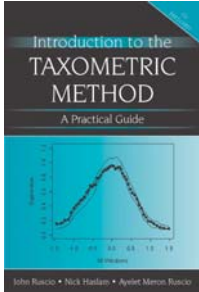


# Tactful Taxometrics

A review of



## **Introduction to the Taxometric Method: A Practical Guide**

by John Ruscio, Nick Haslam, and Ayelet Meron Ruscio

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Reviewed by

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About 14 years ago, I used Gorenstein's (1992) book on mental illness as a recommended reference for an abnormal psychology course, with the intention to highlight the difficulties in distinguishing psychopathologies. Gorenstein's book presented the logical argument for a bootstrap approach for diagnostic categories and provided a cogent rationale for why taxometrics is an important topic. When diagnostic categories are used as explanations regarding the presence of certain symptomatic behaviors, the linkage should be based on empirical distributions indicating this causal association. The impact of Meehl's (e.g., 1999) writings over 30 years was apparent back then and continues with his more recent publications, such as "Clarifications About Taxometric Method," in which Meehl (1999) overviewed the logic behind eight "search procedures" for identifying a latent taxon. These procedures serve as the basis for the reviewed book, *Introduction to the Taxometric Method: A Practical Guide*. The authors are recognized scholars in this area of research and have compiled all important results and known limitations on the methods developed by Meehl into a single source for researchers and students conducting or learning about taxometric methods. The book is a rather readable and thorough coverage of the topic, but is geared to those who are planning or conducting taxometric research rather than for the curious wanting an introduction.

The book is organized into three sections: introduction and background, taxometric method, and applications and future directions. The first section provides an overview of the concept and rationale for latent structures and alternative classification methods. The second section includes an extended introduction, description, and demonstrations of the taxometric methods, with chapters covering maximum slope (MAXSLOPE), mean above minus below cut (MAMBAC), latent mode (L-Mode), maximum covariance (MAXCOV), and maximum eigenvalue (MAXEIG) along with consistency test, interpretation, and a detailed checklist. The third part provides a summary of the literature to date using taxometric methods and

conjectures about what directions this field of inquiry may and should take. Several appendices are also provided that cover simulation of taxonic and dimensional data, estimation of latent parameters for the MAXCOV method, and estimation of the taxon base rate for the MAXEIG method. Also included is a CD that contains the following: a user's manual for the taxometric programs in R, program code that performs taxometric analyses in the R computing environment, and a manual for the R data files described in the user's manual. Each of these files was updated on February 24, 2006. Subsequent updates can be obtained at [www.taxometricmethod.com](http://www.taxometricmethod.com), and this site was updated as of June 11, 2006, for the latest version of R (2.3.1).

In the book's first section, the authors present taxa as having four central properties: (a) A taxon is a latent structure, (b) a taxon is a category with a boundary and finite membership, (c) the taxon boundary is nonarbitrary or objective, and (d) a taxon is enduring within an appropriate time frame. Hence, taxa are not merely based on dimensions with arbitrarily or socially constructed demarcations. Chapter 1 concludes with coverage of seven misconceptions about the distinctions between taxa and dimensions. Chapter 2 focuses on why conceptualizations of latent structures as either taxon or dimensions (their complement) have implications for topics such as classifications, diagnosis, assessment, research, causal explanations, and lay conceptions. The last chapter of the first section covers traditional scientific methods for uncovering latent classes, starting with bimodality, finite mixture modeling, cluster analysis, latent class analysis, and Dimcat.

