

**STATISTICAL ANALYSIS OF QUESTIONNAIRES.  
A UNIFIED APPROACH BASED ON R AND STATA**

Book details:

Francesco Bartolucci, Silvia Bacci, Michela Gnaldi

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*Readership:* master students in psychometrics, biostatistics, economics, and quantitative sciences

This book bridges the gap between theoretical and applied analyses of ordinal variables in the quantification of latent traits. In order to evaluate questionnaires, researchers assume that a single concept underlies all the questions of a batch. The Item Response Theory (IRT) is at the core of the book. Theoretical aspects are presented in detail, and the differences between the classical and IRT approaches are highlighted. The data is analysed in an open source environment using the R and the commercial package Stata. The examined packages in R environment are: ltm (*Latent Trait Models for Item Response Theory Analyses*), irtoys [*Estimate and plot IRT models for binary responses* ], mirt (*Full information maximum likelihood estimation of IRT models*) and multidimensional latent class item response theory models [MultiLCIRT] functions). The authors use examples from different fields, such as education, job satisfaction, and psychology. The software

commands are explained in a clear and detailed way. Each chapter ends with exercises suitable for both Stata and R.

Chapter 2 covers several forms of reliability and validity measures, widespread in the traditional item analysis. In this chapter the focus seems to be more on the results (in terms of latent variables) than on the methods used for quantifying them.

Chapter 3 can be divided into two parts: the first one introducing IRT and classical models - such as Rasch, 2PL, 3PL - and the second one devoted to the development of IRT, with both fixed and random effects. One section introduces estimation methods, which are analysed in more detail in Chapter 5.

Chapter 4 deals with the analysis of polytomous item models. This chapter uses the same scheme as Chapter 3 for presenting the material, with the due adjustments for model assumptions (hypothesis of normality of the latent trait) and model specification (graded response, partial credit, rating scale, sequential, and nominal models). The reader can appreciate how dichotomous and polytomous variables are analysed through an elegant formalism.

Chapter 5 covers the estimation methods for both fixed (joint maximum likelihood and conditional maximum likelihood) and random (marginal maximum likelihood) effects for dichotomous models. A major part of the chapter evaluates how responses to exam questions depend on the latent traits in the exams. Diagnostic instruments pertaining to graphics, differential item function and goodness of fit indexes are also presented.

Chapter 6 contains interesting extensions of previously covered topics, such as analysis with covariates, covariance structure analysis and multilevel analysis under the hypothesis of a continuous latent trait and of a discrete latent distribution.

*Emma Zavarrone*<sup>1</sup>

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<sup>1</sup> Department of Behaviour, Marketing and Communication- IULM University, Milano; emma.zavarrone@iulm.it