ITC 12th Conference on Tests and Testing

Development of a Brazilian version of a computerized Tower of London task

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INTRODUCTION

Planning ability is a complex executive function which has a long developmental trajectory from childhood to adulthood. Deficits in planning functions occur in many neuropsychiatric disorders. Due its importance to day life the assessment and interventions related to planning skills are essential targets for mental health.

OBJECTIVE

Investigate internal structure and items properties of a computerized Tower of London (TOL-BR).

METHOD

Participants: 179 subjects ranging from 15 to 60 y/o (M = 34, SD = 12 years, 51.9% female). Most of the sample was enrolled on an undergraduate course (51,9%).

Instruments: ToL-BR was based on Krikorian's paradigm and developed for a web-platform based on HTML5 and JavaScript. The task was composed by 36 different items addressing all permutations of 3 spheres on 3 pins.

Analytical procedures: The dimensionality was verified by unrestricted (FACTOR 10.9.02 software) and restricted factor analysis (R Software, lavaan and semPlot packages). A Rasch model was fitted for study items properties (R Software, eRm, mirt and Raschsampler packages).

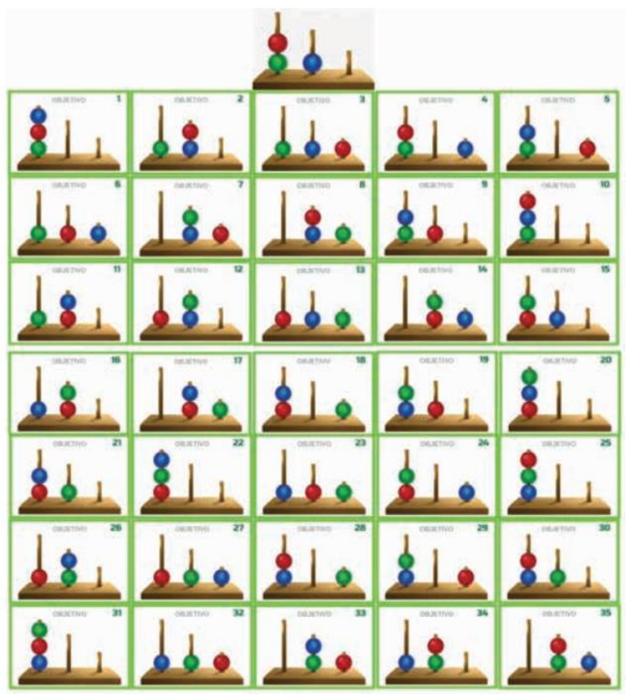

Figure 1. Initial configuration for the 35 tasks of the TOL-BR.

RESULTS

One third of items had 90% or more of correct answers and 15 items were eliminated due low discriminative power. For the 19-items configuration, parallel analysis suggested a unidimensional structure, corroborated by unrestricted and restricted factor analysis (CFI = 0.978, TLI = 0.976, RMSEA = 0.037 [0.022-0.049]). A partial credit model fitted the data, but the items' thresholds indicates that answer's category choice came from 3 to 0 for 15 out 19 items. Then, a dichotomous Rasch was outlined and converged properly. The Wald, Andersen, infit and outfit indicates that items fitted the model. Regarding reliability, the person separation index was 0.77 and the reliability index is greater than 0.60 for the range between -3 to 2 standard deviations.

