

Contents

Preface xiii

Part I: FOUNDATIONS

1. Process of Relative Measurement	3
Introduction	3
Psychological Objects	4
Spatial Representation	6
Judgments or Choices	7
Qualitative or Quantitative Data	8
2. Tasks used in Assessing Subjective Perception	9
Placing Objects	9
Grouping or Clustering	10
Naming Objects (Categorizing)	12
Ordering Objects (Ranking)	12
Quantifying Objects (Numerical Assignment)	17
Combinations	19
Discussion	23
Data Types and Associated Procedures	25

3. Measures of Proximity	28
Correlation	28
Distances	31
Scalar Products	33
Direct Estimation	36
Association	36
Gower's Similarity Measure	38
 4. Interjudge Differences Following Free Clustering	 41
Object Similarity	41
Distribution of Interjudge Differences	42
Distributions of Random Differences	43
The Mean and Variance of Differences	45
Application: How Judges Cluster 11 Words	47
Discussion	50
 Part II: UNIDIMENSIONAL METHODS	
 5. Rank Scaling	 55
Theory: Scale Values Proportional to Rank Sums	55
Method: Dunn-Rankin's Variance Stable Rank Sums	55
Tests of Significance	57
Discussion	59
Application 1: Direct Ranking of Authority	61
Application 2: Direct Ranking of Counselor Roles	64
Application 3: Letter Similarity Scales	65
 6. Circular Triads: Distributions and Applications	 68
Theory: Distributions of Intransitivity	68
Method: Knezek's Tests for Circularity	70
Application: Circularity among Adjective Pairs	72
Discussion	76
 7. Comparative Judgment	 77
Theory: Reactions Are Normally Distributed	77
Method: Thurstone's Case V	79
Reliability	83
Application: Tours for East-West Center Students	83

8. Ordered Categories	86
Method 1: Green's Successive Categories	87
Method 2: Likert's Summated Ratings	91
Example: Remmer's General Scale	93
Application: Revising a Foreign Language Attitude Scale	93
9. Guttman Scaling	102
Theory: Maintaining Order	102
Method: Goodenough's Error Counting	103
Application 1: Cloze Tests in Reading	107
Application 2: Arithmetic Achievement	108
10. Scoring Unidimensional Scales	110
Naming or Pairing	110
Agreement Categories	111
Discussion	112
Exercises for Part II	114
 Part III: CLUSTERING	
11. Graphing Proximities	123
Method 1: Waern's Graphic Similarity Analysis	123
Application: Graphing Letter Similarity	125
Method 2: McQuitty's Elementary Linkage Analysis	125
Application: Grouping Evaluation Items	127
Discussion	135
12. Agglomerative-Hierarchical Methods	136
Theory: Successive Combining	136
Method 1: Ward's Minimum Sums of Squares	136
Application: Grouping Students on Reward Preference	139
Method 2: Johnson's Nonmetric Single and Complete Link	144
Application: Word Similarity	148
13. Partitioning	149
Theory: Groupings Based on Proximity to Centroid	150
Method: <i>K</i> -Means Iterative	152
Application: Modality Preference in Reading	154

Appendix A: List of Tables 382

**Appendix B: An Example using Several
Scaling Techniques 409**
by Sanford Britton

References 418

Author Index 423

Subject Index 425