PSYCHOMETRICS: FROM PRACTICE TO THEORY AND BACK

15 Years of Nonparametric Multidimensional IRT, DIF/Test Equity, and Skills Diagnostic Assessment

William Stout

department of statistics, university of illinois

and

educational testing service

Although this paper is labelled as a "Psychometrika Submission" in the header at the top of each page, it is actually a reprint of an article that was originally published in the December 2002 issue of Psychometrika (Volume 67, Number 4). It is republished here to demonstrate the appearance of a paper that is prepared using the Pmet LaTeX Class Package for Psychometrika Authors (Version 1C1) published by the Psychometric Society. A publication quality copy of William Stout's article can be obtained online at http://www.psychometricsociety.org/ARTICLEstout2002.pdf.
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Requests for reprints should be sent to William Stout, Department of Statistics, University of Illinois, 725 S. Wright Street, Champaign IL 61820. E-Mail: stout@stat.uiuc.edu. A PDF copy of this complete article can be obtained online at http://www.psychometricsociety.org/ARTICLEstout2002.pdf

Dedication: I want to dedicate this paper to my wife, Barbara Meihoefer, who was lost to illness in this year of my presidency. For, in addition to all the wonderful things she meant to me personally and the enormous support she gave concerning my career, she truly enjoyed and greatly appreciated my psychometric colleagues and indeed found psychometrics an important and fascinating intellectual endeavor, in particular finding the skills diagnosis area exciting and important: She often took time from her career as a business manager and entrepreneur to attend psychometric meetings with me and to discuss research projects with my colleagues and me. She would have enjoyed this paper.—William Stout

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Abstract

The paper surveys 15 years of progress in three psychometric research areas: latent dimensionality structure, test fairness, and skills diagnosis of educational tests. It is proposed that one effective model for selecting and carrying out research is to chose one's research questions from practical challenges facing educational testing, then bring to bear sophisticated probability modeling and statistical analyses to solve these questions, and finally to make effectiveness of the research answers in meeting the educational testing challenges be the ultimate criterion for judging the value of the research. The problem-solving power and the joy of working with a dedicated, focused, and collegial group of colleagues is emphasized. Finally, it is suggested that the summative assessment testing paradigm that has driven test measurement research for over half a century is giving way to a new paradigm that in addition embraces skills level formative assessment, opening up a plethora of challenging, exciting, and societally important research problems for psychometricians.

Key words: nonparametric IRT, NIRT, latent unidimensionality, latent multidimensionality, essential unidimensionality, monotone locally independent unidimensional IRT model, MLI1, item pair conditional covariances, DIMTEST, HCA/CCPROX, DETECT, CONCOV, Mokken scaling, generalized compensatory model, approximate simple structure, DIF, differential item functioning, differential bundle functioning DBF, valid subtest, multidimensional model for DIF, MMD, SIBTEST, MultiSIB, Mantel-Haenszel, PolySIB, CrossingSIB, skills diagnosis, formative assessment, Unified Model, reparameterized Bayes Unified Model, MCMC, evidence centered design, ECD, PSAT Score Report Plus.

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