Item Response Theory: Special Topics - Ordinal, Multidimensional, and Explanatory Item Response Theory Models

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Course Description

This course will acquaint participants with several important topics in the field of Item Response Theory (IRT). The course focuses on ordinal, multidimensional, and multilevel IRT models which are used in a number of disciplines in the social and behavior sciences, as well as in the fields of education, business, medicine, and communications. The course will begin with an introduction to multidimensional binary IRT models, including full information exploratory and confirmatory item factor analysis. Then IRT models will be extended to the generalized linear mixed model framework. This will allow for the introduction of explanatory IRT models, where IRT responses can be modeled as functions of item and/or person characteristics and these characteristics can be either observed or latent. Finally, multidimensional and multilevel IRT models will be generalized to polytomous data, including both ordinal and nominal data. In addition to the models mentioned above, we will also examine models for evaluating Differential Item Functioning (DIF) and Mixture IRT models (MixIRT). The applications of these models are quite broad; they can be applied generally to any area of research using repeated categorical data. The course will utilize software (Mplus and MLwin) developed for fitting the models presented in the class.

Participants will have electronic access to all course materials, including overhead slides, analysis scripts, output files, relevant supporting documentation, and recommended readings.

Prerequisites: One or more courses in statistics that include basic statistical models, including regression analysis. Some familiarity with statistical software such as SPSS and SAS and with the use of EXCEL is required.

Tentative Course Schedule

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<th>Day</th>
<th>Time</th>
<th>Topic</th>
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<tr>
<td>Monday</td>
<td>9:00-10:15</td>
<td>Introduction to IRT Models, Linear Mixed Models, and Generalized Linear Mixed Models</td>
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<td>10:30-11:45</td>
<td>Introduction to MLwin</td>
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<td>1:15-2:15</td>
<td>The Rasch Model as a Generalized Linear Mixed Model</td>
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<td>2:25-3:25</td>
<td>A Person Explanatory Model: The Latent Regression Rasch Model</td>
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<td>3:40-5:00</td>
<td>Fitting a Latent Regression Rasch Model Using MLwiN</td>
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Tuesday 9:00-10:15  Extending the Latent Regression Rasch Model: The Multilevel Latent Regression Rasch Model

10:30-11:45  Using SAS to fit IRT Models: SAS procedures GLIMMIX and NLMIXED

1:15-2:30  Extending the Latent Regression Rasch Model: The Multilevel Latent Regression 2 Parameter Model

2:45-4:00  Using Mplus to fit Multilevel IRT Models:

4:00-5:00  Lab Activity: Multilevel Latent Regression IRT Models

Wednesday 9:00-10:15  Item Explanatory Models – The Linear Logistic Test Model

10:30-11:45  Fitting the Linear Logistic Test Model Using MLwiN

1:15-2:30  Extending the Linear Logistic Test Model: The Latent Regression LLTM

2:45-4:00  Extending the Linear Logistic Test Model: The Latent Regression LLTM

4:00-5:00  Lab Activity: LLRM and Extension

Thursday 9:00-10:15  DIF Models

10:30-11:45  Fitting DIF Models in SAS

1:15-2:30  Ordinal MIXED IRT Models

2:45-4:00  Ordinal Mixed IRT Models (Continued)

4:00-5:00  Lab Activity: Fitting Ordinal and Mixed IRT Models

Friday 9:00-10:15  Multidimensional IRT Models: Multidimensional Extension of the Rasch Model

10:30-11:45  Multidimensional Extension of the LLTM

1:15-2:30  Multidimensional IRT Models: Exploratory and Confirmatory Item Factor Analysis

2:45-4:00  Fitting Multidimensional IRT Models in Mplus

4:00-5:00  Lab Activity: Fitting Multidimensional IRT Models