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The Philadelphia Brief Assessment of Cognition (PBAC) is a neuropsychological screening instrument that assesses five cognitive domains: working memory, visuospatial functioning, language, episodic memory and behavior (Pereira et al., *in press*). **Objective:** The aim is to verify the goodness-of-fit with a two-parameter logistic model of the Item Response Theory (IRT) in a Brazilian sample. A brief form of the test is presented after item calibration.

## METHOD

Two-hundred and thirty participants were classified in 3 groups: 100 young adults (mean age = 21.6yrs.±2.5), 100 older adults (mean age = 70.1yrs.±7.3) and 30 patients diagnosed clinically with Alzheimer disease (73.7yrs.±5.7).

**Table 1.** Gender and education of Young, Old and AD groups.

		Young	Old	AD	Total
Gender	Male	56	27	15	98
	Female	44	72	16	132
Education	< 4 years	0	5	12	17
	5 - 8 years	0	6	11	17
	9 - 11 years	6	22	6	34
	> 12 years	94	66	2	162

To maintain a one-dimensional assumption, after factor loading analysis (SPSS), two items which required reading and writing skills were excluded. IRT (Birnbau two-parameter logistic model to polytomous data, graded model) was performed with *PARSCALE software* to calibrate the remaining 10 items. Log-likelihood functions for items were obtained for discrimination (alpha:  $\alpha$ ) and location (delta:  $\delta$ ), as presented below:

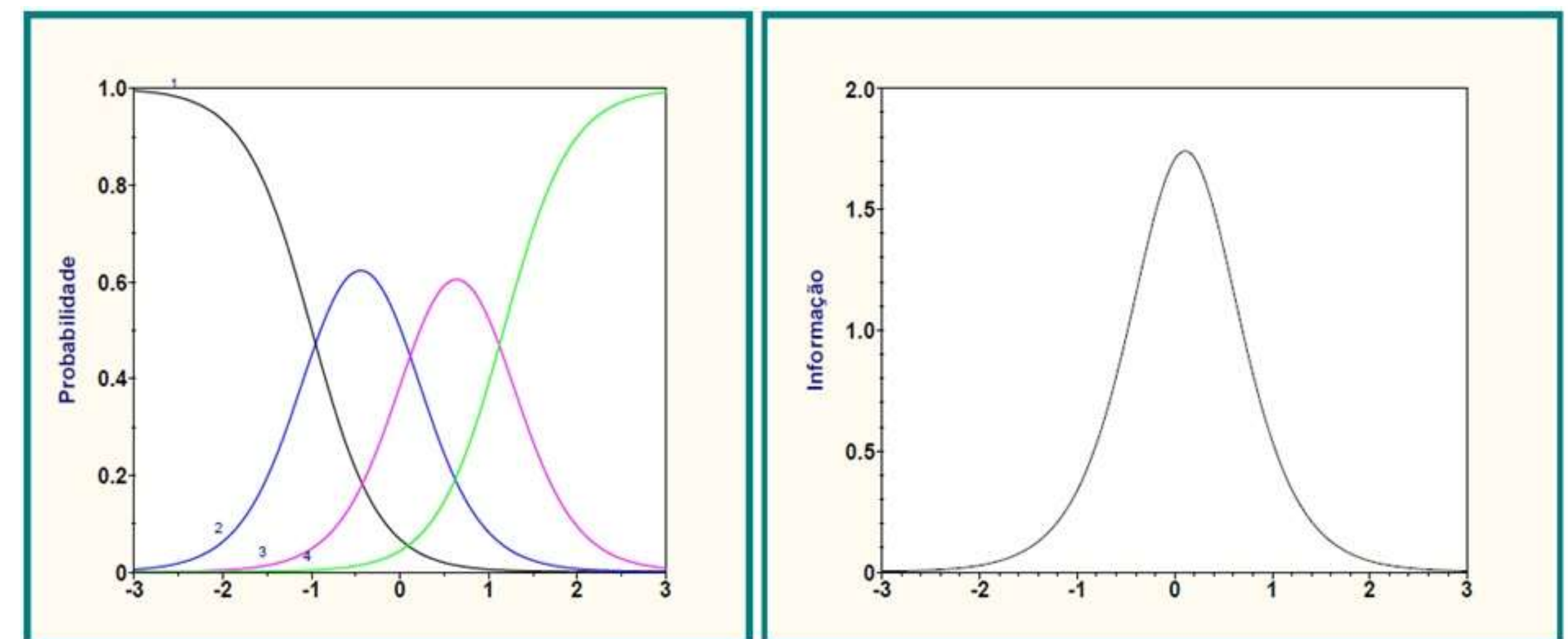
$$P(x_i = 1 | \theta_j, \alpha_i, \delta_i) = \frac{e^{\alpha_i(\theta_j - \delta_i)}}{1 + e^{\alpha_i(\theta_j - \delta_i)}}, \text{ Birnbau two-parameter logistic (2PL) model}$$

## RESULTS

The most discriminative items were: Verbal List Learning ( $\alpha=1.95$ ,  $\delta=-1.79$ ), modified Rey Complex Figure ( $\alpha=1.55$ ,  $\delta=-2.14$ ), Semantic Knowledge ( $\alpha=1.25$ ,  $\delta=-1.73$ ), and Free Recall ( $\alpha=1.15$ ,  $\delta=-0.79$ ). Least discriminative items were: Letter Fluency ( $\alpha=0.45$ ,  $\delta=-0.99$ ), Oral Trails ( $\alpha=0.71$ ,  $\delta=-0.9$ ) and Line Orientation ( $\alpha=0.72$ ,  $\delta=-1.74$ , see Table 1). The calibrated 10 item version is presented, and the total PBAC score ranges between 0 and 60. After scores were changed, the number of categories for the Modified Rey Figure items (copy and recall) were reduced, as showed in Figure 1.

