Modelo de Rasch

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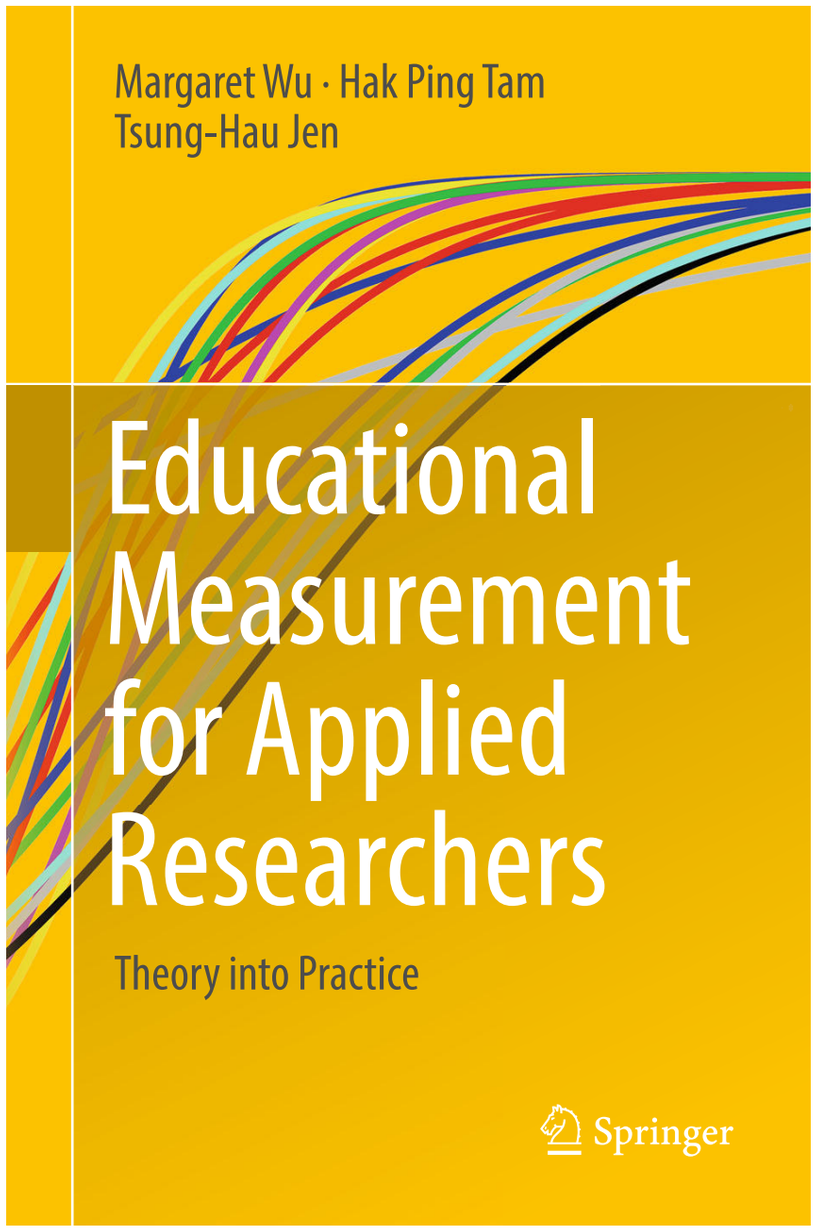
Programa de Pós Graduação Stricto Sensu em Psicologia

Capítulo 7


Margaret Wu · Hak Ping Tam
Tsung-Hau Jen
Educational Measurement for Applied Researchers
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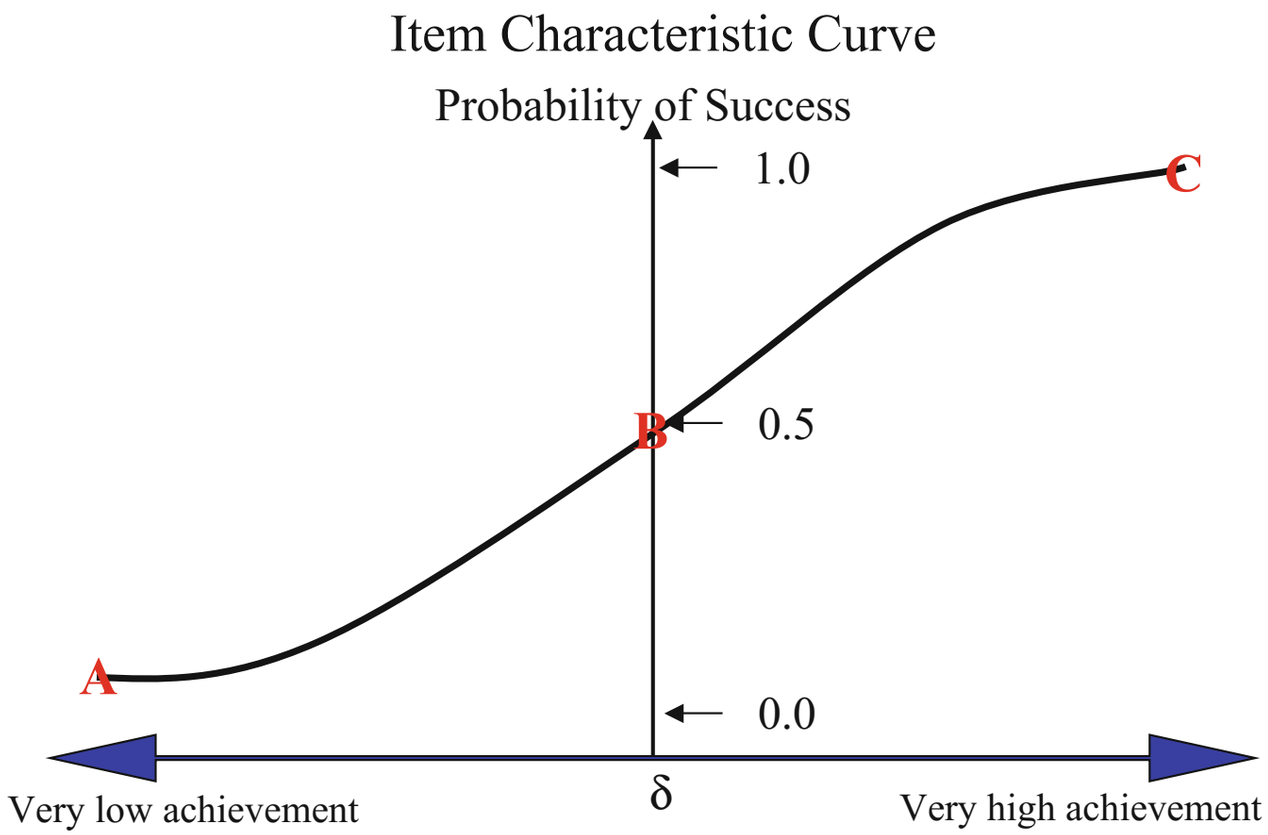
Springer

