Pretace to the Fourth Edition	XXIII
Acknowledgments	xxix
PART One	
DESCRIPTIVE STATISTICS	1
Chapter 1 Introduction Development Court Courter	
Introduction to Psychological Statistics	1
A. Conceptual Foundation	1
What Is (Are) Statistics?	1
Statistics and Research	2
Variables and Constants	2
Scales of Measurement	3
Parametric Versus Nonparametric Statistics	6
Likert Scales and the Measurement Controversy	7
	0
Continuous Versus Discrete Variables	8
Scales Versus Variables Versus Underlying Constructs	8
Independent Versus Dependent Variables	9
Experimental Versus Observational Research	10
Populations Versus Samples	11
Statistical Formulas	12
Summary	12
Exercises	13
B. Basic Statistical Procedures	14
Variables With Subscripts	14
The Summation Sign	15
Properties of the Summation Sign	16
Rounding Off Numbers	18
Summary	19
Exercises	20
C. Analysis by SPSS	21
Ihno's Data	21
Variable View	22
Data Coding	23
Missing Values	23
Computing New Variables	24
Reading Excel Files Into SPSS	24
Exercises	25
Chapter 2	
FREQUENCY TABLES, GRAPHS, AND DISTRIBUTIONS	27
A. Conceptual Foundation	27
Frequency Distributions	27
	20
The Cumulative Frequency Distribution The Poletive Frequency and Cumulative Poletive	20
The Relative Frequency and Cumulative Relative	
Frequency Distributions	29

Percentiles

The Cumulative Percentage Distribution

30

	Graphs	30
	Real Versus Theoretical Distributions	34
	Summary	35
	Exercises	37
В.	Basic Statistical Procedures	38
	Grouped Frequency Distributions	38
	Apparent Versus Real Limits	39
	Constructing Class Intervals	39
	Choosing the Class Interval Width	39
	Choosing the Limits of the Lowest Interval	40
	Relative and Cumulative Frequency Distributions	41
	Cumulative Percentage Distribution	41
	Estimating Percentiles and Percentile Ranks	71
	by Linear Interpolation	42
	Graphing a Grouped Frequency Distribution	43
	Guidelines for Drawing Graphs of Frequency Distributions	44
	Summary	46
0	Exercises	47
C.	Analysis by SPSS	48
	Creating Frequency Distributions	48
	Percentile Ranks and Missing Values	50
	Graphing Your Distribution	50
	Obtaining Percentiles	52
	The Split File Function	52
	Stem-and-Leaf Plots	53
	Exercises	55
	topier 3	the second of th
	ASURES OF CENTRAL TENDENCY AND VARIABILITY	57
		57 57
ME	ASURES OF CENTRAL TENDENCY AND VARIABILITY	57 57 57
ME	ASURES OF CENTRAL TENDENCY AND VARIABILITY Conceptual Foundation	
ME	ASURES OF CENTRAL TENDENCY AND VARIABILITY Conceptual Foundation Measures of Central Tendency	57
ME	ASURES OF CENTRAL TENDENCY AND VARIABILITY Conceptual Foundation Measures of Central Tendency Measures of Variability	57 61
ME	ASURES OF CENTRAL TENDENCY AND VARIABILITY Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions	57 61 69
ME	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary	57 61 69 73
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises	57 61 69 73 75
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures	57 61 69 73 75
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean	57 61 69 73 75
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation	57 61 69 73 75
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From	57 61 69 73 75 76 76
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator	57 61 69 73 75 76 76 77
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean	57 61 69 73 75 76 76 76 77 80 81
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation	57 61 69 73 75 76 76 76 77 80 81 83
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness	57 61 69 73 75 76 76 77 80 81 83 84
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis	57 61 69 73 76 76 76 77 80 81 83 84 85
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary	57 61 69 73 75 76 76 77 80 81 83 84 85 87
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises	57 61 69 73 75 76 76 77 80 81 83 84 85 87 88
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS	57 61 69 73 75 76 76 77 80 81 83 84 85 87 88
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS Summary Statistics	57 61 69 73 76 76 77 80 81 83 84 85 87 88 89 89
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS Summary Statistics Using Explore to Obtain Additional Statistics	57 61 69 73 76 76 77 80 81 83 84 85 87 88 89 90
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS Summary Statistics Using Explore to Obtain Additional Statistics Boxplots	57 61 69 73 75 76 76 77 80 81 83 84 85 87 88 89 90 91
ME A.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS Summary Statistics Using Explore to Obtain Additional Statistics Boxplots Selecting Cases	57 61 69 73 76 76 77 80 81 83 84 85 89 90 91 94
A. B.	Conceptual Foundation Measures of Central Tendency Measures of Variability Skewed Distributions Summary Exercises Basic Statistical Procedures Formulas for the Mean Computational Formulas for the Variance and Standard Deviation Obtaining the Standard Deviation Directly From Your Calculator Properties of the Mean Properties of the Standard Deviation Measuring Skewness Measuring Kurtosis Summary Exercises Analysis by SPSS Summary Statistics Using Explore to Obtain Additional Statistics Boxplots	57 61 69 73 75 76 76 77 80 81 83 84 85 87 88 89 90 91

