Contents

List of Boxes, Tables, and Figures xv List of Symbols xxiii Preface xxvii

1 Statistics and Sociology: Computation and Application 1

Statistics for Sociologists2The Origins of Sociology and Modern Statistics2Using Social Statistics with the Personal Computer4The Origins of Statistical Computing4The Fundamentals of Statistical Computing5Social Statistics in Application5The Limits of Statistical Sociology7Looking Ahead7

Part I. An Overview of Applied Social Statistics 13

2 Statistics: What It Is and Why Sociologists Use It

What Is/Are Statistics? 16
The Place of Statistics in the Scientific Method 17
Hypotheses and Theories 17
Testing Our Expectations 20
Describing What We Observe: Units, Samples, and Variables
Units and Samples in Social Research 24
Variables in Social Research 26

15

23

Summary 27

Key Terms 27

vi Contents

Web Sites to Bookmark 28

Solution-Centered Applications 28

3 Measurement in Sociology: Quantity, Quality, and Social Aggregates 31

Levels of Measurement 31 Nominal Level 33 Ordinal Level 33 Numerical (Quantitative) Variables 34 Interval versus Ratio Levels 34 Creating an Index with Numerical Variables 35 Comparing Levels of Measurement 36 Independent and Dependent Variables 38 Where Do Sociological Data Come From? 41 Collecting Data 42 Experimental Design 42 Surveys 46 Ethnographic Research 47 Secondary Data Analysis 47 **Content Analysis** 48 50 Sources of Secondary Data Summary 51 Key Terms 51 Web Sites to Bookmark 52 Solution-Centered Applications 53

Part II. Tools and Techniques of Description 55

4 Frequency Distributions and Public Sociology 57

Univariate Frequency Distributions: Common Features

58

The Structure of a Frequency Table 58 Proportions, Percentages, and Probabilities 61 65 Graphing Univariate Frequency Distributions Bar Graphs and Histograms 66 Line Graphs or Frequency Polygons 68 Univariate Frequency Distributions: Ordinal and Numerical Variables 70 Order of Attributes 70 Cumulative Frequencies and Percentages 72 Grouping 76 Frequency Distributions with Two Variables 80 **Bivariate** Crosstabs 80 The Structure of the Crosstab 81 What the Crosstab Tells Us 82 Crosstabs and Association 84 Graphing Crosstabs 84 Percentages in the Crosstab 85 Summary 93 Key Terms 93 Web Sites to Bookmark 94 Solution-Centered Applications 94

5

Central Tendency in Microsociology 97

What Is Central Tendency? 97 Nominal Level and the Mode 98 The Median: The Value of the Middle Case 100 Numerical Variables and the Mean 102 The Relationship between Measures of Central Tendency 105 Deviations from the Mean 108 Key Terms 114 Web Sites to Bookmark 114 Solution-Centered and SPSS Applications 115

6 Dispersion and the Analysis of Social Deviance 117

The Range	118
Variance and	Standard Deviation 120
Finding a N	More Complete Measure of Dispersion 120
The Standa	ard Deviation: Rescaling the Variance 125
Standard Scor Calculating	re: Deviation Divided by Standard Deviation 126 Standard Scores 126
Summary	135 million and the second sec
Key Terms	135 and an and an and the solution of a support
Web Sites to E	Bookmark 135
Solution-Cent	tered Applications (for Chapters 5 and 6) 136
Testing Your	r Skills: Practice Quizzes for Chapters 3–6 138

Part III. The Logic of Statistical Induction 145

1	Why Do We Sample? 147
5	Statistics, Parameters, and Generalization 156
5	Sampling Techniques 157
	Non-probability Samples 159
	Probability and Probability Samples 160
	Other Kinds of Probability Samples 166
	Systematic or List Sampling 166
	Stratified Sampling 167
	Multistage Cluster Sampling 168
S	ampling Distributions 169
	Theoretical Probability Distributions 169
	Sampling Distributions as Theoretical Probability Distributions 17.