Modelo de Rasch



$$p = P(X = 1) = \frac{\exp(\theta - \delta)}{1 + \exp(\theta - \delta)}$$

$$\log\left(\frac{p}{1-p}\right) = \theta - \delta$$

Objetividade específica

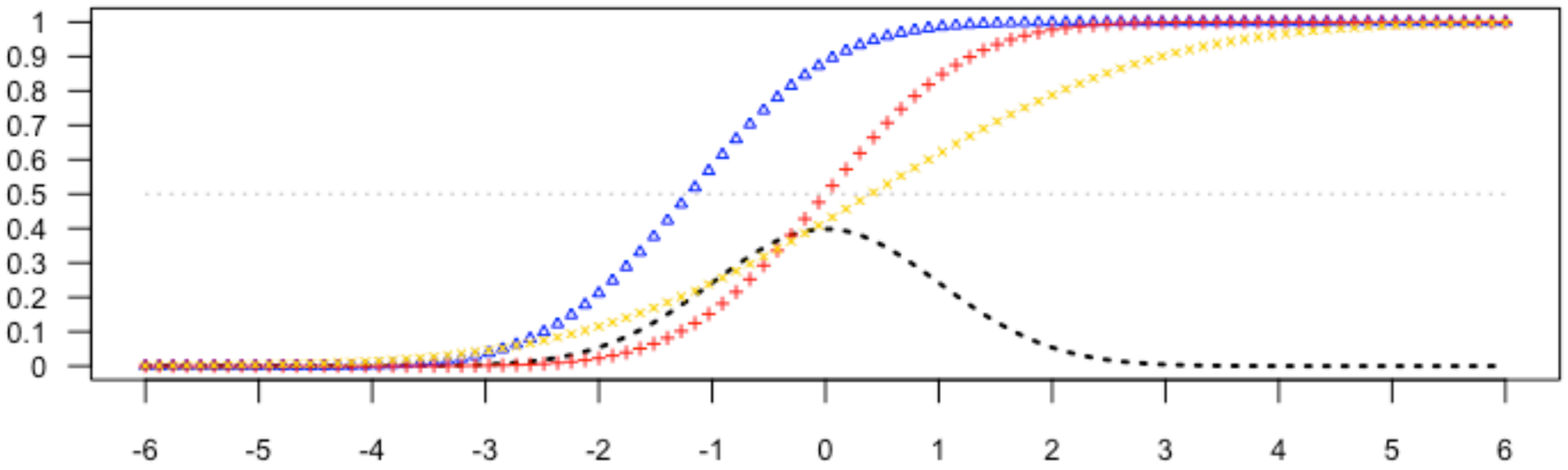
$$\log\left(\frac{p_1}{1-p_1}\right) = \theta_1 - \delta$$
$$\log\left(\frac{p_2}{1-p_2}\right) = \theta_2 - \delta$$

$$\log\left(\frac{p_1}{1-p_1}\right) - \log\left(\frac{p_2}{1-p_2}\right) = \theta_1 - \delta - (\theta_2 - \delta) = \theta_1 - \theta_2$$

"*person free*" / "*sample free*"

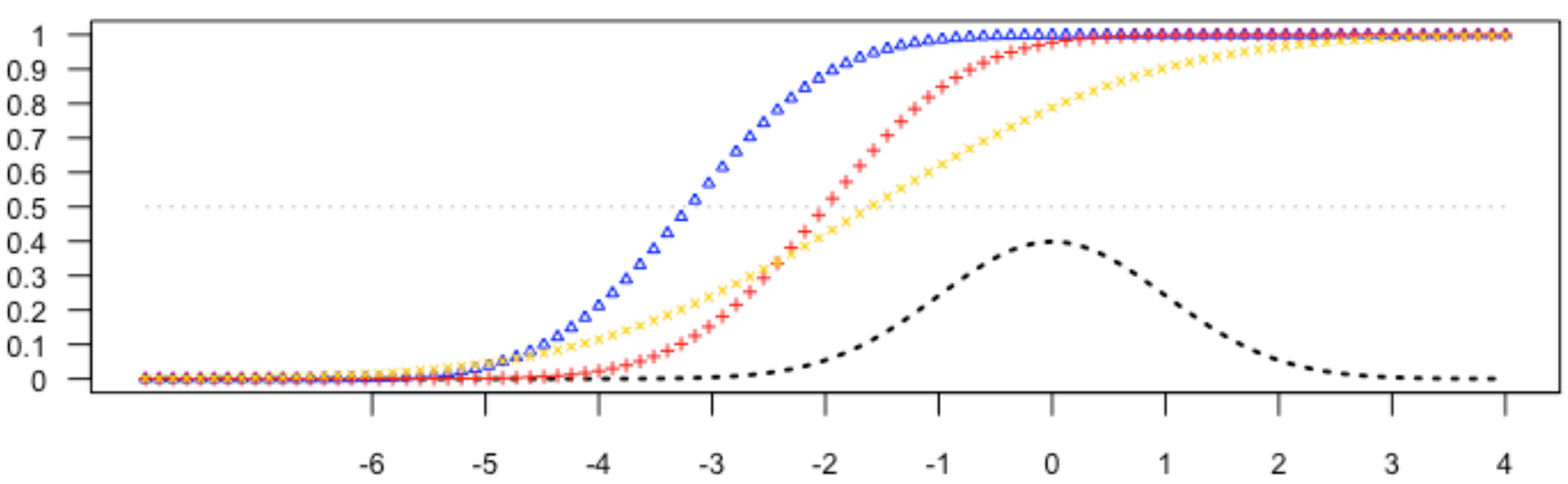
Indeterminação da métrica: localização do zero

- log (p / (1-p)) = theta - delta = (theta + c) - (delta + c)
- a métrica não especifica a localização absoluta da habilidade e nem da dificuldade
- um item com delta=1.2 em uma calibração comparado com outro item com 1.5 em outra calibração não são comparáveis sem antes fazer o *link/equating (calibrar/ equalizar)* a escala.
- é preciso definir/fixar o zero



Theta
M=0
DP=1

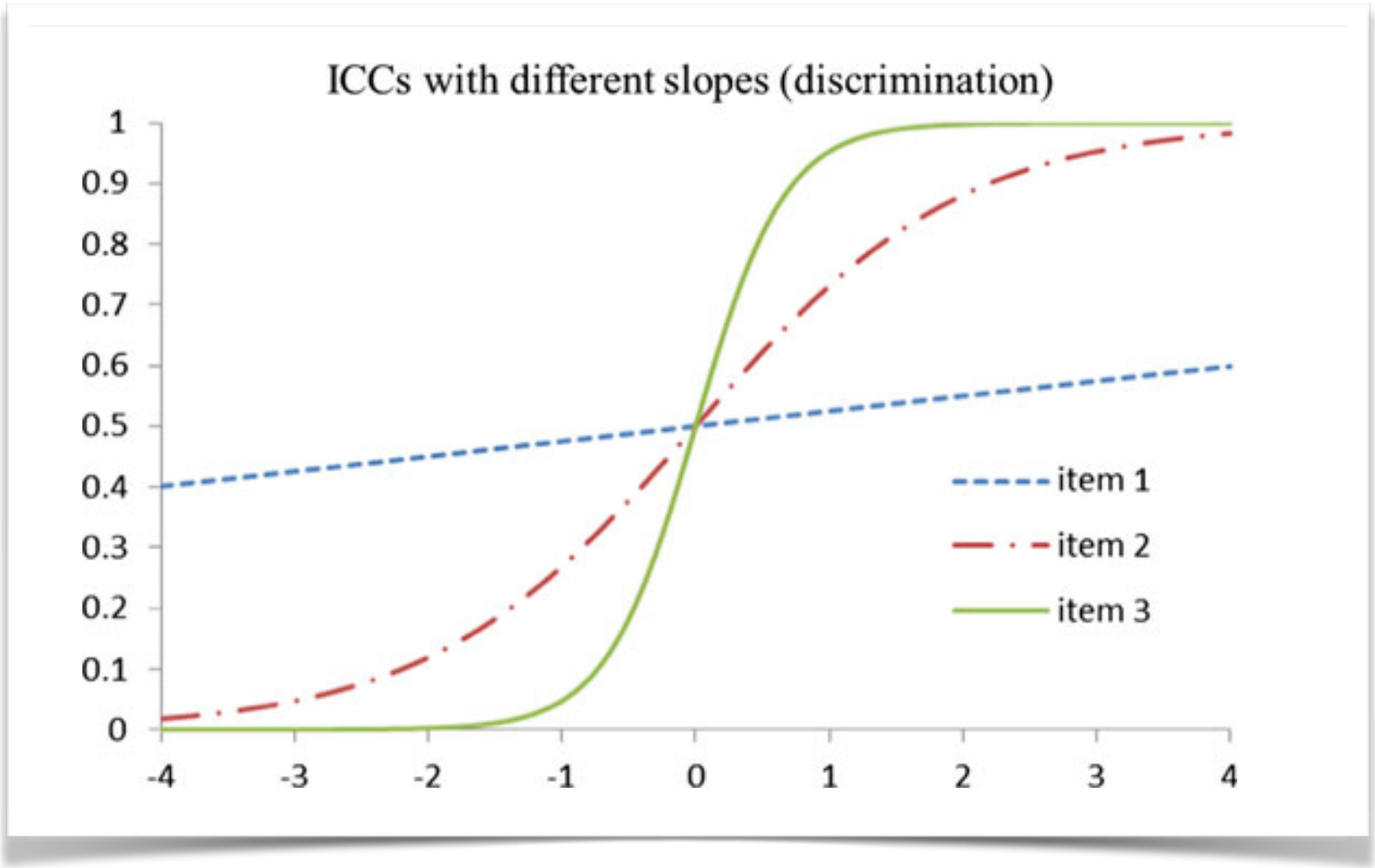
b_1 = -1.2
b_2 = 0
b_3 = .4



Theta verd
M=2 DP 1
Mas calibrado
M=0 DP1
b_1 = ?
b_2 = ?
b_3 = ?