STA	NDARDIZED SCORES AND THE NORMAL DISTRIBUTION	99
A.	Conceptual Foundation	99
	z Scores	99
	Finding a Raw Score From a z Score	101
	Sets of z Scores	101
	Properties of z Scores	102
	SAT, T, and IQ Scores	103
	The Normal Distribution	104
	Introducing Probability: Smooth Distributions Versus	
	Discrete Events	106
	Real Distributions Versus the Normal Distribution	107
	z Scores as a Research Tool	108
	Sampling Distribution of the Mean	109
	Standard Error of the Mean	110
	Sampling Distribution Versus Population Distribution	111
	Summary	112
	Exercises	113
В.	Basic Statistical Procedures	115
	Finding Percentile Ranks	115
	Finding the Area Between Two z Scores	116
	Finding the Raw Scores Corresponding to a Given Area	118
	Areas in the Middle of a Distribution	119
	From Score to Proportion and Proportion to Score	119
	Describing Groups	120
	Probability Rules	122
	Summary	125
	Advanced Material: The Mathematics of the Normal Distribution	127
	Exercises	128
C.	Analysis by SPSS	130
	Creating z Scores	130
	Obtaining Standard Errors	130
	Obtaining Areas of the Normal Distribution	131
	Data Transformations	131
2.0	Exercises	132
Key	Formulas	132
	PART TWO	
ON	E- AND TWO-SAMPLE HYPOTHESIS TESTS	135
2.2		
	1011er 5	
	RODUCTION TO HYPOTHESIS TESTING: THE	125
UN	E-SAMPLE Z TEST	135
A.	Conceptual Foundation	135
	Selecting a Group of Subjects	135
	The Need for Hypothesis Testing	136
	The Logic of Null Hypothesis Testing	137
	The Null Hypothesis Distribution	137
	The Null Hypothesis Distribution for the One-Sample Case	138
	z Scores and the Null Hypothesis Distribution	139
	Statistical Decisions	140

