

Solving Everyday Testing Problems with Item Response Theory (IRT)

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Applications of IRT:

- Adaptive Testing
- Activities That Involve Judges
 - Job Task Analysis
 - Standard Setting
 - Essay Scoring
 - Standardized Patients
 - Portfolio Assessment



Applications of IRT:

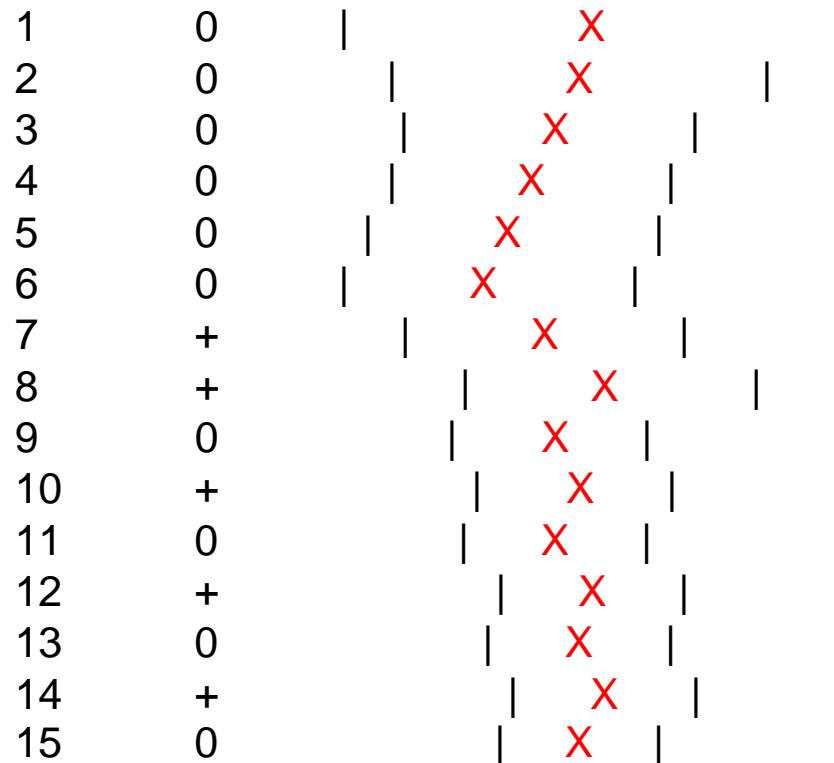
Adaptive Testing

What is necessary to implement an adaptive test?

- IRT calibrated item bank
- Adaptive algorithm
- Test specifications

How does adaptive testing work?

Sample Map



Advantages of adaptive testing

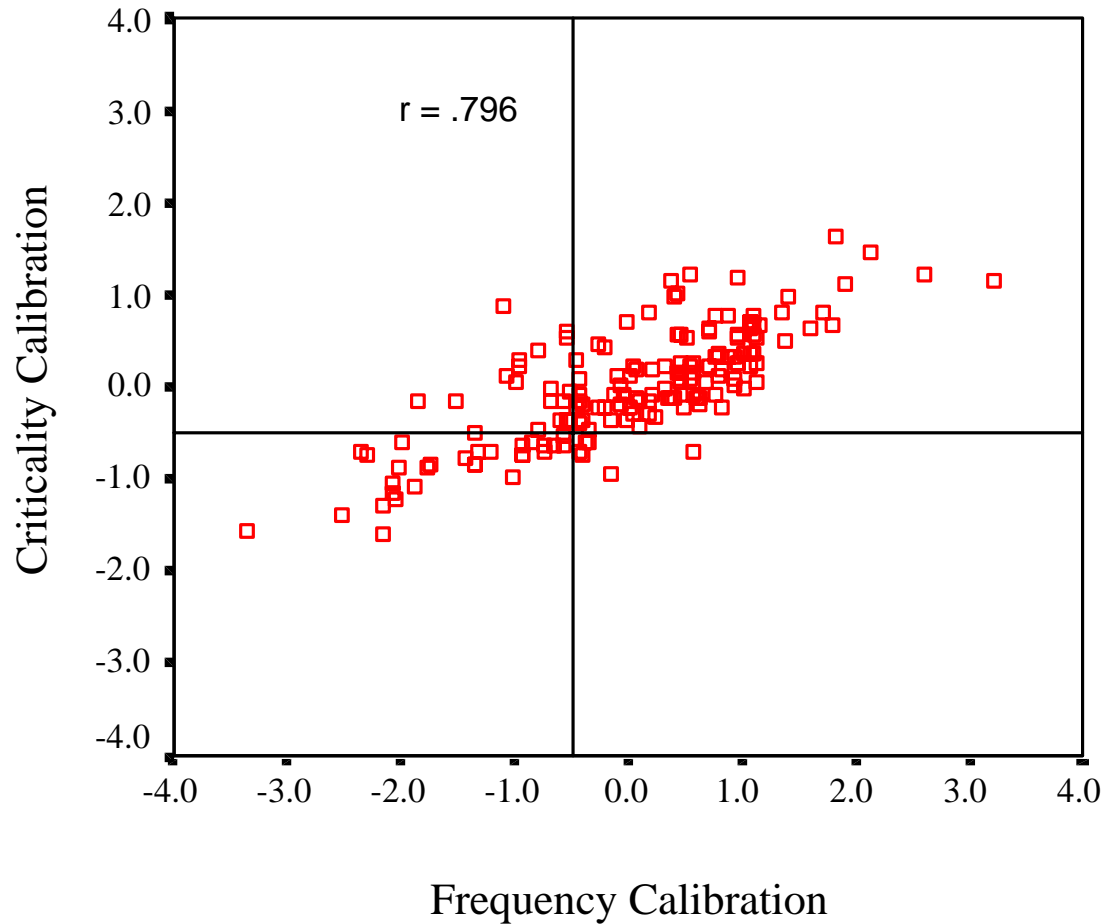
- **Reduced test length**
- **Reduced time**
- **Reduced cost**
- **Increased reliability**
- **Improved security**
- **Reduced anxiety**
- **Appropriate re-test**

