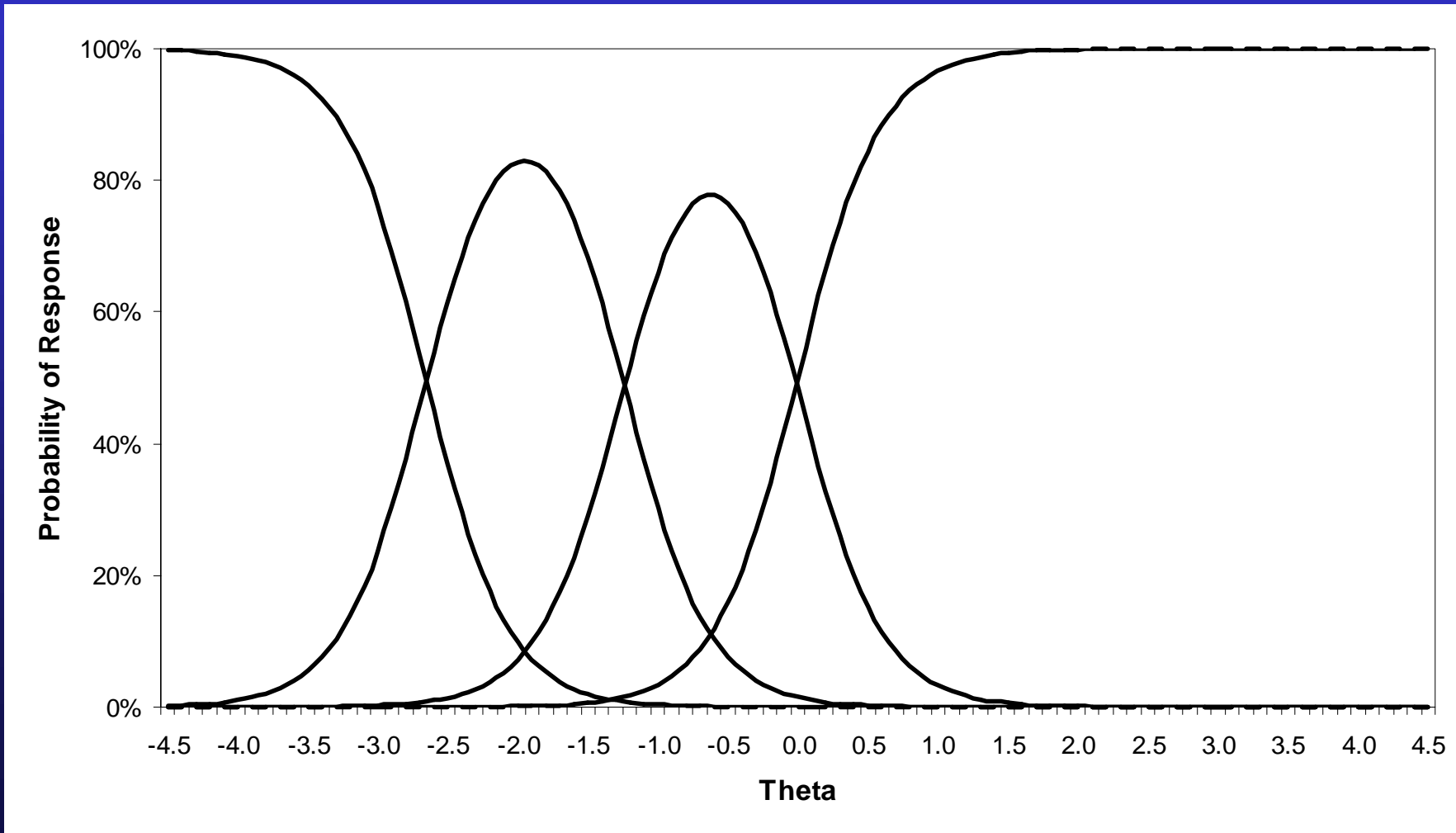
Item Category Probability Curves

Item 24: 15 Minutes Past Appointment Time



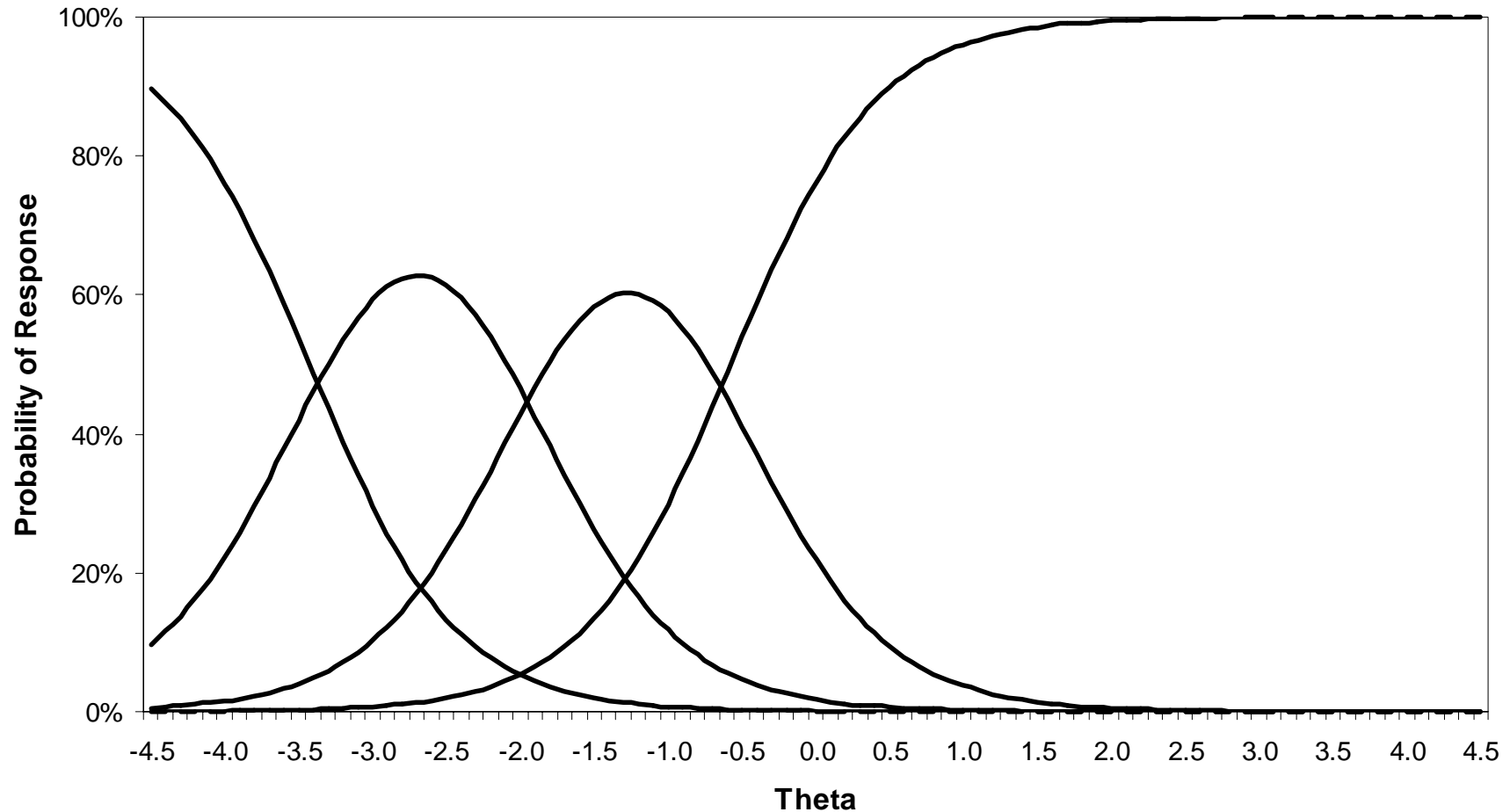
Item Category Probability Curves

Item 27: Listen Carefully