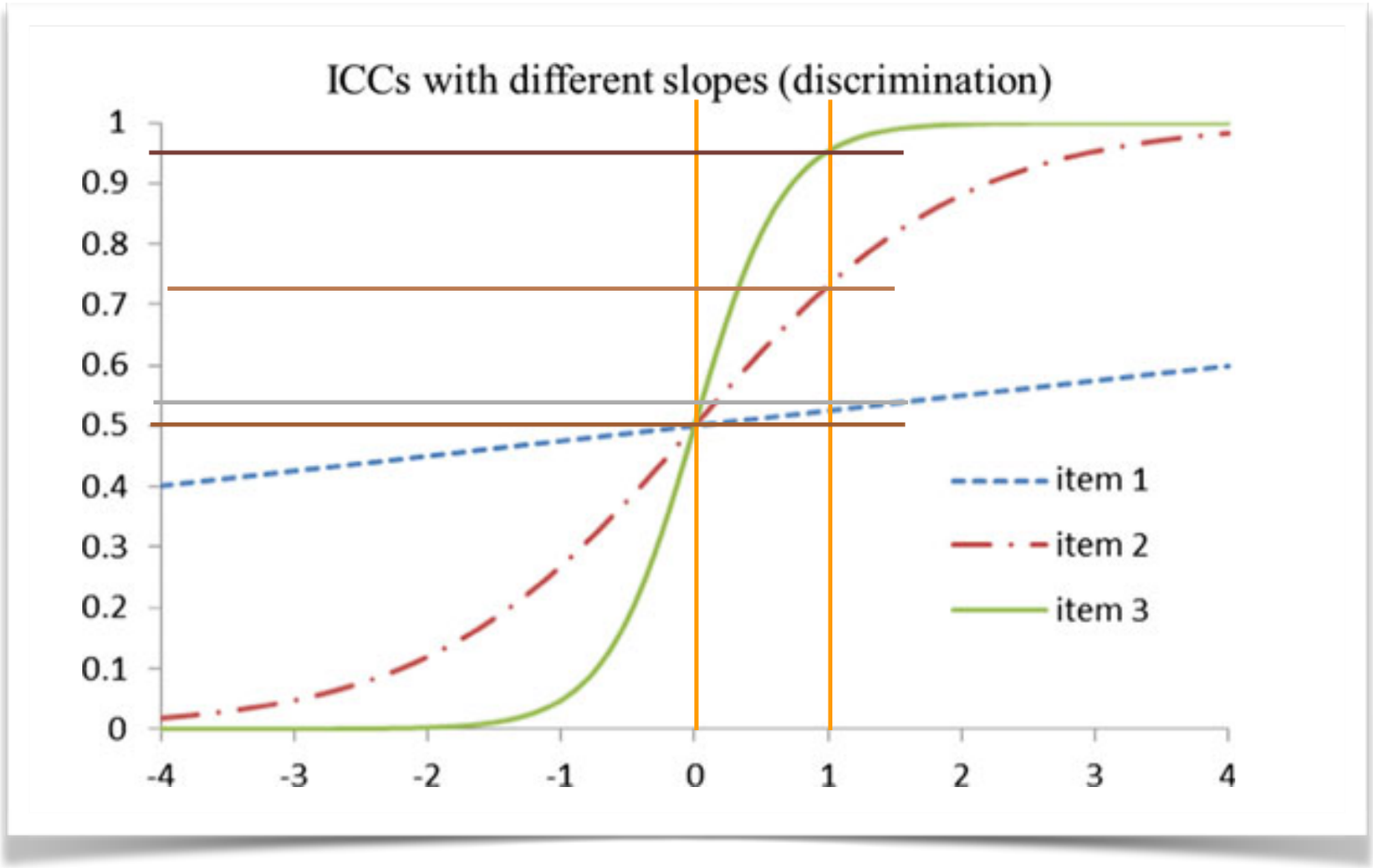
Indeterminação da métrica: discriminação absoluta (scale factor)

- parâmetro a



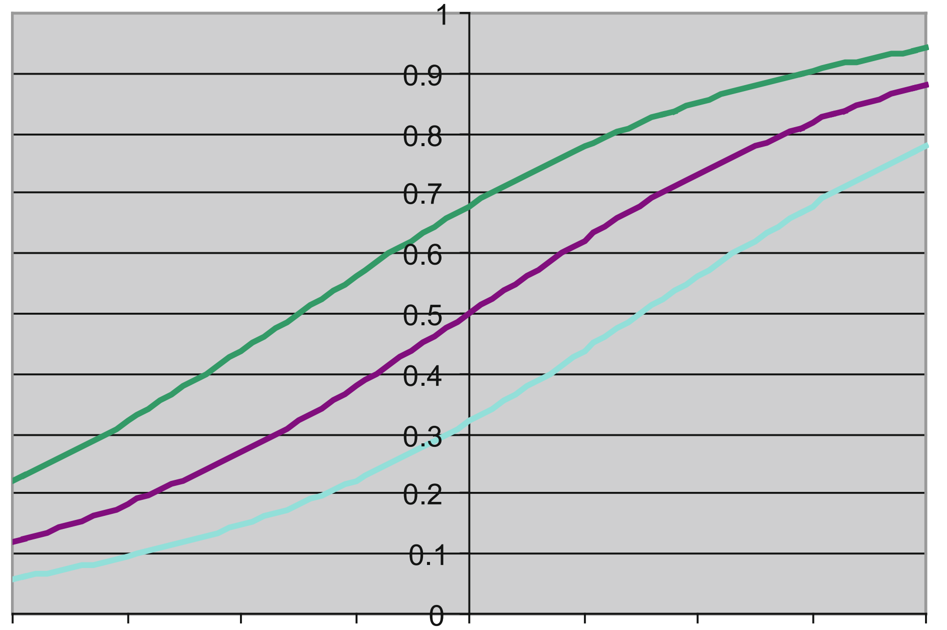
$$p = P(X = 1) = \frac{\exp(a(\theta - \delta))}{1 + \exp(a(\theta - \delta))}$$