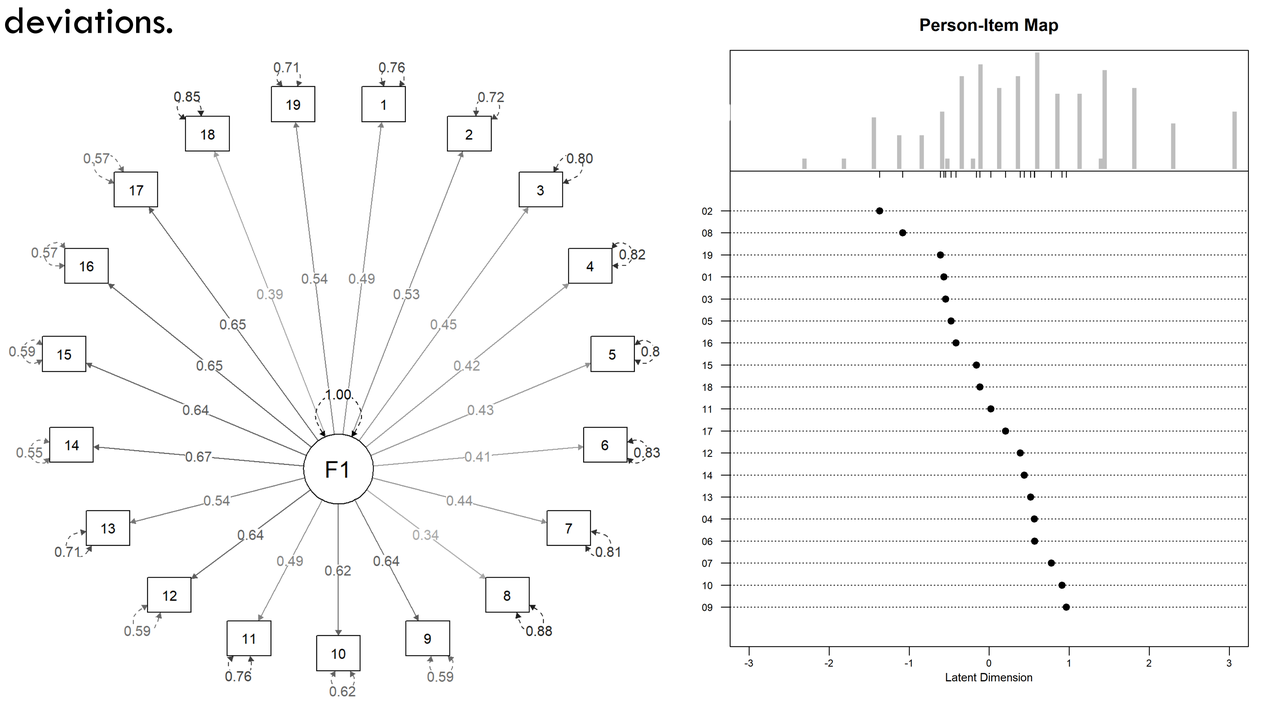

Figure 2. Internal structure, factor loadings and Person-item map for the TOL-BR

Item	χ^2	df	p-value	Outfit	Infit
i11	158.854	180	0.870	0.878	0.965
i13	153.724	181	0.930	0.845	0.933
i16	156.567	181	0.905	0.860	0.961
i17	219.323	180	0.024	1.212	1.143
i19	175.965	180	0.571	0.972	1.025
i20	200.875	181	0.148	1.104	1.059
i21	197.584	181	0.189	1.086	1.082
i22	231.475	180	0.006	1.279	1.076
i23	182.726	181	0.450	1.004	1.006
i24	162.359	181	0.837	0.892	0.924
i25	168.515	181	0.738	0.926	0.991
i27	175.177	181	0.608	0.963	0.953
i28	181.991	181	0.465	1.000	1.022
i29	147.772	181	0.966	0.812	0.884
i30	164.009	180	0.798	0.906	0.950
i31	170.183	179	0.669	0.945	0.882
i32	158.036	181	0.890	0.868	0.924
i34	215.108	181	0.042	1.182	1.097
i35	166.358	181	0.775	0.914	0.978

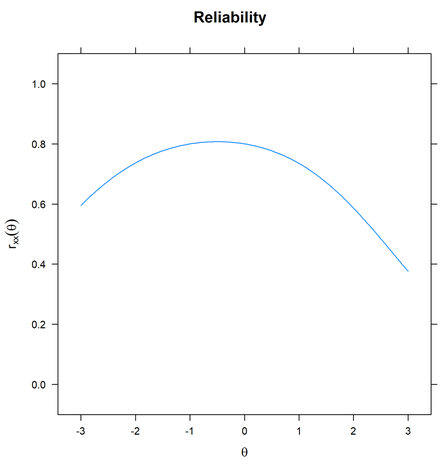

Figure 3. Outfit and Infit of items and reliability of 19-items TOL-BR

CONCLUSION

The TOL-BR presents appropriate psychometric properties. An alternative dichotomous scoring for TOL paradigm is proposed and should be investigate in future studies.