

Advances in  
Rasch Measurement  
Volume 1

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**Preface**

This volume of *Advances in Rasch Measurement* marks the beginning of a series of volumes that will be published by JAM Press, under the leadership of Richard Smith. The 27 chapters of *Volume 1* represent papers presented at the Tenth and Eleventh International Objective Measurement Workshops held in New Orleans in 2000 and 2002 and organized by William Fisher, Trevor Bond, Mary Lunz, and Mark Wilson

*Advances in Rasch Measurement* represents a continuation of the tradition begun in 1992 by Mark Wilson, who edited the first in five volumes of *Objective Measurement: Theory into Practice*. The first volume featured papers selected from the Fifth International Objective Measurement Workshop (IOMW5) held in Tolman Hall at the University of California in Berkeley on March 25 and 26, 1989. George Engelhard joined Mark Wilson in the editing of the volumes in 1996. Karen Draney joined the team in 1997. Many of the contributors to *Objective Measurement: Theory Into Practice* can be found in this volume, including Mark Wilson, William Fisher, E. Matthew Schulz, John M. Linacre, George Engelhard, Raymond Adams, Richard Smith, Karen Draney, Mary Lunz, Edward Wolfe, Carol Myford, and Mary Garner.

The first IOMW was held in the Spring of 1981, convened by David Andrich, Bruce Choppin, Graham Douglas and Ben Wright. Ben Wright described the origins of the International Objective Measurement Workshops in chapter 2 of the first volume of *Objective Measurement: Theory Into Practice*. He begins with a description of how the originators of the IOMW met Georg Rasch:

He was a visiting professor of statistics at the University of Chicago in the spring of 1960. I was the sole survivor of his 24 surprising lectures on measurement. The statisticians found his originality hard to swallow. The social scientists found his mathematics hard to follow. I was lucky. I stayed and listened and then, for 20 years, spent hundreds of exciting hours working with Georg in Denmark, Chicago, and Australia.

Bruce Choppin joined us in Copenhagen in 1965 where we spent two months at Georg's blackboard. David Andrich met Georg when Georg returned to Chicago for three months in 1972 and David spent another six months with Georg at his summer home on Laeso

Island in 1977. Graham Douglas met Georg in Perth when Georg was visiting professor of education and statistics at the University of Western Australia in 1974.

Participants came from England, Australia, and America. The group met in Judd Hall at the University of Chicago. With the help of Richard Smith, Ben Wright recalls the presenters in that first meeting: David Andrich (who introduced the rating scale model), Bruce Choppin, Graham Douglas, Ron Mead, and Geoff Masters (who introduced the partial credit model). IOMW2 was held at the University of Western Australia in 1982; IOMW3 and IOMW4 were held at the University of Chicago.

True to the tradition of the IOMW, this volume represents advances in objective measurement, with "objective measurement" being defined as the following condition:

The comparison between two stimuli should be independent of which particular individuals were instrumental for the comparison; and it should also be independent of which other stimuli within the considered class were or might also have been compared. Symmetrically, a comparison between two individuals should be independent of which particular stimuli within the class considered were instrumental for the comparison; and it should also be independent of which other individuals were also compared, on the same or on some other occasion. (Rasch, 1961, pp. 330-331)

Chapters 1, 2, and 3 focus on measurement theory. Chapter 1 links the Rasch model to additive conjoint measurement. Chapter 2 provides a provocative view of Rasch Measurement theory through the lens of mathematical epistemology. The third presents a new method for estimating the parameters of the partial credit Rasch model for rater-mediated assessments and compares the new method with traditional techniques using simulated data.

Chapters 4 through 8 focus on a variety of crucial considerations in applying any of the family of Rasch models: fit statistics, plausible values, and optimal appropriate measurement (OAM) which is a method for identifying mismeasurement. Chapters 7 and 8 address issues in using the Rasch model in computerized adaptive testing.

Chapters 9, 10, and 11 report applications of the Rasch model using WINSTEPS or BIGSTEPS software to a variety of interesting data sets – figure skating ratings, measures of recursive thinking, and college grades.

Chapters 12, 13, 14, and 15 involve applications of the multidimensional random coefficients multinomial logit model (MRCML); these include

creating a single scale from two statewide examinations, measuring professional development activities, evaluating alternative models of reasoning in genetics, and helping teachers make sense of performance data through a program called ConstructMap.

The many facet Rasch model (MFRM) is used in Chapters 16 through 20 to compare generalizability theory with the MFRM for modeling rater effects, to analyze reliability of performance data, to evaluate different assessor scoring designs, to analyze DIF in the Third International Mathematics and Science Study (TIMSS), and to account for rater, domain, and gender effects in a writing assessment.

Finally, the use of the Rasch model in evaluating theories of epistemological development is the focus of Chapters 21 through 27. The concept of a "Domain Theory or "Learning Theory of Progressive Attainments" is presented in Chapter 22 and applied in the subsequent two chapters. The last three chapters focus on applying the Rasch model to investigating Piagetian concepts of development, including the concept of area, differentiating development from decalage, and balance beam tasks.

The authors of the chapters have our warmest thanks and appreciation. True to the tradition of IOMW, the authors are from a wide variety of businesses and universities, from the U.S., Canada, Australia, Europe. We are also indebted to Richard Smith, who provides an invaluable service to our community through JAM Press.

*Mary Garner, George Engelhard, William Fisher, Mark Wilson*

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