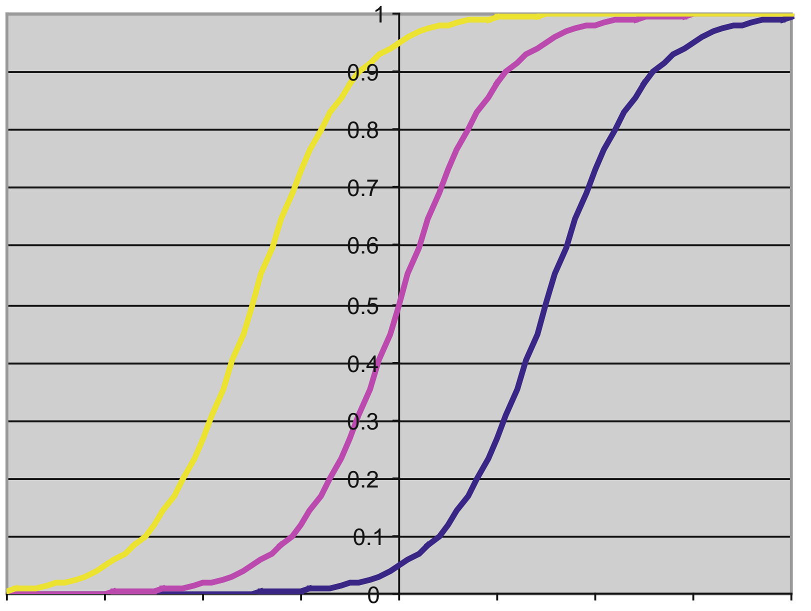
Scale factor

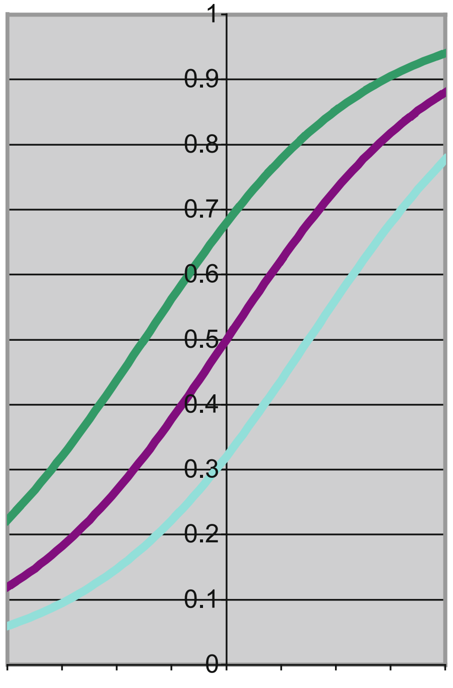


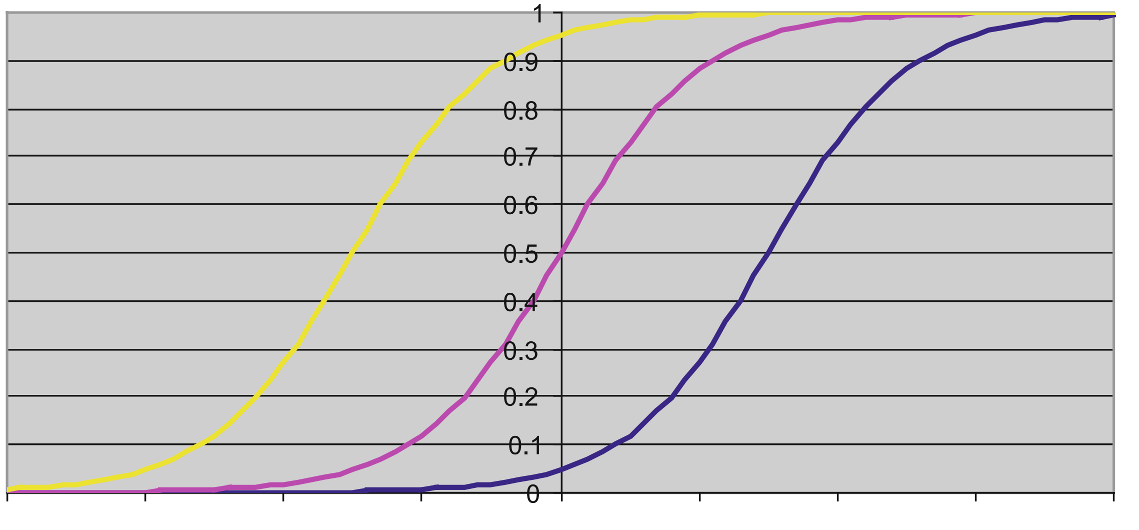
$$p = P(X = 1) = \frac{\exp(a(\theta - \delta))}{1 + \exp(a(\theta - \delta))}$$

- *a* teste 2 > *a* Teste 1
- Variância teste 2 > Variância teste 1
- Confiabilidade teste 2 > confiabilidade do teste 1