	The z Score as Test Statistic	14
	Type I and Type II Errors	14
	The Trade-Off Between Type I and Type II Errors	14
	One-Tailed Versus Two-Tailed Tests	14
	Summary	14
	Exercises	14
D		
В.	Basic Statistical Procedures	14
	Step 1: State the Hypothesis	14
	Step 2: Select the Statistical Test and the Significance Level	15
	Step 3: Select the Sample and Collect the Data	15
	Step 4: Find the Region of Rejection	15
	Step 5: Calculate the Test Statistic	15
	Step 6: Make the Statistical Decision	15
	Interpreting the Results	15
	Assumptions Underlying the One-Sample z Test	15
	Varieties of the One-Sample Test	15
	Why the One-Sample Test Is Rarely Performed	15
		15
	Publishing the Results of One-Sample Tests	
	Summary	16
	Exercises	16
	Advanced Material: Correcting Null Hypothesis	
	Testing Fallacies	16
	Advanced Exercises	16
C.	Analysis by SPSS	16
	The One-Sample z Test	16
	Testing the Normality Assumption	17
	Exercises	17
Key	Formulas	17
	ERVAL ESTIMATION AND THE t DISTRIBUTION	17:
A.	ERVAL ESTIMATION AND THE t DISTRIBUTION	
	ERVAL ESTIMATION AND THE t DISTRIBUTION Conceptual Foundation	17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution	17. 17.
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known	17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution	17. 17.
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known	17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example	17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution	17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The <i>t</i> Distribution Degrees of Freedom and the <i>t</i> Distribution Critical Values of the <i>t</i> Distribution	17 17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test	17 17 17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test	17 17 17 17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test	17 17 17 17 17 17 17 17 17
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test	17 17 17 17 17 17 17 17 17 18 18
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean	17 17 17 17 17 17 17 17 17 18 18
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary	17 17 17 17 17 17 17 17 18 18 18
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises	17 17 17 17 17 17 17 17 18 18 18 18
	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators	17 17 17 17 17 17 17 17 18 18 18 18 18
В.	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures	17 17 17 17 17 17 17 17 18 18 18 18
B .	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators	17 17 17 17 17 17 17 17 18 18 18 18 18
B .	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures	17 17 17 17 17 17 17 17 18 18 18 18 18 18
B .	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures Step 1: Select the Sample Size	17 17 17 17 17 17 17 17 18 18 18 18 18 18
B .	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures Step 1: Select the Sample Size Step 2: Select the Level of Confidence Step 3: Select the Random Sample and Collect the Data	17 17 17 17 17 17 17 17 18 18 18 18 18 18
В.	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures Step 1: Select the Sample Size Step 2: Select the Level of Confidence Step 3: Select the Random Sample and Collect the Data Step 4: Calculate the Limits of the Interval	17 17 17 17 17 17 17 17 18 18 18 18 18 18 18
B .	Conceptual Foundation The Mean of the Null Hypothesis Distribution When the Population Standard Deviation Is Not Known Calculating a Simple Example The t Distribution Degrees of Freedom and the t Distribution Critical Values of the t Distribution Calculating the One-Sample t Test Sample Size and the One-Sample t Test Uses for the One-Sample t Test Cautions Concerning the One-Sample t Test Estimating the Population Mean Summary Exercises Advanced Material: A Note About Estimators Basic Statistical Procedures Step 1: Select the Sample Size Step 2: Select the Level of Confidence Step 3: Select the Random Sample and Collect the Data	17 17 17 17 17 17 17 17 18 18 18 18 18 18 18



	Assumptions Underlying the One-Sample t Test and the	
	Confidence Interval for the Population Mean	191
	Use of the Confidence Interval for the Population Mean	193
	Publishing the Results of One-Sample t Tests	194
	Summary	194
	Exercises	195
C.	Analysis by SPSS	196
	Performing a One-Sample t Test	196
	Confidence Intervals for the Population Mean	198
	Bootstrapping	198
	Exercises	200
Kev	Formulas	200
ixey		200
CV	1011611	tombattohistorikosenskolenski kristellosiskolensk
THI	E t TEST FOR TWO INDEPENDENT SAMPLE MEANS	203
A.	Conceptual Foundation	203
	Null Hypothesis Distribution for the Differences	
	of Two Sample Means	204
	Standard Error of the Difference	205
	Formula for Comparing the Means of Two Samples	206
	Null Hypothesis for the Two-Sample Case	207
	The z Test for Two Large Samples	208
	Separate-Variances t Test	209
	The Pooled-Variances Estimate	209
	The Pooled-Variances t Test	210
	Formula for Equal Sample Sizes	211
	Calculating the Two-Sample t Test	211
		211
	Interpreting the Calculated <i>t</i> Limitations of Statistical Conclusions	213
		213
	Summary	213
D	Exercises Pacie Statistical Drogodynas	
В.	Basic Statistical Procedures	215
	Step 1: State the Hypotheses	215
	Step 2: Select the Statistical Test and the Significance Level	216
	Step 3: Select the Samples and Collect the Data	216
	Step 4: Find the Region of Rejection	217
	Step 5: Calculate the Test Statistic	217
	Step 6: Make the Statistical Decision	218
	Interpreting the Results	218
	Confidence Intervals for the Difference Between Two	
	Population Means	219
	Assumptions of the t Test for Two Independent Samples	221
	HOV Tests and the Separate-Variances t Test	223
	Random Assignment and the Separate-Variances t Test	224
	When to Use the Two-Sample t Test	225
	When to Construct Confidence Intervals	226
	Heterogeneity of Variance as an Experimental Result	226
	Publishing the Results of the Two-Sample t Test	226
	Summary	227
	Exercises	. 228
	Advanced Material: Finding the Degrees of Freedom	
	for the Separate-Variances t Test	230
	Advanced Exercises	231

