

Contents

Preface	ix
1. Introduction	1
1.1 Aims of the Book	1
1.2 Review of Basic Concepts	3
1.3 Multiple Regression Theory: The Foundation of Factor Analysis	14
1.4 Some Basic Multivariate Hypotheses	20
1.5 The Key Concepts of Common Factor Analysis	28
1.6 Mathematical Notes on Chapter 1	41
2. Exploratory Common Factor Analysis	50
2.1 The Parameters of the Common Factor Model	50
2.2 Estimation	52
2.3 Component Theory, Image Theory, Approximate Methods, and Heywood Cases	62
2.4 Devices for Approximating Simple Structure	81
2.5 Related Methods	88
2.6 Mathematical Notes on Chapter 2	93
3. The Analysis of Covariance Structures: Confirmatory Factor Analysis and Pattern Hypotheses	96
3.1 Introduction	96
3.2 Confirmatory Factor Analysis	99

3.3	Pattern Hypotheses and Parallel Tests	107
3.4	Mathematical Notes on Chapter 3	110
4.	Models for Linear Structural Relations	113
4.1	Causal Relations and Causal Modeling	113
4.2	McArdle's Model for Linear Structural Relations	127
4.3	Mathematical Notes on Chapter 4	151
5.	The Problem of Factor Scores	156
5.1	Factor Analysis as a Test Construction Device	156
5.2	The Estimation of Common Factors	157
5.3	The Indeterminacy of Common Factors	165
5.4	Mathematical Notes on Chapter 5	168
6.	Problems of Relationship Between Factor Analyses	171
6.1	The Comparison of Separate Analyses	171
6.2	Simultaneous Factor Analysis in Several Populations	180
6.3	Repeated-Measures Designs	188
7.	Item Response Theory	198
7.1	The Problem of Binary (Dichotomous) Data	198
7.2	Item Response Theory—Latent Trait Theory	202
7.3	Factor Analysis and Test Theory	214
8.	Summary	223
8.1	Introduction	223
8.2	Exploratory Common Factor Analysis	225
8.3	The Analysis of Covariance Structures	227
8.4	Models for Linear Structural Relations	227
8.5	The Problem of Factor Scores	229
8.6	Problems of Relationship Between Factor Analyses	230
8.7	Item Response Theory	231
	Appendix—Some Matrix Algebra	232
A.1	Matrices, Vectors, Scalars	232
A.2	Matrix Equalities, Sums and Differences	234

A.3	Multiplication—Length of a Vector	235
A.4	The Trace of a Matrix	238
A.5	Special Matrices	240
A.6	The Inverse of a Matrix	243
A.7	Determinants	244
A.8	Partitioned Matrices	245
A.9	Expected Values	246
	References	249
	Author Index	253
	Subject Index	255