Job Task Analysis

- Nursing intervention tasks were rated for frequency and criticality
- Data were analyzed with the Rasch model
- Tasks were ordered based on their frequency and criticality as determined by the item calibrations
- The two sets of calibrations were plotted against each other.

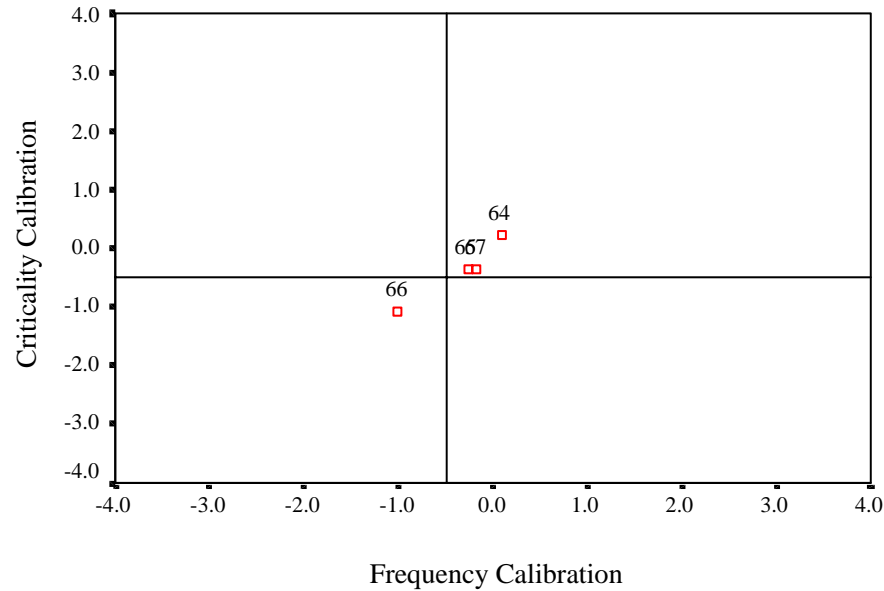
Nursing Interventions

Frequency vs. Criticality Calibrations



Perioperative Care

Frequency vs. Criticality Calibrations



Perioperative Care

Item Number	Nursing Interventions	Frequency Calibration	Criticality Calibration
64	Postanesthesia Care	0.05	0.22
65	Preoperative Coordination	-0.59	-0.35
66	Surgical Assistance	-1.88	-1.07
67	Surgical Preparation	-0.41	-0.35

Nursing Interventions Test Blueprint

a

	Subarea	Percent
	<i>Activity & Exercise Management</i>	3.98
	<i>Elimination Management</i>	8.01
	<i>Immobility Management</i>	3.61
	<i>Nutrition Support</i>	4.17
	<i>Physical Comfort Promotion</i>	.95
	<i>Self-Care Facilitation</i>	4.36
	<i>Electrolyte & Acid/Base Management</i>	3.83
	<i>Drug Management</i>	4.22
	<i>Neurologic Management</i>	8.10
	<i>Perioperative Care</i>	1.82
	<i>Respiratory Management</i>	6.46
	<i>Skin/Wound Management</i>	3.80
	<i>Thermoregulation</i>	1.72
	<i>Tissue Perfusion Management</i>	5.08
	<i>Behavior Therapy</i>	3.72
	<i>Cognitive Therapy</i>	3.72
	<i>Coping Assistance</i>	5.45
	<i>Patient Education</i>	7.27
	<i>Crisis Management</i>	1.35
	<i>Risk Management</i>	5.56
	<i>Lifespan Care</i>	2.80
	<i>Health Systems Medication</i>	.72
	<i>Health Systems Management</i>	5.66
	<i>Information Management</i>	3.79
	<i>Total</i>	100.15

a. Total exceeds 100.00% because of rounding.



Applications of IRT

Portfolio Assessment

Portfolio Assessment

- Candidates submit a Portfolio that documents their professional accomplishments.
- Portfolio submissions are scored by a team of subject matter experts
- A three-faceted Rasch model was used for analysis, with the three facets being candidates, raters and items.

Portfolio Assessment

- The analysis adjusts the estimates of candidate ability to account for both item difficulty and rater severity.
- The ability of a candidate is estimated independently of the severity of the raters, the difficulty of the items, and the abilities of other candidates taking the test.

Measure	Candidate	Rater	Task
3	C2		Task 8
2	C4		
	C1		Task 3
1	C5	R1	
		R2	Task 5 Task 6
0		R6	
		R5 R3	
-1	C3	R4	Task 1
			Task 7 Task 3
-2	C7		
	C8		
-3	C6		

Advantages of Using IRT

- Equal Interval Measure
- Test-takers, items and raters are represented on the same scale
- Calibrations are independent of the particular test-takers, items or raters used for calibration
- Measurement precision is estimated for each test taker, item and rater

We Test the WorldSM



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