Advancing Quantitative Methods in Second Language Research

Edited by Luke Plonsky

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Advancing quantitative methods in second language research is a compendium of 14 chapters divided into three parts. As evident from the title, this edited volume focuses on advanced statistical procedures and is geared toward readers who are already familiar with basic quantitative methods such as t-tests, ANOVAs, and correlations. According to the editor, the primary goal of the book entails ‘informing and expanding the statistical repertoire of L2 researchers’ (p. 4) by equipping them with knowledge and tools necessary for carrying out more sophisticated and powerful methodological procedures that are underutilized in applied linguistics and second language acquisition (SLA) research. The majority of the chapters in this volume are structured the same way. Each chapter presents a brief overview of a particular technique and contains a discussion – oftentimes supplemented with step-by-step instructions – of how to carry out the technique using statistical software. A list of additional resources and publications for further reading is provided at the end of each chapter, thereby enabling interested readers to delve more into each specific technique. Finally, the book is accompanied by a companion website that hosts practice data sets for most of the chapters, except Chapters 1, 2, and 5.

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The first two chapters constitute Part I of the book. In the introductory Chapter 1, Plonsky establishes the reasons for writing the book and introduces three major themes that permeate the rest of the chapters: the role of researcher judgment, transparency, and the interrelatedness of the statistical procedures. Furthermore, he provides a brief overview of the book structure and summarizes the types of software used for describing each statistical procedure in the book. In Chapter 2, Brown speculates about the reasons why L2 researchers should learn advanced quantitative methods. In addition to outlining the main benefits of learning and using various advanced quantitative methods, he examines some challenges related to employing such methods in L2 research and suggests how these challenges could ultimately lead to long-term benefits.

Part II comprises four chapters that expand on statistical techniques fairly commonly used in L2 research. Plonsky starts Chapter 3 by denouncing the blind adherence of most quantitative L2 research to null hypothesis significance testing (NHST) and exposes its main flaws, including unreliability and the lack of informational value. The author's criticism of p values seems to echo similar trends in other disciplines and publication venues, some of which have gone as far as banning the use of NHST altogether (Trafimow & Marks, 2015). To help inform and guide L2 theory and practice, Plonsky argues, researchers should engage in carrying out more explicative analyses that are derived from descriptive statistics such as means, standard deviations, confidence intervals, and effect sizes. In Chapter 4, LaFlair, Egbert, and Plonsky discuss bootstrapping, a statistical technique that entails drawing new samples from the original sample which acts as a population. After discussing the potential of this statistic for overcoming the threats to the validity of parametric tests, the authors provide step-by-step practical guidelines for utilizing bootstrapping with several statistical procedures (e.g., descriptive statistics, Pearson’s correlation, t-tests, and ANOVAs) and present summaries of two sample studies to illustrate the use of this technique in research practice. Chapter 5 covers the topic of visual presentation of quantitative data and statistical results. After outlining the general rules for displaying graphic data, Hudson discusses key principles and potential issues related to the design of tables, graphs, and charts. The chapter concludes with a brief overview of advantages and disadvantages of Excel, SPSS, and R for generating such visual displays; however, no practical instructions for using these software choices are offered. In Chapter 6, Plonsky and Oswald provide a step-by-step guide for conducting a meta-analysis of major issues related to L2 research. The steps discussed in this chapter include defining the research domain, conducting the literature search, preparing for and managing the coding process, analyzing the data, and interpreting the results. Two sample studies are provided to demonstrate the use of meta-analytic methods in practice.
Part III consists of eight chapters devoted to advanced and multivariate statistical methods that are less common in L2 research. In Chapter 7, Jeon introduces three types of multiple regression analysis (MRA): standard multiple regression, hierarchical regression analysis, and stepwise regression analysis. Upon discussing the considerations that researchers need to heed when preparing their data and choosing the appropriate type of MRA, she gives detailed instructions on how to run each type of MRA in SPSS and interpret the results. In Chapter 8, Cunnings and Finlayson give an overview of mixed effects models and their benefits for longitudinal studies. The bulk of the chapter explores a practical example describing how to perform longitudinal mixed effects data analysis using the R software package. In Chapter 9 Loewen and Gonulal offer a conceptual motivation for using factor analysis in L2 research. Focusing on two main types of factor analysis (i.e., exploratory factor analysis and confirmatory factor analysis), the authors provide step-by-step guidelines for conducting each procedure, explain what information should be reported, and propose three principles to help guide those L2 researchers who might consider using this statistical technique. In Chapter 10, Schoonen highlights the potential of structural equation modeling for exploring complex relationships that exist among different factors involved in L2 learning. Following a discussion of considerations involved in preparing, designing, and evaluating a model, readers are walked through the process of conducting a SEM analysis in two software packages: LISREL and AMOS.

Cluster analysis is the focus of Chapter 11. Staples and Biber start this chapter with an informative overview of cluster analysis and an insightful discussion of how this statistical procedure can be applied to research on L2 learning. The rest of the chapter delivers an 11-step procedure for conducting cluster analysis in SPSS. Knoch and McNamara delve into the essentials of Rasch analysis in Chapter 12. Having been adopted by language test developers and researchers, this method is rarely used in other areas of applied linguistics. To demonstrate the potential of this statistical technique and advocate for its broader use, the authors provide a concise review of four types of Rasch models followed by a comprehensive tutorial on how to carry out a Rasch analysis and interpret the output. Chapter 13, by Norris, is devoted to discriminant analysis. Similar to other chapters, this chapter proposes the conceptual motivation for utilizing this technique in L2 research and presents a practical guide for performing discriminant analysis in SPSS. Of particular value here is a detailed sample report illustrating how to write up and present the results of such analysis. In the last chapter of the book, Mackey and Ross elucidate the fundamentals of Bayesian informative hypothesis testing and outline the procedures for conducting Bayesian confirmatory analysis of variance using a sample of data from a study on the validity of listening and reading tests.
Overall, this edited volume provides a comprehensive overview of advanced research methods and offers insights into their application in the field of applied linguistics and SLA. It delivers a good balance between highlighting conceptual considerations and providing informative practical guides for utilizing each statistical procedure. Written in a clear and concise manner, most of the chapters in this volume succeed in rendering complex statistical concepts and procedures more accessible to novice and intermediate users of these advanced research methods. The book’s focus and appeal could be further strengthened by including a conclusion chapter that pulls together the main conceptual and practical strands making up this volume into a cohesive, reflective summary. The book will be useful for readers both as a resource that introduces the key concepts and principles of using advanced quantitative methods in L2 research and as a practical guide for performing these sophisticated statistical procedures in different software packages. Ultimately, *Advancing quantitative methods in second language research* is a valuable and welcome contribution to an expanding body of literature on research methods aimed at improving and advancing L2 theory and practice.

**About the reviewer**

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