A Proposal for a Workshop at the
International Meeting of the Psychometric Society
in Hong Kong on July 18, 2011

Cognitive Diagnosis Modeling: A General Framework Approach

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A. Abstract

The primary aim of skills or cognitive diagnosis is to develop and analyze tests in ways that reveal information with more diagnostic value, when compared with traditional approaches. In the methods for cognitive diagnosis that we consider mastery of a finite set of skills can be represented by a list of binary latent variables. The main objective of cognitive diagnosis is to classify examinees according to this list of skills. This workshop aims to provide both the theoretical underpinnings and practical experience necessary for participants to use cognitive diagnosis modeling in applied settings.

The theoretical component of the workshop will provide a comprehensive overview of cognitive diagnosis modeling, and will include the following topics: what is the cognitive diagnosis modeling paradigm and how it differs from the traditional unidimensional framework, what steps are involved in attribute identification and validation, what is the Q-matrix and what role does it play in cognitive diagnosis modeling, what are some of the commonly used cognitive diagnosis models and how are they related to each other, how are model parameters estimated and how is model-data fit evaluated, how are cognitive diagnosis models compared and selected, and what procedures are involved in constructing an optimally diagnostic assessment.

The practical component of the workshop will provide participants with a hands-on experience on the different aspects of cognitive diagnosis modeling through various exercises. Participants will learn how to identify attributes, construct appropriate tasks given some attribute specifications, validate attributes and tasks, run computer codes to estimates different cognitive diagnosis models, compare fits of competing models at the item and test level, empirically evaluate the appropriateness of a Q-matrix, and construct a test based on a specific set of constraints and given a pool of calibrated items.

B. Intended Audience

The intended audience of the workshop includes anyone interested in skills or cognitive diagnosis who has some familiarity with item response theory or classical test theory. No previous knowledge of latent class models or cognitive diagnosis is required. The workshop will be useful for faculty and students specializing in educational measurement, as well as testing professionals working in government or private testing organizations.

C. Organization and Length

A tentative schedule of the workshop is given below. The workshop will begin at 8:00 a.m. and will end 5:00 p.m., with 30-minute morning and afternoon breaks, and a one-hour break. The workshop schedule includes ten 40-minute sessions with built-in practical exercises where appropriate.

Time	Topic
8:00-8:10	Welcome
8:10-8:50	(1) Introduction to Diagnostic Modeling Framework
8:50-9:30	(2) Defining and Validating Attributes
9:30-10:10	(3) Q-matrix Construction and Validation
10:10-10:40	*Break*
10:40-11:20	(4) Models and Approaches to Diagnostic Modeling
11:20-12:00	(5) Estimation of CDMs
12:00-1:00	*Break*
1:00-1:40	(6) The G-DINA Model Framework
1:40:2:20	(7) Evaluating Model Fit
2:20-3:00	(8) Model Comparison
3:00-3:30	*Break*
3:30-4:10	(9) Empirical Q-matrix Validation
4:10-4:50	(10) Attribute Estimation, Person Fit and Test Construction
4:50-5:00	Wrap-Up

D. Materials

Participants will be given copies of the slides and access to a website where they can download computer codes that can be used with Ox for fitting latent variable models for cognitive diagnosis, and conducting other analyses.