~	10	10
36.	86	

C.	Analysis by SPSS	232
	Performing the Two-Independent-Samples t Test	232
	Confidence Interval for the Difference of Two Population Means	
	Bootstrapping	233
	Exercises	233
Key I	Formulas	234
	7	
Ch		Ontopularion deviarily podano
	TISTICAL POWER AND EFFECT SIZE	237
A.	Conceptual Foundation	237
/M.	The Alternative Hypothesis Distribution	237
	The Expected t Value (Delta)	239
	The Expected value (Bella) The Effect Size	24:
4	Power Analysis	242
	The Interpretation of t Values	243
	Estimating Effect Size	244
	Manipulating Power	246
	Summary	246
	Exercises	247
В.	Basic Statistical Procedures	248
	Using Power Tables	248
	The Relationship Between Alpha and Power	249
	Power Analysis With Fixed Sample Sizes	250
	Sample Size Determination	25
	The Case of Unequal Sample Sizes	252
	The Power of a One-Sample Test	253
	Constructing Confidence Intervals for Effect Sizes	254
	Calculating Power Retrospectively	255
	Meta-Analysis	256
	Summary	25
	Exercises	258
	Advanced Material: When Is Null Hypothesis Testing Useful?	259
C.	Analysis by SPSS	265
	Power Calculations in SPSS	265
	G*Power 3	26
	Exercises	268
Key l	Formulas	269
	PART Three	
HYP	OTHESIS TESTS INVOLVING TWO MEASURES	
ON F	EACH SUBJECT	271
OIX I		Anna A. J.
	apter 9 -	Shekerbaya salawaya tar
LINE	EAR CORRELATION	271
A.	Conceptual Foundation	27
3	Perfect Correlation	27
	Negative Correlation	272
4	The Correlation Coefficient	272
	Linear Transformations	274

	Graphing the Correlation	274
	Dealing With Curvilinear Relationships	275
	Problems in Generalizing From Sample Correlations	277
	Correlation Does Not Imply Causation	279
	True Experiments Involving Correlation	280
	Summary	280
	Exercises	281
В.	Basic Statistical Procedures	283
	The Covariance	283
	The Unbiased Covariance	284
	An Example of Calculating Pearson's r	284
	Which Formula to Use	285
	Testing Pearson's r for Significance	285
	Understanding the Degrees of Freedom	287
	Assumptions Associated With Pearson's r	288
	Uses of the Pearson Correlation Coefficient	289
	Publishing the Results of Correlational Studies	290
	The Power Associated With Correlational Tests	291
	Summary	293
	Exercises	294
C.	Analysis by SPSS	296
	Creating Scatterplots	296
	Computing Pearson's r	296
	The Listwise Option	298
	Using the Syntax Window for More Options	298
	Using the Keyword "With" to Reduce the Size	
	of Your Correlation Matrix	299
	Bootstrapping	300
	Exercises	301
Kev	Formulas	302
Ch	apter 10	
	EAR REGRESSION	303
LIN	EAR ILEGRESSION	303
A.	Conceptual Foundation	303
	Perfect Predictions	303
	Predicting With z Scores	304
	Calculating an Example	304
	Regression Toward the Mean	305
	Graphing Regression in Terms of z Scores	305
	The Raw-Score Regression Formula	306
	The Slope and the Y Intercept	307
	Predictions Based on Raw Scores	308
	Interpreting the Y Intercept	309
	Quantifying the Errors Around the Regression Line	309
	The Variance of the Estimate	310
	Explained and Unexplained Variance	311
	The Coefficient of Determination	312
	The Coefficient of Nondetermination	312
	Calculating the Variance of the Estimate	312
	Summary	313
	Exercises	313
В.		
D.	Basic Statistical Procedures	
ъ.		314 314

