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Psychometric Properties of the Pyramids and Palm Trees Test

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Introduction

Item response theory (IRT) models are rapidly becoming the mainstream in psychometrics and are replacing classical test theory (CTT) that has been used in the past to construct and assess achievement and psychological tests (e.g., GRE, army aptitude tests). One key concept in IRT is associated with the *total information (TI) function* which is equivalent to reliability under the CTT framework. The TI function assesses how the standard error of measurement varies at each ability level. An IRT-based approach can be used to assess a test depending on the target population and the test's purpose.

Of interest for the current study is the TI function of the Pyramids and Palm Trees (PPT; Howard & Patterson, 1992), a test that is often used for assessing semantic memory. The role and degradation of semantic memory has been explored using the PPT in aphasia, dementia, and aging populations (e.g., Dean & Black, 2005; Wierenga et al., 2008; McGeown et al., 2009). However, despite its frequent use, the data regarding PPT's reliability are limited (Klein & Buchanan, 2009). To the best of our knowledge, no published study has investigated PPT's properties using IRT modeling.

The purpose of the current study is to explore the psychometric characteristics of the PPT by estimating the test's TI function and assessing how the standard error of measurement varies as a function of a sample's characteristics.

Method

Data were collected from 359 healthy adults ($M = 49.9$ y.o., $SD = 18$). All participants completed a computerized version of the PPT. Word triads were presented on a screen; the target word was positioned centrally above two probes. Participants indicated which probe was semantically related to the target. Accuracy and response time were recorded.

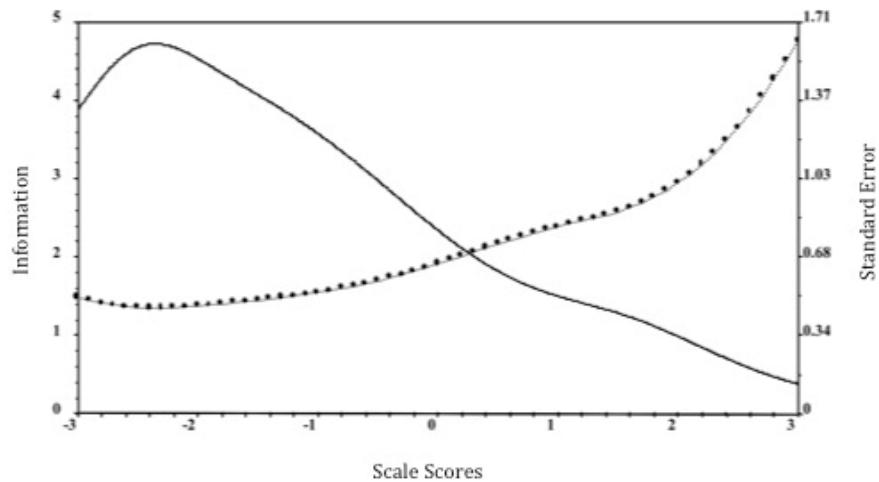
Results and Discussion

After confirmatory factor analysis was used to assess the assumption of unidimensionality, a 3-parameter logistic model with a common asymptote was fit to the data and was used to estimate the TI function. Preliminary results indicated that the TI function peaks for individuals with very low functioning (Figure 1), suggesting that the test is more suitable for measuring individuals' semantic abilities at the extreme negative end of the distribution. Implications of the findings for clinicians and researchers will be discussed in an IRT framework.

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Figure 1. Total Information Function and Standard Error across the semantic memory continuum. The continuous line corresponds to Information and the dotted line corresponds to Standard Error.



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