Applied Multivariate Research
Contents

Preface xxxi

PART I: FOUNDATIONS

1. An Introduction to Multivariate Design 1
   The Univariate and Bivariate Domain 1
   The Tricky Definition of the Multivariate Domain 2
   The Importance of Multivariate Designs 4
   The General Organization of the Book 6
   Recommended Readings 15

2. Some Fundamental Research Design Concepts 17
   Samples and Populations 17
   Variables 18
   Scales of Measurement 19
   Roles Played by Variables 24
   Independent Variables, Dependent Variables, and Covariates 25
   Between-Subjects and Within-Subjects Independent Variables 27
   Latent Variables, Measured Variables, and Variates 28
   Linking Latent Variables to Measured Variables 29
   Degrees of Freedom 31
   Statistical Significance 32
   Statistical Power 38
   Type I and Type II Errors 38
   Recommended Readings 42

3A. Data Screening 43
   Code and Value Cleaning 44
   Distribution Diagnosis 45
   Dealing With Missing Values 56
   Outliers 65
   Multivariate Statistical Assumptions 67
PART II: THE INDEPENDENT VARIABLE VARIATE

4A. Bivariate Correlation and Simple Linear Regression 107
   The Concept of Relationship 107
   Strength of Relationship 114
   Pearson Correlation for a Quantitative Variable and a Dichotomous Nominal Variable 118
   Range (Variance) Restriction 120
   The Scatterplot 121
   Simple Linear Regression 127
   Recommended Readings 136

4B. Bivariate Correlation and Simple Linear Regression Using SPSS 137
   Bivariate Correlation 137
   Simple Linear Regression 141
   Results 145
   4B Exercises 146

5A. Multiple Regression 147
   General Considerations 147
   The Variables in a Multiple Regression Analysis 148
   Multiple Regression Research 148
   The Regression Equations 150
   The Variate in Multiple Regression 153
   A Range of Regression Methods 154
   The Standard (Simultaneous) Regression Method 154
   Summary of the Solution for the Standard Regression Method Example 163
   Step Methods of Building the Model 171
   Evaluation of the Statistical Methods 175
Interpreting the Discriminant Function 261
Accuracy of Classification 262
Different Discriminant Function Methods 263
Recommended Readings 265

7B. Two-Group Discriminant Function Analysis Using SPSS 267
    Overview of the Study 267
    Summary of Canonical Discriminant Functions 270
    Classification Statistics 275
    Results 277
    7B Exercises 278

PART III: THE DEPENDENT VARIABLE VARIATE

8A. Univariate Comparisons of Means 279
    The Strategy of Comparing Means 279
    Measurement Error 280
    The Ratio of Mean Difference to Measurement Error 280
    One-Way Designs: Effects of One Independent Variable 283
    Two-Way Factorial Designs:
        Two Main Effects and One Two-Way Interaction 288
    Three Variations of Factorial Designs 290
    Strength of Effect 294
    Recommendations 301
    Some Examples of Main Effects
        and Interactions: Overview 301
    Example 1: Main Effects Not Significant, Significant Interaction 301
    Example 2: Main Effects and the Interaction Are Significant 307
    Example 3: Significant Main Effects
        and a Nonsignificant Interaction 310
    The Transition to Multivariate Design 312
    Recommended Readings 313

8B. Univariate Comparisons of Means Using SPSS 315
    Numerical Example 1: Independent-Samples t Test 316
    Results 319
    Numerical Example 2: Paired-Samples t Test 319
    Results 320
    Numerical Example 3: One-Way Between-Subjects ANOVA 321
    Results 327
    Numerical Example 4: One-Way Within-Subjects ANOVA 328
    Results 335