



Contents

Preface to the second edition	x
Study guide for students	xiii
Acknowledgements	xv
Prologue	1
Part I Introduction	5
<hr/>	
1 Introduction to experimental research	7
1.1 The experimental hypothesis	7
1.2 The null hypothesis	7
1.3 Independent and dependent variables	8
1.4 Controlling irrelevant variables	9
2 Introduction to experimental design	12
2.1 Experimental and control conditions	12
2.2 Three or more experimental conditions	14
2.3 Different subjects (unrelated designs)	15
2.4 Same subjects (related designs)	17
3 Introduction to statistical analysis	19
3.1 Variability of scores	19
3.2 Statistical probabilities	23
3.3 Selecting a level of significance	24
3.4 One-tailed and two-tailed hypotheses	26
3.5 Looking up probabilities in statistical tables	27
4 Selecting a statistical test	29
4.1 Basic principles for selecting tests	29
4.2 Same versus different subjects	29
4.3 Number of experimental conditions	30
4.4 Using the decision charts	30

5	General method for non-parametric tests	35
	5.1 Preparing the data	35
	5.2 Assigning ranks to scores	36
	5.3 Dealing with tied scores	37
	5.4 Rank ordering of unrelated scores	38
	5.5 Rank ordering of related scores	39
	5.6 Ranking positive and negative scores	40
	5.7 Calculating rank totals	42
	5.8 Looking up non-parametric statistical tables	43
	5.9 Non-parametric tests, step by step	44
6	Non-parametric tests (two conditions)	46
	6.1 Wilcoxon test (related)	46
	6.2 Mann–Whitney test (unrelated)	50
7	Non-parametric tests (three or more conditions)	55
	7.1 Friedman test (related)	55
	7.2 Page's <i>L</i> trend test (related)	59
	7.3 Kruskal–Wallis test (unrelated)	63
	7.4 Jonckheere trend test (unrelated)	67
8	Correlations	71
	8.1 Interpreting correlations	71
	8.2 Positive correlations	73
	8.3 Negative correlations	74
	8.4 Correlation coefficients	75
	8.5 Testing the significance of correlations	76
	8.6 Spearman rank correlation coefficient	78
9	Chi-square test	83
	9.1 Introduction	83
	9.2 Chi-square test	84

Part III Parametric tests

10	Requirements for parametric tests	95
	10.1 Proportions of variability	95
	10.2 Types of measurement	96
	10.3 Normal distributions	98
11	General method for parametric tests	101
	11.1 Using Decision Chart 2	101
	11.2 Parametric versus non-parametric tests	101
	11.3 Symbols used in parametric tests	103
	11.4 Types of parametric tests	104

	11.5	Degrees of freedom	105
	11.6	Looking up parametric statistical tables	108
	11.7	Parametric tests, step by step	108
12		<i>t</i> test	111
	12.1	<i>t</i> test (related)	111
	12.2	<i>t</i> test (unrelated)	115
13		One-way ANOVA	119
	13.1	Understanding ANOVA tables	119
	13.2	One-way ANOVA (unrelated)	121
	13.3	One-way ANOVA (related)	127
14		Multivariable experimental designs	133
	14.1	Single-variable designs	133
	14.2	Multivariable designs	134
	14.3	Two-by-two tables	135
	14.4	Interpreting interactions	136
	14.5	Using graphs to investigate interactions	137
	14.6	Using Decision Chart 2	141
	14.7	Computerized statistical packages	142
15		Two-way ANOVA	144
	15.1	Two-way ANOVA tables	144
	15.2	Two-way ANOVA (unrelated)	146
	15.3	Two-way ANOVA (related)	154
	15.4	Two-way ANOVA (mixed)	163
	15.5	Comparisons between individual conditions	167
Epilogue			171
		Answers to questions	176
		Recommended reading	197
		References	198
		Appendix 1: Computer statistical packages	199
		Appendix 2: Statistical tables	201
		Index	220
		Decision Chart 1: Non-parametric tests	inside front cover
		Decision Chart 2: All statistical tests	inside back cover