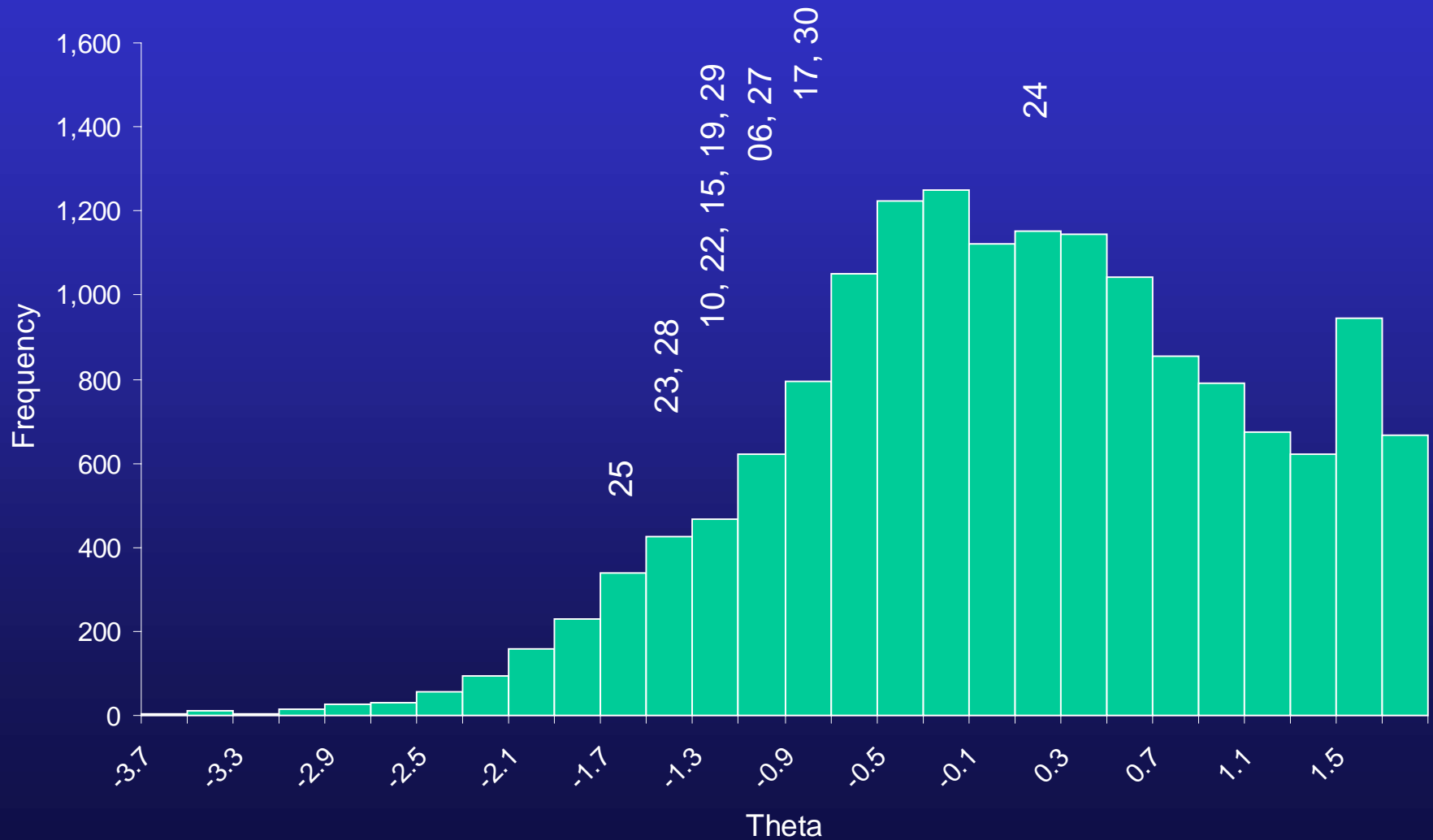


Item Category Probability Curves

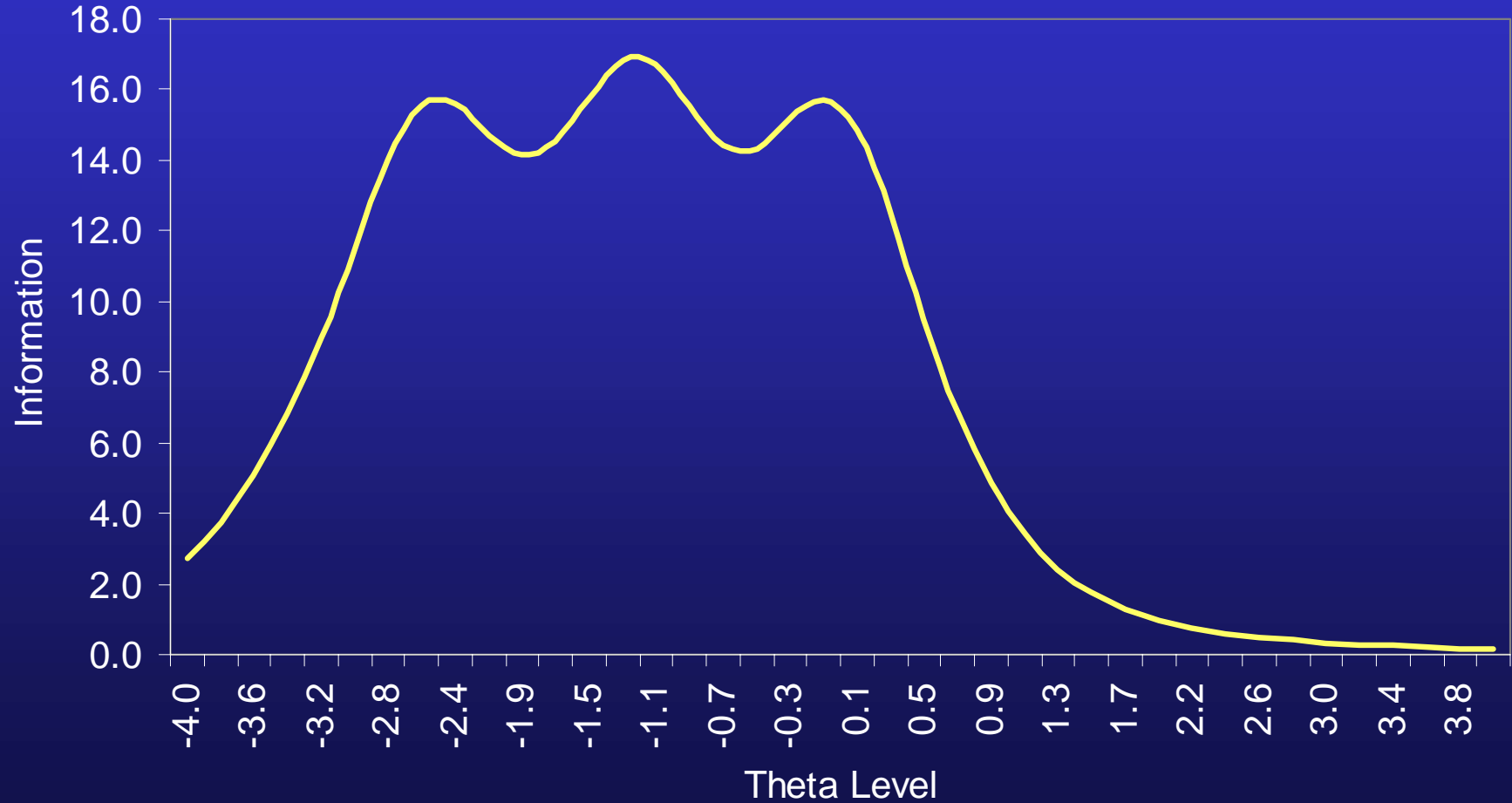
Item 25: Courtesy and Respect



Distribution of Respondents versus Items Locations