Finding the Regression Equation

315

	Making Predictions	316
	Using Sample Statistics to Estimate the Variance	
	of the Estimate	316
	Standard Error of the Estimate	317
	Testing the Regression Slope for Significance	318
	Assumptions Underlying Linear Regression	319
	Regressing X on Y	319
	Alternative Formula for the Regression Slope	320
	When to Use Linear Regression	320
	The Point-Biserial Correlation Coefficient	322
	Calculating $r_{\rm pb}$	323
	Deriving r_{pb} From a t Value	324
	Interpreting $r_{\rm pb}$	324
	Strength of Association in the Population (Omega Squared)	325
	Biserial r	327
	Summary	327
	Exercises	328
C.	Analysis by SPSS	330
	Computing a Linear Regression Analysis	330
	Bootstrapping	333
	Point-Biserial Correlations	333
	Exercises	333
Key	Formulas	334
THE	E MATCHED t TEST	337
A.	Conceptual Foundation	337
	Before-After Design	227
		337
	The Direct-Difference Method	338
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation	338 339
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom	338 339 341
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design	338 339 341 341
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs	338 339 341 341 341
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design	338 339 341 341 342
	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples	338 339 341 341 341 342 343
	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched <i>t</i> Test	338 339 341 341 342 343 343
	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary	338 339 341 341 342 343 343 344
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises	338 339 341 341 342 343 343 344 345
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures	338 339 341 341 342 343 343 344 345 346
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses	338 339 341 341 342 343 344 345 346 346
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level	338 339 341 341 342 343 343 344 345 346
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data	338 339 341 341 342 343 344 345 346 346 346
B.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level	338 339 341 341 342 343 344 345 346 346 346 346
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection	338 339 341 341 342 343 344 345 346 346 346 346 346 347
В.	The Direct-Difference Method The Matched <i>t</i> Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched <i>t</i> Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic	338 339 341 341 342 343 344 345 346 346 346 346 347 347
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic Step 6: Make the Statistical Decision	338 339 341 341 342 343 344 345 346 346 346 346 347 347 348
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic Step 6: Make the Statistical Decision Using the Correlation Formula for the Matched t Test The Confidence Interval for the Difference of Two Population Means	338 339 341 341 342 343 344 345 346 346 346 346 347 347 348
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic Step 6: Make the Statistical Decision Using the Correlation Formula for the Matched t Test The Confidence Interval for the Difference of Two Population Means Effect Size for the Matched t Test	338 339 341 341 342 343 344 345 346 346 346 347 347 348 348
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic Step 6: Make the Statistical Decision Using the Correlation Formula for the Matched t Test The Confidence Interval for the Difference of Two Population Means Effect Size for the Matched t Test Power of the Matched t Test	338 339 341 341 342 343 344 345 346 346 346 347 348 348 348
В.	The Direct-Difference Method The Matched t Test as a Function of Linear Correlation Reduction in Degrees of Freedom Drawback of the Before-After Design Other Repeated-Measures Designs Matched-Pairs Design Correlated or Dependent Samples When Not to Use the Matched t Test Summary Exercises Basic Statistical Procedures Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level Step 3: Select the Samples and Collect the Data Step 4: Find the Region of Rejection Step 5: Calculate the Test Statistic Step 6: Make the Statistical Decision Using the Correlation Formula for the Matched t Test The Confidence Interval for the Difference of Two Population Means Effect Size for the Matched t Test	338 339 341 341 342 343 344 345 346 346 346 346 347 348 348 348

8	-
A	N.

•

xvi

C.	Analysis by SPSS	401
	Performing a One-Way ANOVA	401
	Reporting Effect Size for a One-Way ANOVA	402
	Exercises	403
Key	Formulas	403
700		
Ch	apter 13	
Mui	TIPLE COMPARISONS	407
A.	Conceptual Foundation	407
	The Number of Possible t Tests	407
	Experimentwise Alpha	408
	Complex and Planned Comparisons	409
	Fisher's Protected t Tests	409
	Complete Versus Partial Null Hypotheses	411
	Tukey's HSD Test	412
	The Studentized Range Statistic	412
	Advantages and Disadvantages of Tukey's Test	413
	Other Procedures for Post Hoc Pairwise Comparisons	414
	The Advantage of Planning Ahead	416
	Bonferroni t, or Dunn's Test	416
	Summary	417
	Exercises	418
В.	Basic Statistical Procedures	419
	Calculating Protected t Tests	419
	Calculating Fisher's LSD	420
	Calculating Tukey's HSD	421
	The Harmonic Mean Revisited	422
	Interpreting the Results of Post Hoc Pairwise Comparisons	422
	Confidence Intervals for Post Hoc Pairwise Comparisons	423
	Tukey's HSD Versus ANOVA	424
	The Modified LSD (Fisher-Hayter) Test	424
	Which Pairwise Comparison Procedure Should You Use?	425
	Complex Comparisons	425
	Scheffé's Test	429
	Orthogonal Contrasts	430
	Modified Bonferroni Tests	432
	The Analysis of Trend Components	433
	Summary	440
	Exercises	1110
C	Analysis by SPSS	444
C.	Multiple Comparisons	
	Contrasts	444
	Exercises	448
Kow	Formulas	448
Key	I Ol IIIulas	-4-4-C
gine "		
	CIPICI 14 MICELLA MICE	1 pm 4
IWC	-WAY ANOVA	451
A.	Conceptual Foundation	451
	Calculating a Simple One-Way ANOVA	451
	Adding a Second Factor	452
	Regrouping the Sums of Squares	453
	New Terminology	453