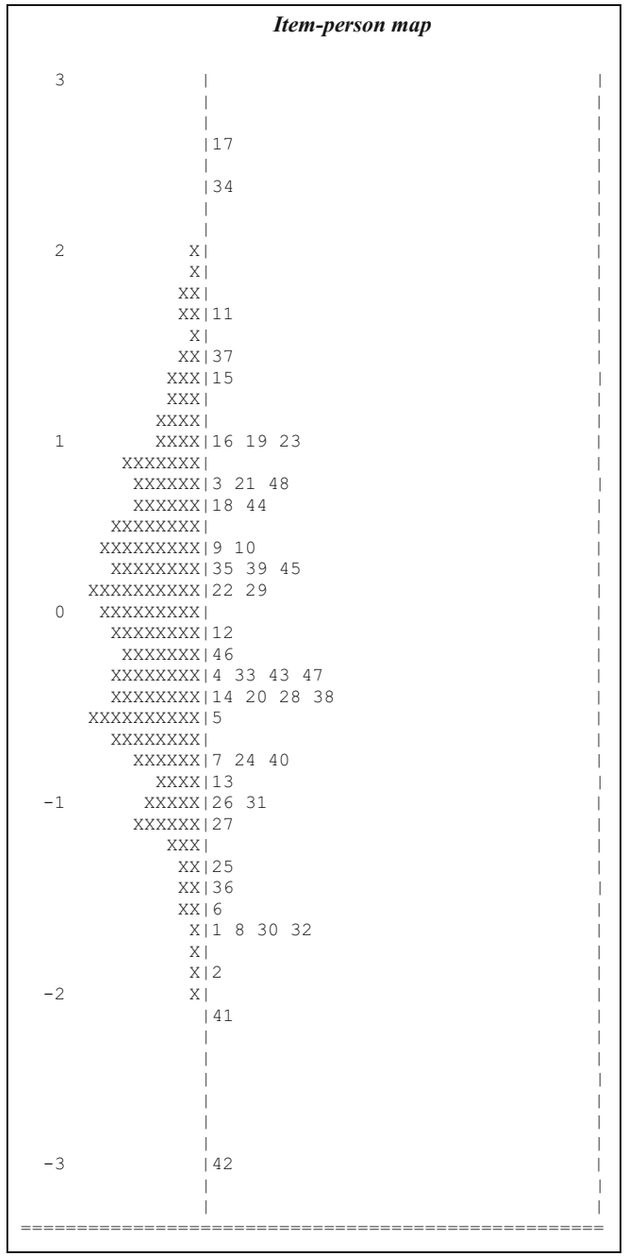


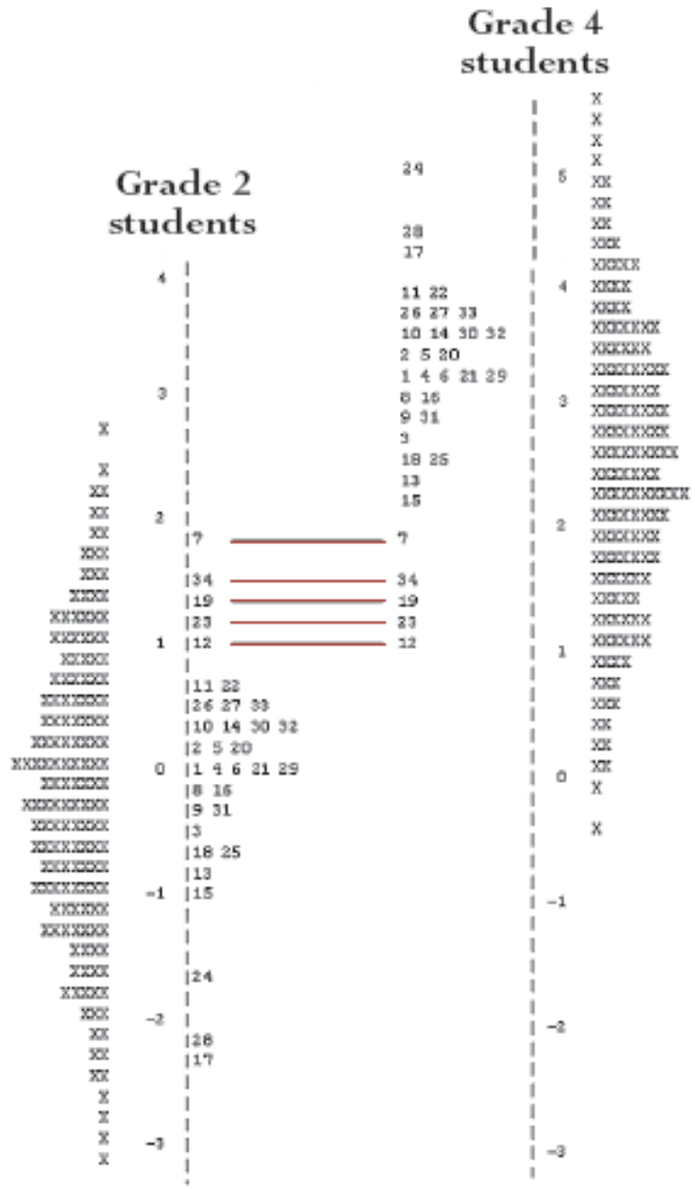
Indeterminação da métrica: *length of a logit*

- A métrica do logit é relativa
- Embora o modelo de Rasch não modele diferenças de discriminação, ela aprece no desvio padrão das distribuições.
- *a* - slope - indica a variação de acertos para uma variação de uma unidade da métrica de theta.

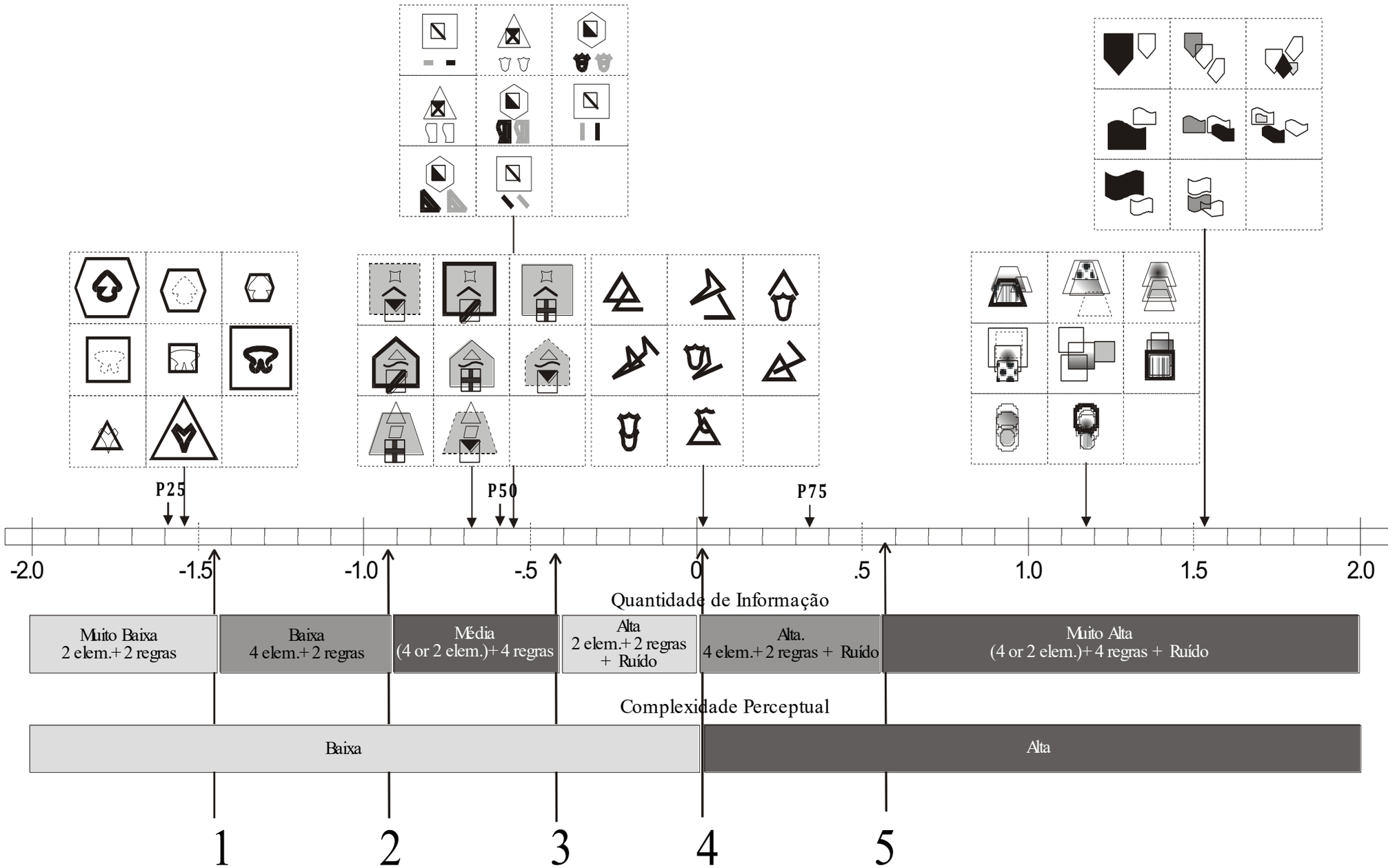
Escalas de proficiência (progression scales)

- A escala de dificuldade é a mesma da habilidade





Primi (2002) Citado por Urbina (2004) pag. 118 ☺



Psychological Assessment

1040-3590/14/$12.00 http://dx.doi.org/10.1037/a0036712

Developing a Fluid Intelligence Scale Through a Combination of Rasch Modeling and Cognitive Psychology

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Ability testing has been criticized because understanding of the construct being assessed is incomplete and because the testing has not yet been satisfactorily improved in accordance with new knowledge from cognitive psychology. This article contributes to the solution of this problem through the application of item response theory and Susan Embretson's cognitive design system for test development in the development of a fluid intelligence scale. This study is based on findings from cognitive psychology; instead of focusing on the development of a test, it focuses on the definition of a variable for the creation of a criterion-referenced measure for fluid intelligence. A geometric matrix item bank with 26 items was analyzed with data from 2,797 undergraduate students. The main result was a criterion-referenced scale that was based on information from item features that were linked to cognitive components, such as storage capacity, goal management, and abstraction; this information was used to create the descriptions of selected levels of a fluid intelligence scale. The scale proposed that the levels of fluid intelligence range from the ability to solve problems containing a limited number of bits of information with obvious relationships through the ability to solve problems that involve abstract relationships under conditions that are confounded with an information overload and distraction by mixed noise. This scale can be employed in future research to provide interpretations for the measurements of the cognitive processes mastered and the types of difficulty experienced by examinees.