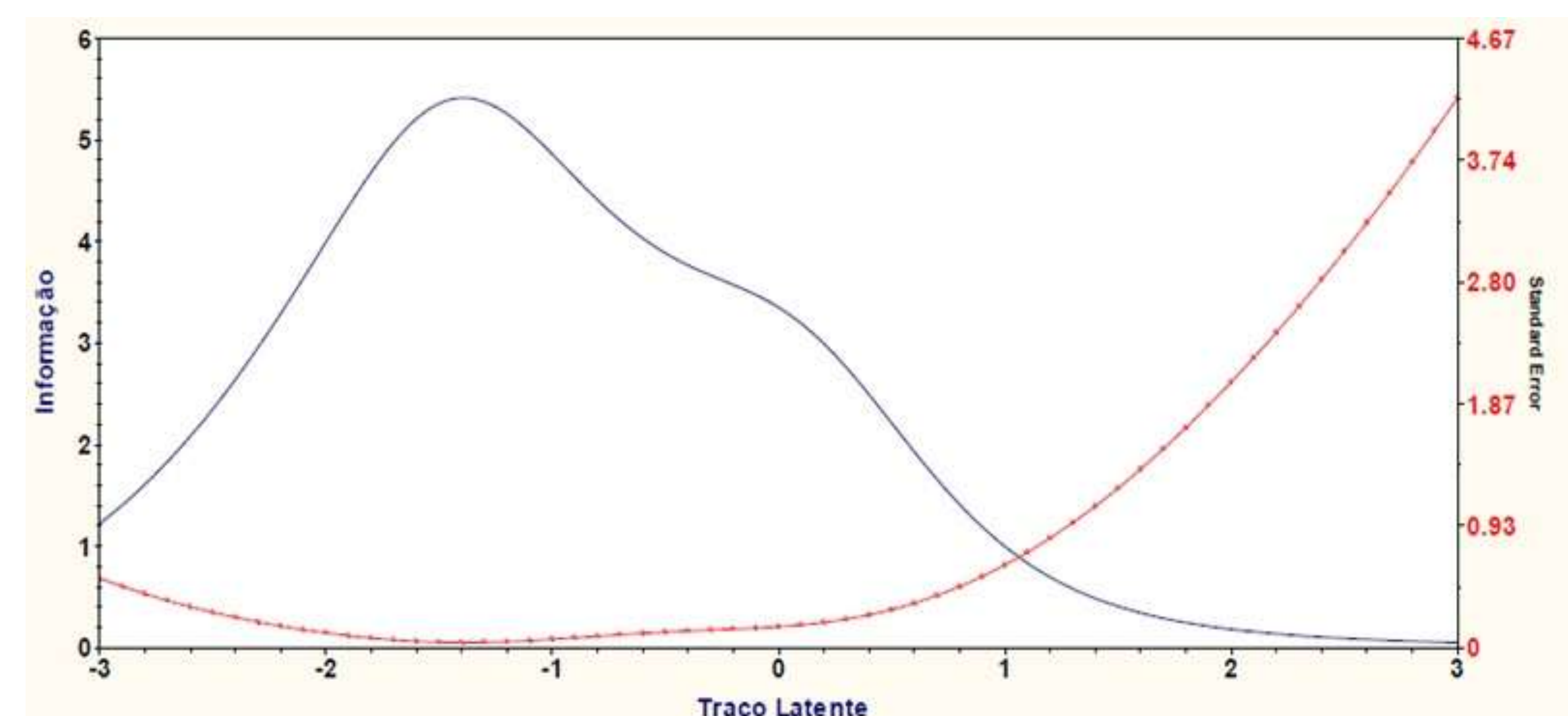
**Table 2.** Item discrimination (alpha) and location (delta) of ten PBAC items.

Item	$\alpha$	$\delta$
Verbal Learning	1.95	-1.79
Letter Fluency	0.45	-0.99
Free Recall	1.15	-0.79
Recognition	1.07	-1.26
Semantics	1.25	-1.73
Naming	1.18	-1.58
Rey Figure (Copy)	1.03	0.09
Line Orientation	0.72	-1.74
Rey Figure (Recall)	1.55	-2.14
Oral Trails	0.71	-0.90



**Figure 1** – Item response and item information function for the Rey figure recall item.

The total PBAC test information function (Figure 2) shows that it gives more information to individuals located between -1.8 to -0.8 (in latent trait). This information suggests that the PBAC can be properly used to identify mild cognitive impairment (MCI) patients.



**Figure 2** – Total PBAC test information function (blue) and standard error (red).

## DISCUSSION

This new brief PBAC test presented with adequate goodness-of-fit in a two-parameter logistic model of IRT, and was properly reduced to become more discriminative for individuals. PBAC items showed good parameters (alpha and delta), one-dimension assumption, and good total test information function indicating that it can be used to mild cognitive impairment (MCI) assessment. Since reading and writing items were excluded, the test can also be used in illiterate people. However, illiterates and MCI samples should be evaluated using this brief 10 item test to check these assumptions.

## REFERENCES

- Pereira DA, Satler C, Medeiros L, Pedroso R & Tomaz C. Brief Assessment of Cognition (PBAC) in Healthy and Clinical Brazilian Sample. *Arquivos de Neuropsiquiatria (in press)*.
- Libon DJ, Xie SX, Moore P, et al. Patterns of neuropsychological impairment in frontotemporal dementia. *Neurology*. 2007;68(5):369-375.

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