## Analyzing Quantitative Data

## From Description to Explanation

Norman Blaikie

UHOCHSCHULE "• LIECHTENSTEIN Bibliothek

## **®SAGE** Publications

London • Thousand Oaks » New Delhi

## **Detailed Chapter Contents**

List of Figures	xiv
List of Tables	xvi
Acknowledgements	XX
Introduction: About the Book	1
Why was it written?	1
Who is it for?	3
What makes it different?	4
What are the controversial issues?	6
What is the best way to read this book?	7
What is needed to cope with it?	8
Notes	9
1 Social Research and Data Analysis: Demystifying Basic Concepts	10
Introduction	10
What is the purpose of social research?	10
The research problem	11
Research objectives	11
Research questions	13
The role of hypotheses	13
What are data? .	15
Data and social reality	16
Types of data	17
Forms of data	20
Concepts and variables	22
Levels of measurement	22
Categorical measurement	23
Nominal-level measurement .	23
Ordinal-level measurement	23
Metric measurement	24
Interval-level measurement	25
Ratio-level measurement	25
Discrete and continuous measurement	26
Review	26
Transformations between levels of measurement	27
What is data analysis?	28
Types of analysis	29
Univariate descriptive analysis	29

	Bivariate descriptive analysis	29
	Explanatory analysis	30
	Inferential analysis	32
	Logics of enquiry and data analysis	33
	Summary	34
	Notes	36
2	Data Analysis in Context: Working with Two Data Sets	37
	Introduction ,	37
	Two samples	37
	Descriptions of the samples •	39
	Student sample ^	39
	Resident sample	39
	Concepts and variables	40
	Formal definitions	40
	Operational definitions '•	• 40
	Levels of measurement ,	43
	Data reduction	44
	Notes	45
3	Descriptive Analysis - Univariate: Looking for Characteristics	47
	Introduction	47
	Basic mathematical language	48
	Univariate descriptive analysis	51
	Describing distributions	52
	Frequency counts and distributions	53
	Nominal categories ",	53
	Ordinal categories ',	54
	Discrete and grouped data	55
	Proportions and percentages, ratios and rates	59
	Proportions "	. 59
	Percentages	59
	Ratios	61
	Rates	62
	Pictorial representations	62
	Categorical variables	63
	Metric variables	64
	Shapes of frequency distributions: symmetrical,	
	skewed and normal	66
	Measures of central tendency	68
	I ne three Ms	68
	Mode	68
	Neer	09
	iviean	/1

	Mean of means • ,	. 7 4
	Comparing the mode, median and mean	75
	Comparative analysis using percentages and means	76
	Measures of dispersion -'	77
	Categorical data $< \cdot - * : - \cdot \cdot$	7g
	Interquartile range	78
	Percentiles - \	79
	Metric data • • • ' • . • •	79
	Range	79
	Mean absolute deviation	79
	Standard deviation	80
	Variance	83
	Characteristics of the normal curve **-	84
	Summary	87
	Notes	87
4	Descriptive Analysis - Bivariate: Looking for Patterns	89
	Introduction	, 89
	Association with nominal-level and ordinal-level variables	91
	Contingency tables	91
	Forms of association .	94
	Positive and negative .	94
	Linear and curvilinear .	. 9 6
	Symmetrical and asymmetrical	96
	Measures of association for categorical variables	• 96
	Nominal-level variables	97
	Contingency coefficient •	97
	Standardized contingency coefficient	99
	Phi	101
	Cramer's V	101
	Ordinal-level variables	. • 102
	Gamma •	• 102
	Kendall's tau-b	• 104
	Other methods for ranked data .	105
	Combinations of categorical and metric variables .	105
	Association with interval-level and ratio-level variables	106
	Scatter diagrams	106
	• •	107
	Pearson's r	108
	Comparing the measures	III
	Association between categorical and metric variables	113
	Code metric variable to ordinal categories	• 113
	Dichotomize the categorical variable	113
	Summary	114
	Notes	11.4