Keywords: inductive reasoning, fluid intelligence, Rasch measurement, matrix reasoning

Primi, R. (2014, April 28). Developing a Fluid Intelligence Scale Through a Combination of Rasch Modeling and Cognitive Psychology. *Psychological Assessment*. Advance online publication. http://dx.doi.org/10.1037/a0036712

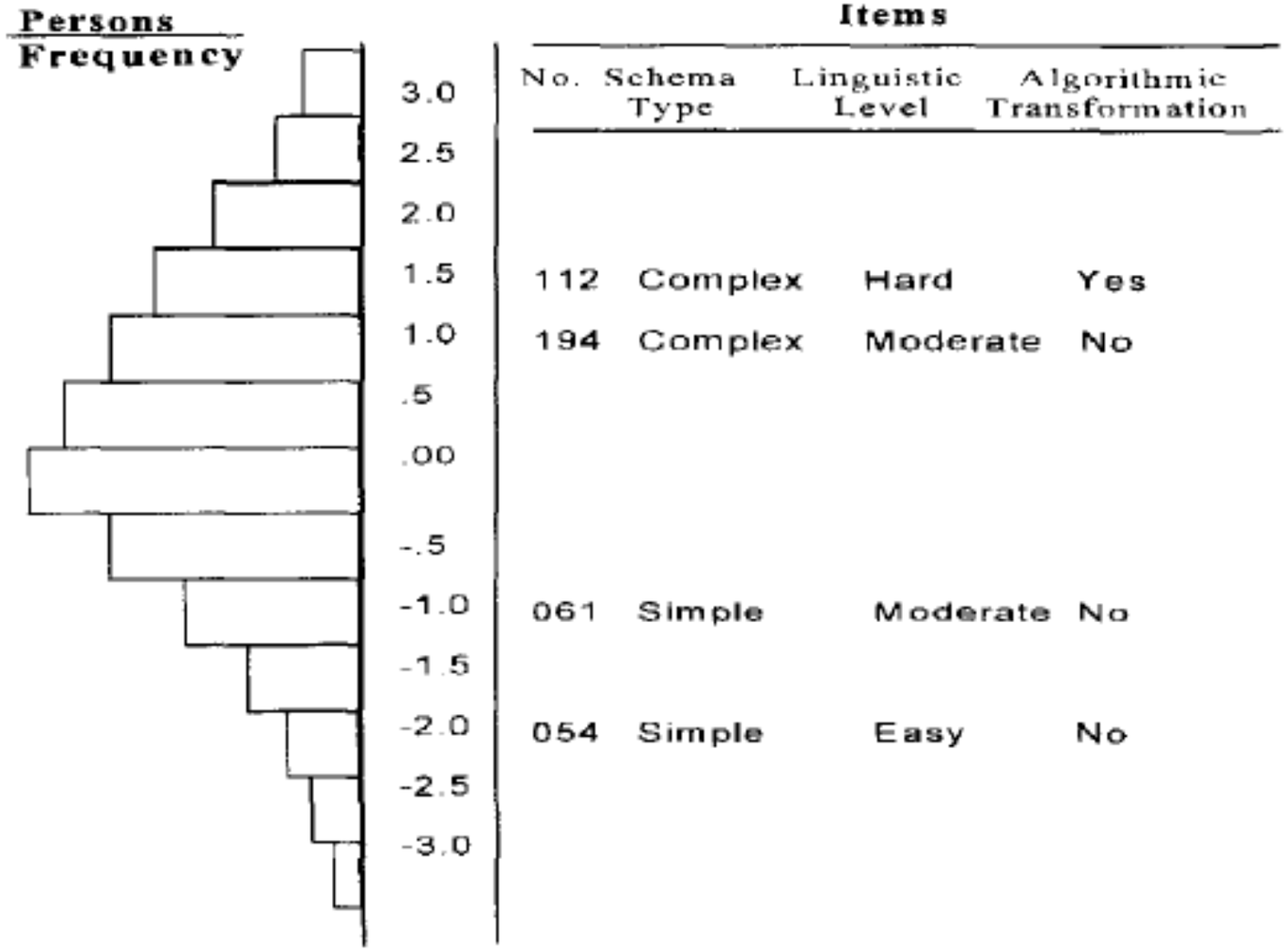

Figure 5. Common scale measurement of item difficulty and trait scores.

A PROVA DO ENADE DE PSICOLOGIA 2006: CONCEPÇÃO, CONSTRUÇÃO E ANÁLISE PSICOMÉTRICA DA PROVA

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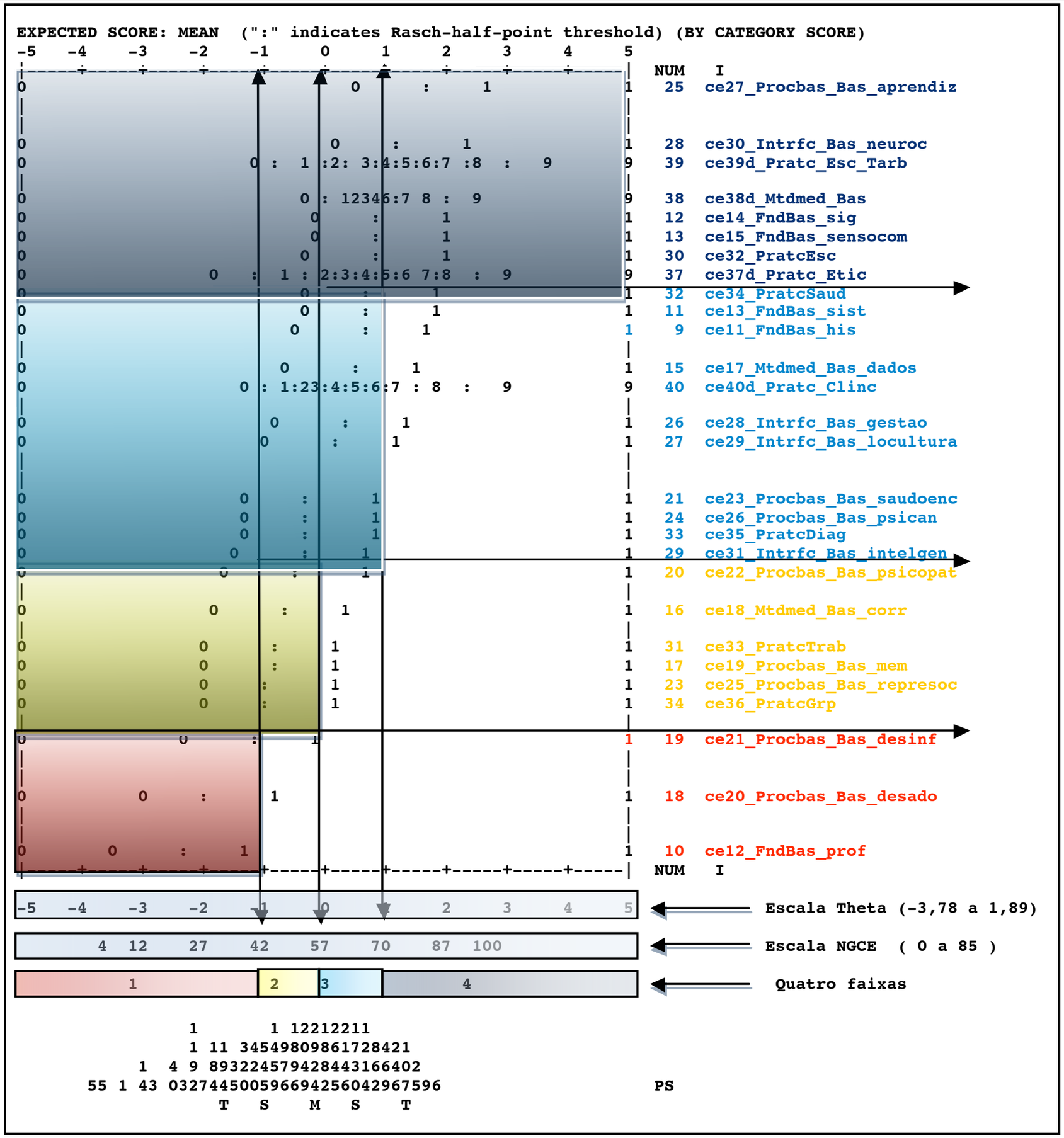
Marjorie Cristina Rocha da Silva – Universidade São Francisco (LabAPE, USF)