Web Sites to Bookmark185Solution-Centered Application186

8 Induction: Using Sample Means in the Study of Diversity 187

The Sampling Distribution of Means as Normal 188 Properties of the Normal Distribution 188 Estimation and Error 190 The Concept of Confidence Interval 191 Defining "Confidence Interval" 192 Finding the Margin of Error 193 Estimating Confidence Intervals When σ Is Not Used 199 Illustration When σ Is Not Known, for Any Sample Size 202 Illustration with a Small Sample 206 Summary 212

Key Terms212Web Sites to Bookmark213Solution-Centered Applications213

9 Hypothesis Testing: The Foundation of Sociological Theory 215

Stating Hypotheses 215 **Decisions and Probabilities** 217 The Critical Region and One and Two-Tailed Tests 219 The Critical Region for Two-Tailed Tests 220 **One-Tailed** Tests 221 An Illustration 221 Web Sites to Bookmark 225 Testing Your Skills: Practice Quizzes for Chapters 7-9 226

Part IV. Bivariate Applications: Using Induction and Association in Sociological Research 231

10	Two Sample <i>t</i> -Tests and an Application to the Study of Altruism	233
	The <i>t</i> -Test of the Difference between Two Means 234	
	Calculated t as a Measure of Association 234	
	Two-Tailed versus One-Tailed Tests 235	
	Two-Tailed 235	
	One-Tailed 236	
	Two-Tailed Tests with Independent Subsamples237An Illustration of a Two-Tailed Independent-Sample Test240	
	One-Tailed Tests with Independent Samples242An Illustration of a One-Tailed Independent-Sample Test243	
	Before-and-After <i>t</i> -Test 245	
	Substituting for Degrees of Freedom and $s_{\overline{x}_1 - \overline{x}_2}$ 245 Calculating $s_{=}$ 246	
	An Illustration of the Before-and-After Test 246	
	Summary 254 Key Terms 255	
	Web Sites to Bookmark255Solution-Centered Application256	

11 Comparing Three or More Samples in Small-Group Research 257

One-Way Analysis of Variance257The F Sampling Distribution258The Calculated F Ratio259The F Ratio as a Measure of AssociationDecomposing the F Ratio261Calculating the F Ratio262An Illustration of ANOVA263

260

Contents xi

Post-Hoc Tests: Determining the Pair(s) Contributing to
a Significant F Ratio266

Summary 274 Key Terms 275 Web Sites to Bookmark 275 Solution-Centered Application 276

12 Association and Induction in Qualitative Sociology: From Private Problems to Public Issues 277

Two-Way (Bivariate) Chi-Square 277 279 Chi-Square as a Measure of Association Using Chi-Square for Inductive Applications 284 Degrees of Freedom with Chi-Square 285 Testing Hypotheses with Chi-Square 287 **Rank-Order** Correlation 291 Rank-Order Correlation as a Measure of Association 291 Significance Tests with Rank-Order Correlation 294 Summary 295 **Key Terms** 295 Web Sites to Bookmark 295 Solution-Centered Applications 296

13 Correlation Description and Induction in Comparative Sociology 297

Data for Correlation and Regression: The Scatterplot297Creating the Scatterplot302The Best-Fitting Line: Slope302Determining the Slope308Nonlinear Correlation309The Best-Fitting Line: Shape310Correlation Description312

Contents

Measuring Correlation with Pearson's r 312 Calculating r 313 An Illustration 316 The Coefficients of Determination and Alienation 317 Summary of Correlation Description 320 **Correlation Induction** 321 323 Summary **Key Terms** 324 Web Sites to Bookmark (for Chapters 13 and 14) 324

14 **Regression Description and Induction in the** Sociological Study of Globalization 325

Regression Description 325 *The Slope and y-Intercept* 326 Slope 326 Intercept 327 *Measuring the Slope and the* y-*Intercept* 330 Calculating Slope and Intercept 332 Illustrating the Use of the Regression Line 333 Least Squares and Regression Error 335 **Regression Induction** 339 Testing the Significance of b 340 Analysis of Variance in Regression 343 An Illustration of Regression Induction 345 Summary 346 Key Terms 352 Solution-Centered Applications 352

Testing Your Skills: Practice Quizzes for Chapters 10-14 354

xii

15 Supplemental Material Online at http://www.rowmanlittlefield.com/RL/Books/WeinsteinStats/

The Role of Additional Variables in Frequency Distributions Confidence Intervals with Nominal- and Ordinal-Level Data Margin of Error and CIs Using the Sampling Distribution of Proportions An Example from Political Polling Difference of Proportions The Procedure An Illustration Chi-Square with Three or More Variables Multivariate Correlation Partial Correlation Multiple Correlation

An Illustration

Appendix A: Tables 359

Appendix B: Subscripts, Summation, and Scientific Notation371Appendix C: Answers to Selected Practice Quizzes375Appendix D: Formulas Used in This Book381Notes387References397Index401About the Author417