The coverage of all but the last scientific method is appropriate, with a brief synopsis of the strengths and weaknesses with each method. However, the coverage of Dimcat is insufficient, given that this is a rather new approach with an alternative interpretation of taxa. Dimcat is a conceptual and psychometric approach to classification (De Boeck, Wilson, & Acton, 2005) whereby categories and dimensions have a polythetic definition. The brief summary in this chapter emphasizes that Dimcat was developed for categorical variables rather than continuous variables found in taxometric research. Hence, authors John Ruscio, Nick Haslam, and Ayelet Meron Ruscio argue that the two procedures are not equally appropriate for addressing the same question on the latent structure of classification. In addition, they point out that supporting research has yet to be generated from the Dimcat approach. De Boeck et al. (2005) did address taxometric research, and Haslam and Kim (as cited in De Boeck et al., 2005) stated that about half of the taxometric studies reviewed used dichotomous indicators. The point made is that the use of dichotomous indicators is why the Dimcat approach is more suitable and that Dimcat explicitly includes all category qualities for manifest categories, unlike taxometrics. Both categories and dimensions have likenesses and degrees. As such, there is not only homogeneity of within-category members but heterogeneity exhibited by individual category members. This inclusion of heterogeneity estimates within categories is something that the covered taxometric methods do not generate, given the use of different statistical algorithms. Because they include Dimcat in coverage of other methods, Ruscio et al. should address

whether the covered taxometric methods are more appropriate than Dimcat in regard to uncovering taxa, rather than the more peripheral concerns they state.

Most of the text in Part 2 covers the main taxometric methods, starting with the data requirements for these methods in Chapter 4. The authors recommend a minimum sample size of 300, along with taxon base rates of at least 0.10 for the presented methods to be robust. The authors also discuss distribution skews of indicators, sampling methods, indicator intercorrelations, and the power of empirical sampling distributions, with useful recommendations and caveats. The original taxometric methods of MAXSLOPE, MAMBAC, and L-Mode are presented in Chapter 5, followed by the more recent MAXCOV and MAXEIG methods in Chapter 6. There is a solid presentation of each method in these chapters, along with useful examples from four different data sets used throughout the text for pedagogic purposes. A main strength of this approach is that one can better comprehend the caveats and limitations for each method. One would likely find these chapters rather difficult to follow without the use of the same data across methods.

One of the strongest and most difficult chapters is Chapter 7, on consistency tests, with new insights and analytical methods for consistency tests. The inchworm consistency test (pp. 166-171) is presented as a powerful method that allows taxometric researchers to work with positively skewed data and a small number of taxa. This is accomplished via a windowing technique whereby, through an increase in the number of windows and the overlap among the windows, the number of taxon members becomes close to the number of complement members within a given window frame. A second method, the comparison curve fit index (pp. 188-192), allows for determination of model fit by using the root-mean-square residual on averaged curves for both the research and the simulated data and then subtracting the fit for the dimensional comparison data from the fit for the taxon data. This index ranges from .00 to 1.00, and a higher value (above .50) indicates better fit for determining a taxon. Other useful suggestions are contained in Chapter 8, on interpretational issues. A particular strength is the detailed exploration of the influence of increasing amounts of indicator skew on results from MAMBAC, MAXCOV, and MAXEIG models (pp. 218-223). A simulation experiment highlights the findings on this parameter on the given taxon methods and again discusses the subjectivity of interpretation for taxometric methods. Finally, Chapter 9 is a useful checklist for those who are planning to implement the presented taxometric methods in Chapters 5 or 6.

Part 3 consists of two chapters, with Chapter 10 providing the main findings of the literature implementing the covered methods in research on psychopathology, normal personality, and other latent traits. In addition, methodological trends are presented regarding data sources, indicators, sample size, graphic presentations, and consistency test. The last chapter covers trends in taxometric methods across many areas of study, with an emphasis on new areas for exploration in epidemiology, developmental psychopathology, cognition, and biology. Suggestions are also presented regarding the use of rating scales and the need for

additional methodological procedures for generating data. Finally, five known limitations of Monte Carlo methods are addressed, with suggestions for future simulation studies.

This is a very thorough overview of taxometric studies and methodology as well as relevant literature on categorization and statistics. It is a good complement to the text by Schmidt, Kotov, and Joiner (2004) in that it gives an update on findings as well as much more detail on methodology. Because it provides a rather dense coverage of many technical issues, this is a good source for serious researchers and students of taxometrics. Others might find more useful for an introduction some of Meehl's (e.g., 1999) later articles written for psychology at large or the first three chapters in Schmidt et al. (2004). In conclusion, I also forewarn the novice that this text requires some substantial knowledge of graphing techniques and computer simulation to be fully appreciated and, in regard to these techniques, has some very important findings from the field of taxometric research.

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