	Calculating the Two-Way ANOVA	454
	Calculating MS_W	455
	Calculating the Main Effect of the Drug Treatment Factor	455
	Calculating the Main Effect of the Gender Factor	455
	Graphing the Cell Means	456
	The General Linear Model	457
	Calculating the Variability Due to Interaction	458
	Types of Interactions	459
	Separating Interactions From Cell Means	462
	The F Ratio in a Two-Way ANOVA	463
	Advantages of the Two-Way Design	463
	Summary	465
D	Exercises	466
В.	Basic Statistical Procedures	467
	Step 1: State the Null Hypothesis	467
	Step 2: Select the Statistical Test and the Significance Level	467
	Step 3: Select the Samples and Collect the Data	468
	Step 4: Find the Regions of Rejection	468
	Step 5: Calculate the Test Statistics	469
	Step 6: Make the Statistical Decisions	472
	The Summary Table for a Two-Way ANOVA	472
	Interpreting the Results	473
	Post Hoc Comparisons for the Significant Main Effects	474
	Effect Sizes in the Two-Way ANOVA	475
	Post Hoc Comparisons for a Significant Interaction	477
	Interaction of Trend Components	481
	Assumptions of the Two-Way ANOVA	481
	Advantages of the Two-Way ANOVA With Two	
	Experimental Factors	482
	Advantages of the Two-Way ANOVA With One	102
	Grouping Factor	483
	Advantages of the Two-Way ANOVA With Two	703
		102
	Grouping Factors	483
	Publishing the Results of a Two-Way ANOVA	484
	The Two-Way ANOVA for Unbalanced Designs	485
	Summary	487
0	Exercises	489
C.	Analysis by SPSS	493
	Performing a Two-Way ANOVA	493
	Options for Univariate ANOVA	495
	Simple Main Effects	496
	Exercises	498
Key I	Formulas	498
	PART Five	
ARTAI	LYSIS OF VARIANCE WITH REPEATED MEASURES	501
MINAL	LISIS OF VARIANCE WITH INEPEATED WEASURES	301
		4
Ch	apter 15	
		EO1
KEP	EATED MEASURES ANOVA	501
A.	Conceptual Foundation	501
127	Calculation of an Independent-Groups ANOVA	501
	The One-Way RM ANOVA as a Two-Way Independent ANOVA	502
	Calculating the SS Components of the RM ANOVA	503



xviii

	Comparing the Independent ANOVA With the RM ANOVA	504
	The Advantage of the RM ANOVA	505
	Picturing the Subject by Treatment Interaction	506
	Comparing the RM ANOVA to a Matched t Test	506
	Dealing With Order Effects	508
	Differential Carryover Effects	509
	The Randomized-Blocks Design	509
	Summary	510
	Exercises	511
В.	Basic Statistical Procedures	512
	Step 1: State the Hypotheses	513
	Step 2: Select the Statistical Test and the Significance Level	513
	Step 3: Select the Samples and Collect the Data	513
	Step 4: Find the Region of Rejection	513
	Step 4. I mu the Region of Rejection Step 5: Calculate the Test Statistic	
		514
	Step 6: Make the Statistical Decision	515
	Interpreting the Results	515
	The Residual Component	516
	The Effect Size of an RM ANOVA	517
	Power of the RM ANOVA	519
	Assumptions of the RM ANOVA	520
	Dealing With a Lack of Sphericity	522
	Post Hoc Comparisons	523
	Varieties of Repeated-Measures and Randomized-Blocks	
	Designs	524
	Counterbalancing	526
	Trend Analysis With Repeated Measures	528
	Publishing the Results of an RM ANOVA	529
	Summary	531
	Exercises	532
	Advanced Material: Using MANOVA to Test	332
	T) 1 7 7	535
C.	Analysis by SPSS	
C.		536
X-5	Performing a One-Way RM ANOVA	536
	Plots and Contrasts	540
	Options	540
**	Exercises	542
Key	Formulas	542
Ch	OPTEV 16	MAKESYPPERKEGESAMBERTSREECUNGSPREE
	-WAY MIXED-DESIGN ANOVA	545
Λ	Conceptual Foundation	545
PA.		
	The One-Way RM ANOVA Revisited	546
	Converting the One-Way RM ANOVA to a	9 999
3 11-	Mixed-Design ANOVA	547
	Two-Way Interaction in the Mixed-Design ANOVA	550
	Summarizing the Mixed-Design ANOVA	551
	Interpreting the Results	552
	The Varieties of Mixed Designs	552
× ×	Summary	554
The same	Exercises	ATT
В.	Basic Statistical Procedures	
	Step 1: State the Hypotheses Step 2: Select the Statistical Test and the Significance Level	
	oup 2. octou the otation at test and the orginicance Level	556

