

Examining Dimensionality of ESL Listening Tests: The Rasch Models vs. Factor Analysis

Vahid ARYADOUST

Centre for English Language Communication
National University of Singapore
10 Architecture Drive, Singapore 117511

Janna FOX

Associate Professor
Linguistics & Language Studies
215 Paterson Hall
1125 Colonel By Drive
Carleton University
Ottawa, ON K1S 5B6, Canada,

Purpose

Unidimensionality is a requirement of many latent trait models such as item response theory (IRT). The present study aims to explore the dimensionality concept in the International English Language Competency Assessment (IELCA).

Research Methods and Results

We first fitted the performance data from 588 international test takers to the unidimensional Rasch model, and subsequently checked unidimensionality by performing a principal component analysis of Rasch model residuals (PCAR). A secondary dimension emerged; item residuals loading on this dimension were all from Section 2 of the test where test takers are required to supply answers while listening to the audio text. It seems that the audio experience in these items might be directed by the demands of the test items, likely engaging a good deal of writing and reading abilities.

To confirm this finding, we applied a multidimensional Rasch model (MDRM) and then factor analysis (FA) of the tetrachoric correlations matrix. Results were mixed: although MDRM supported the presence of a second dimension in the data, FA yielded several factors which seem to be “illusory”. This solution seems to have stemmed from collinearity in data which is caused by the strong correlation of dichotomous items.

Discussion

It is suggested that psychometric dimensions of listening tests is not necessarily consistent with psychological dimensions. If a group of test items engages cognitive processes which are distinct from other groups, the item bundles might function as a distinguishable dimension. The Rasch models and PCAR seem to be promising approaches to establishing dimensionality in listening tests. In this study, using the Rasch models allowed us to relate the second dimension to the bundle that demanded the execution of a rather different set of cognitive processes/abilities on this listening test. (284 words)

Keywords: Factor analysis; listening comprehension; IELCA; Rasch models;