Test Information



Summary of Findings

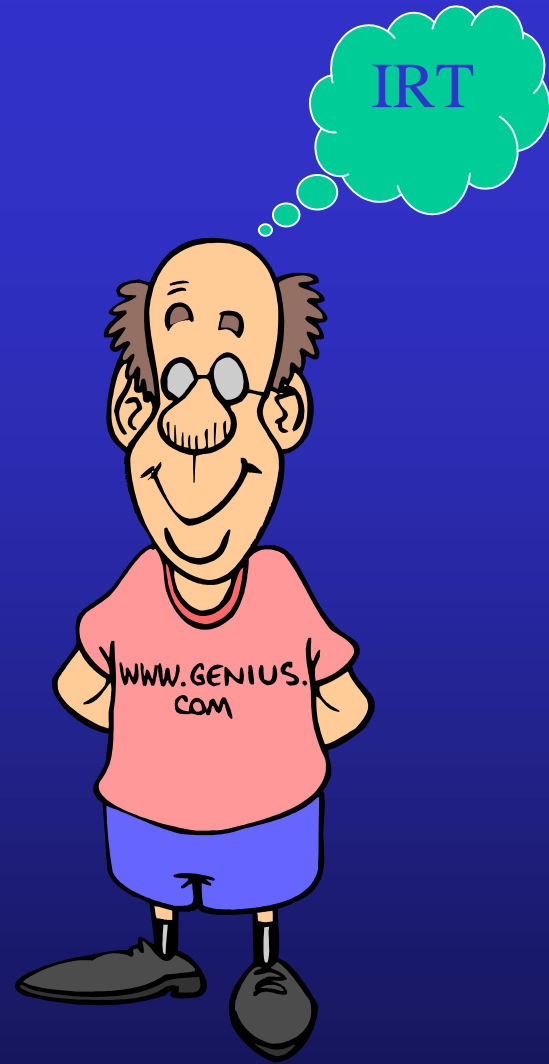
- Model Choice
- Items
- Future Directions:
 - IRT Models with Covariates
 - Testlets
 - DIF

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Root Mean Square Residual

$$RMSR = \sqrt{\frac{\sum_{i=1}^I \sum_{j=1}^J (x_{ij} - p_{ij} | \hat{\theta}_i)^2}{I \times J}}$$

Where,

Items = 1,2,3, ... I

Persons = 1,2,3, ... J