		CONTENTS
700	Step 3: Select the Samples and Collect the Data	556
	Step 4: Find the Regions of Rejection	557
	Step 5: Calculate the Test Statistics	558
	Step 6: Make the Statistical Decisions	561
	Interpreting the Results	561
	Alternative Breakdown of the SS Components of a	301
		F(2
	Mixed-Design ANOVA	562
	Estimating Effect Sizes for a Mixed Design	563
	Publishing the Results of a Mixed ANOVA	563
	Assumptions of the Mixed-Design ANOVA	564
	A Special Case: The Before-After Mixed Design	565
	Post Hoc Comparisons	566
	An Excerpt From the Psychological Literature	569
	Interactions Involving Trends	570
	Removing Error Variance From Counterbalanced Designs	571
	Summary	572
	Exercises	574
0		
C.	Analysis by SPSS	578
	Performing a Two-Way Mixed-Design ANOVA	578
	Plots	579
	Post Hoc Tests	580
	Options: Homogeneity Tests	580
	Simple Main Effects	581
**	Exercises	582
Key	Formulas	582
	PART Six	
Mui	LTIPLE REGRESSION AND ITS CONNECTION TO ANOVA	A 585
	apter 17	
IVIUI	LTIPLE REGRESSION	585
A.	Conceptual Foundation	585
	Uncorrelated Predictors	586
	The Standardized Regression Equation	587
	More Than Two Mutually Uncorrelated Predictors	587
	The Sign of Correlations	588
	Two Correlated Predictors	588
	The Beta Weights	589
	Completely Redundant Predictors	591
	Partial Regression Slopes	591
	Degrees of Freedom	593
	Semipartial Correlations	593
	Calculating the Semipartial Correlation	594
	Suppressor Variables	595
	Complementary Variables	596
	The Raw-Score Prediction Formula	597
	Partial Correlation	598
	Finding the Best Prediction Equation	600
	Hierarchical (Theory-Based) Regression	601
	Summary	602
	Exercises	603

В.	Basic Statistical Procedures	605
	The Significance Test for Multiple R	605
	Tests for the Significance of Individual Predictors	606
	Methods for Variable Selection	607
	Problems Associated With Having Many Predictors	611
	Too Few Predictors	615
	Minimal Sample Size	615
	Basic Assumptions of Multiple Regression	616
	Regression With Dichotomous Predictors	618
	Multiple Regression as a Research Tool: Variable Ordering	619
,	Publishing the Results of Multiple Regression	621
	Summary	622
	Exercises	623
	Optional Exercise	626
	Advanced Material	626
C.	Analysis by SPSS	632
	Performing a Multiple Regression Analysis	632
	Statistics, Plots, Save, and Options	634
	Stepwise Regression	635
	Hierarchical Regression	636
	Exercises	636
Key	Formulas	637
CI	topier 18 -	
	E REGRESSION APPROACH TO ANOVA	639
Α.	Conceptual Foundation	639
	Dummy Coding	640
	The Regression Plane	640
	Effect Coding	641
	The General Linear Model	642
	Equivalence of Testing ANOVA and R ²	642
	Two-Way ANOVA as Regression	643
	The GLM for Higher-Order ANOVA	645
	Analyzing Unbalanced Designs	646
	Methods for Controlling Error Variance	649
	Summary	650
	Exercises	652
В.	Basic Statistical Procedures	653
	Simple ANCOVA as Multiple Regression	653
	The Linear Regression Approach to ANCOVA	656
	Post Hoc Comparisons	663
	Performing ANCOVA by Multiple Regression	664
	Power and Effect Size	665
	The Assumptions of ANCOVA	665
	Additional Considerations	666
	Factorial ANCOVA	667
	Using Two or More Covariates	668
	Alternatives to ANCOVA	668
	Using ANCOVA With Intact Groups	670
	Summary	671
	Exercises	673
C.	Analysis by SPSS	675
0.000	Dummy Coding	675
	Effect Coding	677