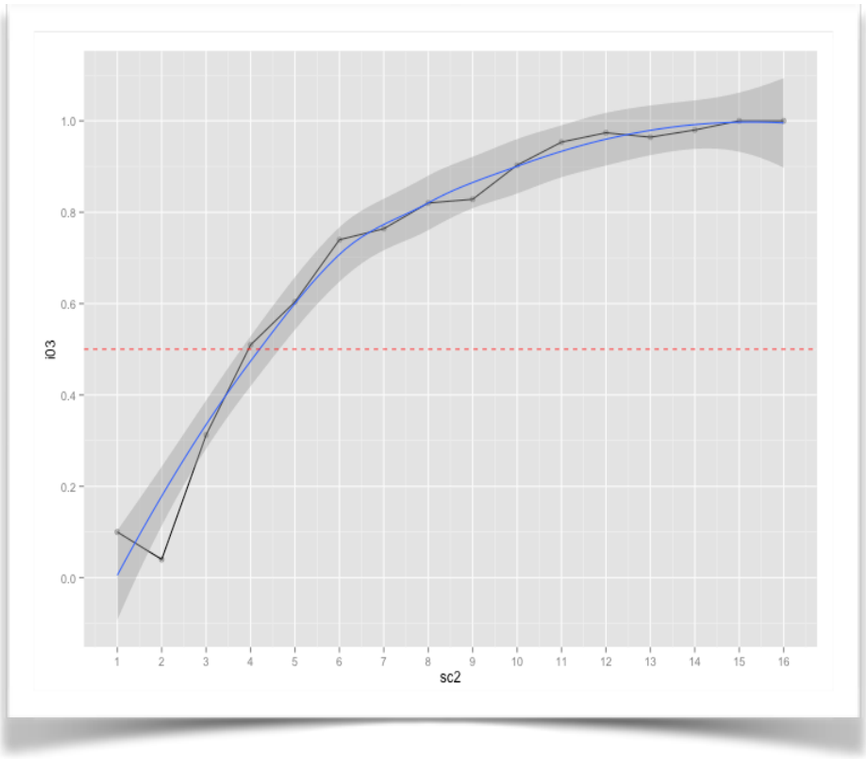
RESUMO
O Exame Nacional de Desempenho dos Estudantes (ENADE) é elaborado com o objetivo de avaliar as habilidades acadêmicas e competências profissionais desenvolvidas pelos estudantes de Psicologia ao longo de sua trajetória no ensino superior, bem como obter informações sobre suas características socioeconômicas. As informações do ENADE são usadas, em última instância, como parte dos conceitos dos cursos e instituições. Este trabalho apresenta a análise da prova de 2006, respondida por 26613 estudantes ingressantes e concluintes de psicologia. Apresentam-se os procedimentos de construção da prova, uma análise psicométrica empregando a análise fatorial dos itens por informação completa e calibração dos parâmetros dos itens empregando o modelo Rasch e de créditos parciais (para as questões dissertativas). Apresenta-se uma análise dos mapas de itens para se estabelecer referências de interpretação das notas, que permitiu realizar uma caracterização das competências e habilidades dos estudantes pesquisados comparando-se o desempenho dos concluintes em relação aos ingressantes.
Palavras-chave: Avaliação do ensino superior; Modelo de Rasch; Competências; Habilidades.

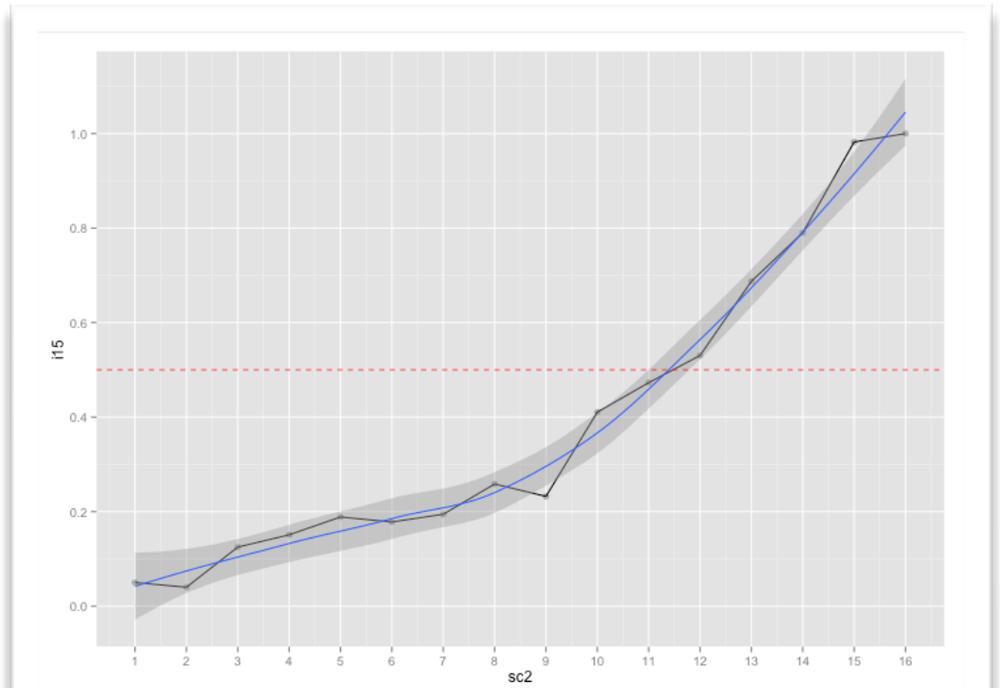
THE ENADE PSYCHOLOGY EXAM: CONCEPTION, CONSTRUCTION AND PSYCHOMETRIC ANALYSIS

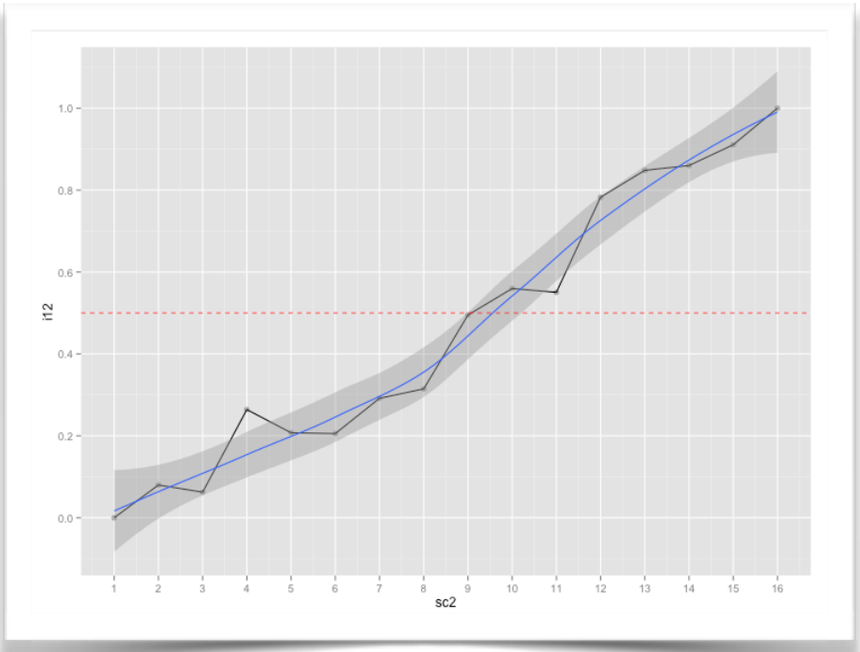
ABSTRACT
The National Exam of Student Performance (ENADE) is a test conducted with the objective of assessing the academic abilities and professional competences developed by psychology students throughout their years of study in higher education as well as information about their socioeconomic characteristics. The information from ENADE is used ultimately as part of a system that evaluates undergraduate programs and institutions. This paper presents an analysis of the 2006 exam, which was answered by 26,613 freshmen and graduating students in psychology. The test construction procedures are presented as well as a psychometric analysis of the exam based on full information item factor analysis and item calibration using the Rasch and Partial Credit (for essay questions). An analysis of item maps is presented to establish references points for scale interpretation that allowed a characterization of the abilities and competences of students comparing the performance of freshmen with graduating students.
Keywords: Assessment of higher education; Rasch Model; Skills; Abilities.