5	Explanatory Analysis: Looking for Influences	116
	Introduction	116
	The use of controlled experiments	117
	Explanation in cross-sectional research	118
	Bivariate analysis	120
	Influence between categorical variables	120
	Nominal-level variables: lambda	120
	Ordinal-level variables: Somer's d	124
	Influence between metric variables: bivariate regression	125
	Two methods of regression analysis	128
	Coefficients	130
	An example **, . , .	132
	Points to watch for	133
	Influence between categorical and metric variables	"134
	Coding to a lower level	134
	Means analysis .	134
	Dummy variables	135
	Multivariate analysis	136
	Trivariate analysis •	136
	Forms of relationships -' •	136
	Interacting variables	137
	The logic of trivariate analysis *	141
	Influence between categorical variables	141 141
	Three-way contingency tables	141 141
	An example	141
	Other methods	145
	Influence between metric variables	146
	Partial correlation	146
	Multiple regression	148
	An example	150
	Collinearity	150
	Multiple-category dummy variables	153
	Other methods	15.3
	Dependence techniques	154
	Analysis of variance	154
	Multiple analysis of variance	154
	Logistic regression	154
	Logit logistic regression	154
	Structural equation modelling	154
	Interdemendence techniques	155
	Factor analysis	155
	Chieter englysis	\55
	Cluster analysis -	•155
	summary	156
	Summary Notes	158
	110105	

6	Inferential Analysis: From Sample to Population	159
	Introduction	159
	Sampling	160
	Populations and samples	160
	Probability samples	161
	Probability theory	163
	Sample size	166
	Response rate .	167
	Sampling methods	168
	Parametric and non-parametric tests	171
	Inference in univariate descriptive analysis	172
	Categorical variables	. 1 7 3
	Metric variables	175
	Inference in bivariate descriptive analysis	177
	Testing statistical hypotheses	178
	Null and alternative hypotheses	1/9
	Type I and type II errors	180
	The process of testing statistical hypotheses	101
	The process of testing statistical hypotheses	102
	Some critical issues	105
	Categorical variables	185
	Nominal-level data	189
	Ordinal-level data	107
	Metric variables	191
	Comparing means •	192
	Group t test	193
	Mann-Whitney $U$ test	197
	Analysis of variance • . • •	201
	Test of significance for Pearson's r	204
	Inference in explanatory analysis •	205
	Nominal-level data	205
	Ordinal-level data • .	206
	Metric variables	208
	Bivariate regression	. 208
	Multiple regression	209
	Summary • .	209
	•Notes •. ,	212
7	Data Reduction: Preparing to Answer Research Questions	214
	Introduction •	214
	Scales and indexes	214
	Creating scales	215
	Environmental Worldview scales and subscales .	215
	Pre-testing the items .	216
	Item-to-item correlations	217

xi

	Item-to-total correlations • •	217
	Cronbach's alpha	219
	Factor analysis	220
	Willingness to Act scale	238
	Indexes	239
	Avoidance of environmentally damaging products .	240
	Support for environmental groups	240
	Recycling behaviour	240
	Recoding to different levels of measurement	241
	Environmental Worldview scales and subscales	. 242
	Recycling index	243
	Age "	243
	Characteristics of the samples **-	244
	Summary .	246
•	Notes ' "	248
8	Real Data Analysis: Answering Research Questions' *	249
	Introduction	249
	Univariate descriptive analysis ' • -	249
	Environmental Worldview	250
	Environmentally Responsible Behaviour	252
	Bivariate descriptive analysis	257
	Environmental Worldview and Environmentally	
	Responsible Behaviour -	258
	Metric variables	258
	Categorical variables	260
	Comparing metric and categorical variables	262
	Conclusion •'	263
	Age, Environmental Worldview and Environmentally Responsible	
	Behaviour '?	264
	Metric variables •	264
	Categorical variables ~ •	266
	Gender, Environmental Worldview and	
	Environmentally Responsible Behaviour	268
	Explanatory analysis	270
	Bivariate analysis • : . •	273
	Categorical variables	. 274
	Categorical and metric variables: means analysis	276
	Metric variables	277
	Multivariate analysis • • •	T i l
	Categorical variables	278
	EWVGSC and WILLACT with ERB	279
	WILLACT, Age and Gender with ERB	282
	Categorical and metric variables: means analysis	285
	EWVGSC and WILLACT with ERB	286
	WILLACT and Gender with ERB	287

Metric variables Partial correlation Multiple recreasion	292 292 292
Conclusion Notes	293 303 304
Glossary	306
Appendix A: Symbols	324
Appendix B: Equations	326
Appendix C: SPSS Procedures	333
Appendix D: Statistical Tables	339
References '•	344
Index	347
Summary Chart of Methods	353