	CONTENTS
Two-Way ANOVA by Regression	677
Analysis of Covariance	678
Analysis of Covariance by Multiple Regression	681
Exercises	682
Key Formulas	682
PART Seven	
Nonparametric Statistics	685
Chapter 19	
THE BINOMIAL DISTRIBUTION	685
A. Conceptual Foundation	685
The Origin of the Binomial Distribution	686
The Binomial Distribution With $N = 4$	687
The Binomial Distribution With $N = 4$ The Binomial Distribution With $N = 12$	688
When the Binomial Distribution Is Not Symmetrical	689
The z Test for Proportions	
	691
The Classical Approach to Probability The Dules of Probability Applied to Discrete Veriebles	692
The Rules of Probability Applied to Discrete Variables	693
The Empirical Approach to Probability	694
Summary Exercises	695 696
B. Basic Statistical Procedures	697
Step 1: State the Hypotheses	697
Step 2: Select the Statistical Test and the Significance Level	
Step 3: Select the Samples and Collect the Data	698
Step 4: Find the Region of Rejection	698
Step 5: Calculate the Test Statistic	698
Step 6: Make the Statistical Decision	699
Interpreting the Results	699
Assumptions of the Sign Test	699
The Gambler's Fallacy	700
When to Use the Binomial Distribution for Null	
Hypothesis Testing	700
Summary	702
Exercises	703
Advanced Material: Permutations and Combinations	704
Constructing the Binomial Distribution	705
C. Analysis by SPSS	706
Performing a Binomial Test	706
Options for the Binomial Test	708
The Sign Test	709
Exercises	710
Key Formulas	711
Chapter 20	
CHI-SQUARE TESTS	713
A. Conceptual Foundation	713
The Multinomial Distribution	713
The Chi-Square Distribution	714
Expected and Observed Frequencies	714

	The Ch	i-Square Statistic	715
	Critica	l Values of Chi-Square	715
	Tails of	f the Chi-Square Distribution	716
	Expect	ed Frequencies Based on No Preference	717
	The Va	rieties of One-Way Chi-Square Tests	718
	Summa	ary	720
	Exercis	ses	720
B.	Basic S	Statistical Procedures	721
	Two-Va	ariable Contingency Tables	721
	Pearso	n's Chi-Square Test of Association	722
	An Exa	imple of Hypothesis Testing With Categorical Data	722
	The Sin	mplest Case: 2 x 2 Tables	726
	Measur	ring Strength of Association	726
	Assum	ptions of the Chi-Square Test	729
	Some T	Jses for the Chi-Square Test for Independence	730
		ning the Results of a Chi-Square Test	731
	Summa		732
	Exercis	ses	733
	Advanc	ced Material	735
C.	Analys	is by SPSS	737
		ning a One-Way Chi-Square Test	737
		ning a Two-Way Chi-Square Test	739
	Exercis		741
Key	Formula	as	741
Ar	opend	lix A	une our de la constant de la constan
STA	TISTICA	L TABLES	743
	A.1.	Areas Under the Standard Normal Distribution	743
	A.2.	Critical Values of the <i>t</i> Distribution	746
	A.3.	Power as a Function of δ and Significance Criterion (α)	
	A.4.	δ as a Function of Significance Criterion (α) and Power	
	A.5.	Critical Values of Pearson's r (df = $N - 2$)	749
	A.6.	Table of Fisher's Transformation of r to Z	750
	A.7.	Critical Values of the <i>F</i> Distribution for $\alpha = .05$	751
	A.8.	Critical Values of the F Distribution for $\alpha = .025$	752
	A.9.	Critical Values of the F Distribution for $\alpha = .025$	753
	A.10.	Power of ANOVA ($\alpha = .05$)	754
	A.11.	Critical Values of the Studentized Range	154
	71.11.	Statistic (q) for $\alpha = .05$	755
	A.12.	Orthogonal Polynomial Trend Coefficients	756
	A.13.	Probabilities of the Binomial Distribution for $P = .5$	757
	A.14.	Critical Values of the χ^2 Distribution	758
	A.14.	Critical values of the χ^2 Distribution	130
A	openo	lix B	
100	- Participant	o Selected Exercises	
		S A AND B	759
20 -	openc		
		I IHNO'S EXPERIMENT	777
JA.	ALRON	I AIIIVO S LAFERINIENI	
	Refere	ences	781
	Index		787