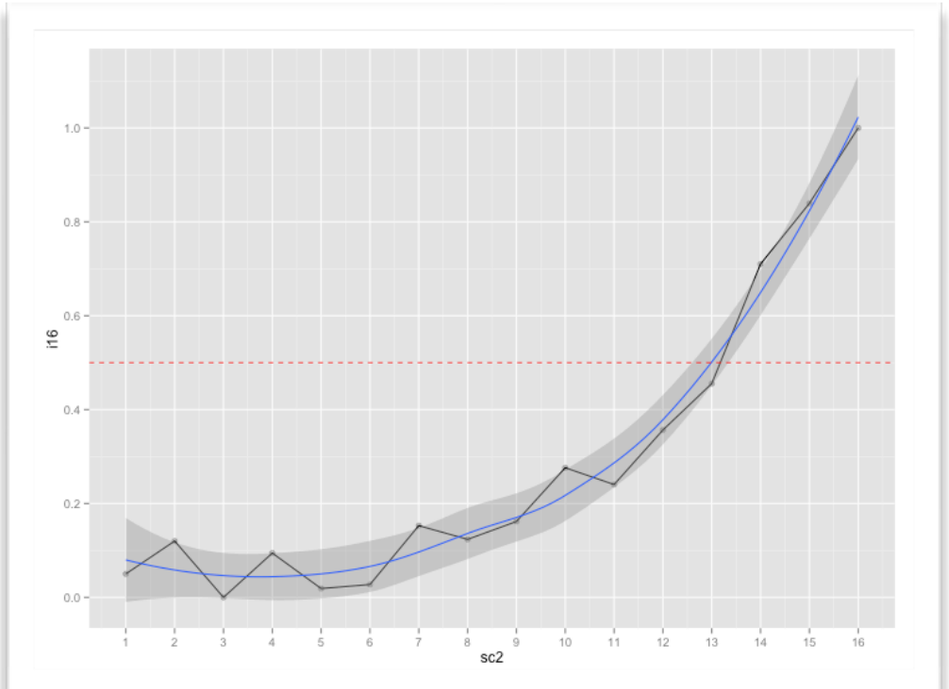

EXPECTED SCORE: MEAN (":" indicates Rasch-half-point threshold) (BY CATEGORY SCORE)
-5 -4 -3 -2 -1 0 1 2 3 4 5
NUM I
25 ce27_Procbas_Bas_aprendiz
28 ce30_Intrfc_Bas_neuroc
39 ce39d_Pratc_Esc_Tarb
38 ce38d_Mtdmed_Bas
12 ce14_FndBas_sig
13 ce15_FndBas_sensocom
30 ce32_PratcEsc
37 ce37d_Pratc_Etic
32 ce34_PratcSaud
11 ce13_FndBas_sist
9 ce11_FndBas_his
15 ce17_Mtdmed_Bas_dados
40 ce40d_Pratc_Clinc
26 ce28_Intrfc_Bas_gestao
27 ce29_Intrfc_Bas_locultura
21 ce23_Procbas_Bas_saudoenc
24 ce26_Procbas_Bas_psican
33 ce35_PratcDiag
29 ce31_Intrfc_Bas_intelgen
20 ce22_Procbas_Bas_psicopat
16 ce18_Mtdmed_Bas_corr
31 ce33_PratcTrab
17 ce19_Procbas_Bas_mem
23 ce25_Procbas_Bas_represoc
34 ce36_PratcGrp
19 ce21_Procbas_Bas_desinf
18 ce20_Procbas_Bas_desado
10 ce12_FndBas_prof
NUM I
-5 -4 -3 -2 -1 0 1 2 3 4 5
Escala Theta (-3,78 a 1,89)
4 12 27 42 57 70 87 100
Escala NGCE (0 a 85)
1 2 3 4
Quatro faixas
1 1 12212211
1 11 34549809861728421
1 4 9 893224579428443166402
55 1 43 03274450059669425604296759 6
T S M S T
PS

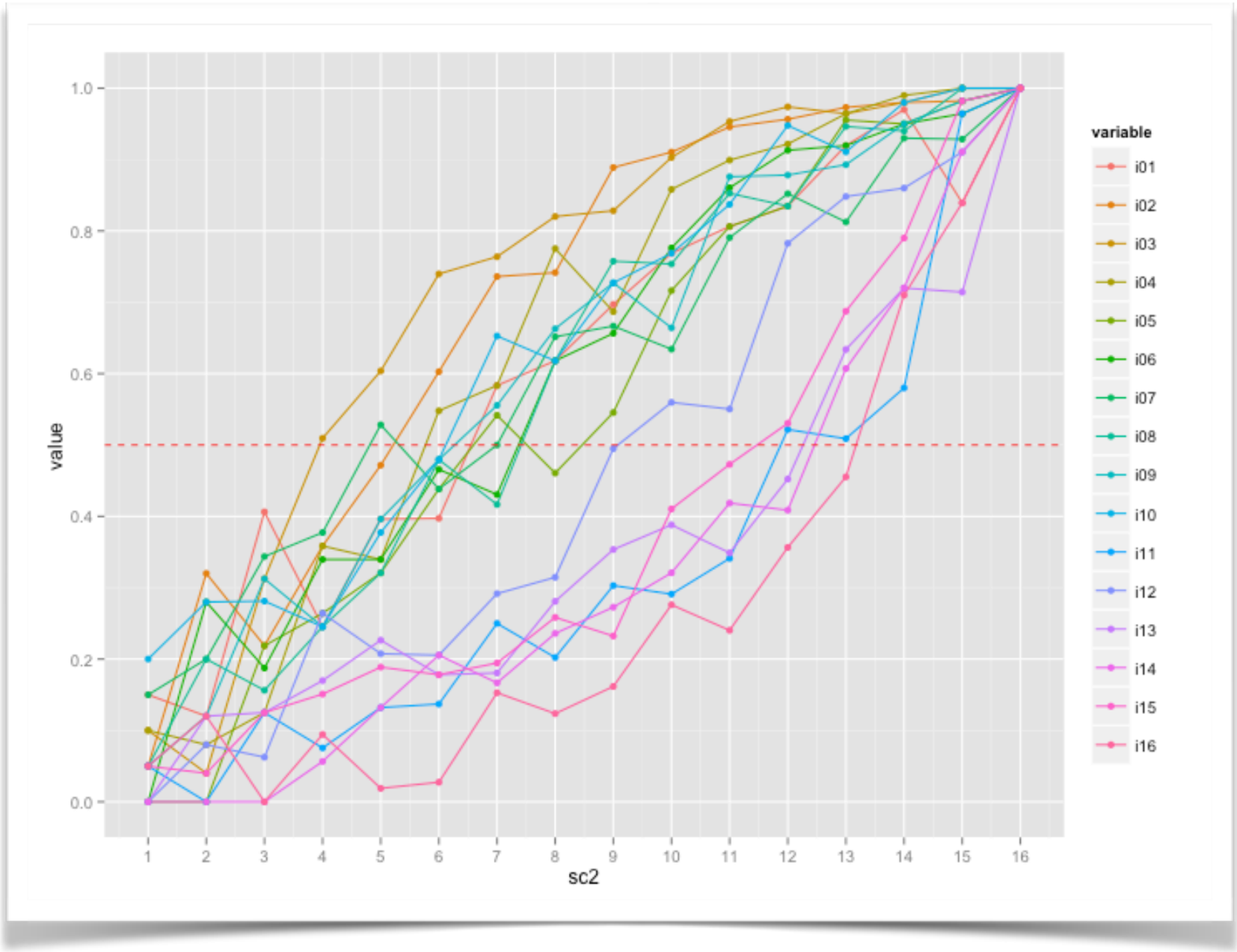
Intuição sobre como observar as CCI's










1.0
0.8
0.6
0.4
0.2
0.0
value
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
sc2
variable
i01
i02
i03
i04
i05
i06
i07
i08
i09
i10
i11
i12
i13
i14
i15
i16

Exercício 2

- Calibrando o modelo de Rasch no ENEM