UNIVERSITAT
POMPEU FABRA

Item Response Theory and Structural Equation Modeling:

Scale Construction with EQSIRT & SEM Methods from EQS 7

Peter M. Bentler, UCLA

Barcelona, June 6th-7th 2013

PROGRAMME

Day 1 of this 2-day workshop will provide an introduction to item response theory (IRT), concentrating on how to use the new EQSIRT program for IRT analyses, e.g., selecting items for an acceptable IRT scale. Originally developed for educational testing, and standardly used by all major testing organizations around the world, IRT methodology is now used in a wide variety of fields to develop, evaluate, and link scales for binary and/or ordinal response data.

The new program EQSIRT was developed by the authors of the EQS structural equations program and IRT experts under sponsorship of the US National Cancer Institute to allow a wide variety of IRT methodologies to be accomplished in a coherent, user-friendly, and identical way across Windows, Mac, and Linux environments. Participants will be given a time-limited copy of EQSIRT and EQS to use during the workshop and an order form for its discounted purchase, and their own data readable into EQS can be used for analyses.

EQSIRT allows Rasch, 1PL, 2PL, 3PL models for binary data and the Graded Response Model (GRM), Generalized Partial Credit Model (GPCM), Rating Scale Model (RSM), and Nominal Response Model (NRM) for ordinal data. In EQSIRT, a scale may contain both binary and ordinal items, if desired. Scale evaluation also may require the use of multiple-group and/or multidimensional models; these options are provided by EQSIRT for all model types except NRM. EQSIRT also allows Mokken scale analysis, non-normal latent traits, covariates, multilevel models, DIF analysis, equating methods, and simulation. Only selected model types and methods will be illustrated in the workshop.

Day 2 of this workshop turns to selected topics in structural equation modeling that are incorporated into the EQS 7 structural equations program which is planned for release in late 2013. Five topics of interest to fields from the social and behavioral sciences to business, management, and marketing are presented and made available in a free working version of EQS. Partial least squares (PLS) is often considered to be an alternative to structural equation models (SEM), but it is not available in SEM programs. The workshop will describe PLS in EQS, as well as the new consistent and efficient versions of PLS developed by Dijkstra and Huang. Latent interaction models can be used to explain nonlinear effects of factors on other factors and variables. Latent variable mixture models are useful for understanding heterogeneous populations in which observed data are a probabilistic combination of different latent processes. Latent variable multilevel models provide a way to decompose effects into within-cluster and between-cluster sources for data with nested observations, e.g., individuals in organizations, patients in clinics, or students in classrooms. The final topic is a structural modeling approach to Guttman scaling of binary data. Developed by the instructor, this absolute simplex SEM-type methodology allows errors in variables and permits statistical tests.

Target Audience

The course is aimed at applied researchers and methodologists in the social, behavioral and environmental sciences, medicine, epidemiology, etc., who (1) want to develop or evaluate scales or tests using modern item response theory, or at least understand how this is done; and (2) have some experience with structural equation modeling and would like to learn about some advanced topics in the latent variable statistical modeling of multivariate data.

Teaching staff

Peter M. Bentler received his Ph.D. in Clinical Psychology from Stanford University, spent a postdoctoral year at the Educational Testing Service, and has been at UCLA for more than four decades. A former Chair of the Department of Psychology, he is now Distinguished Professor of Psychology and Statistics. Bentler has been an elected president of the Society of Multivariate Experimental Psychology (SMEP), the Psychometric Society, the Western Psychological Association, and the Division of Evaluation, Measurement and Statistics of the American Psychological Association. He received SMEP's 2005 Sells Award for Outstanding Career Contributions to Multivariate Experimental Psychology and, in 2007, was the recipient (with Karl Jöreskog) of the American Psychological Association's Distinguished Scientific Contribution Award for the Applications of Psychology.

Academic contents

6th June · Morning from 9.30 to 13.30 hours.

- Introduction to IRT, EQSIRT, and documentation for EQSIRT
- Dimensionality assessment with correlation and full information methods
- Rasch, 1PL, 2PL, and 3PL models for binary data

Afternoon from 15.00 to 18.00 hours.

- IRT plots and latent trait scores
- Variety of ordinal models (GRM, GPCM, RSM, NRM)
- Computer practice

7th June · Morning from 9.30 to 13.30 hours.

- Partial least squares (PLS) and its new statistical versions PLSc and PLSe
- Latent interaction models using 3rd-order moments
- Mixture models for continuous variables

Afternoon from 15.00 to 18.00 hours.

- Multilevel between- and within-cluster latent variable models
- Guttman and quasi-Guttman scaling with absolute simplex methodology
- Computer practice

Site

Barcelona School of Management building,
Balmes 132-134 08008 Barcelona.
www.barcelonaschoolofmanagement.upf.edu/ceqs