Contents

Foreword by Howard Wainer ix Preface to the 2010 editon of the English translation xi Preface to the English edition by Jacques Bertin xiii

PART ONE: SEMIOLOGY OF THE GRAPHIC SIGN-SYSTEM

General theory 2 Definition of graphics 2

Annotated table of contents to part one:

- I. Analysis of the information 4
- II. The properties of the graphic system 7
- III. The rules of the graphic system 9

I. Analysis of the information 15

- A. The invariant and the components

 Definition 16

 The order of the components 18

 Wording of titles and legends 19
- B. The number of components 28
- C. The length of the components 33
- D. The level of organization of the components 34

II. The properties of the graphic system 41

- A. The scope of the graphic system 42
- B. The plane 44
 - (1) Implantation (classes of representation) 44
 - (2) The plane is continuous and homogeneous 46
 - (3) The level of organization of the plane 48
 - (4) Imposition (groups of representation) 50
- C. The retinal variables 60
 - 1. The level of organization of the retinal variables 64
 - 2. Characteristics and properties of the retinal variables 71
 Size variation 71
 Value variation 73

Texture variation 79

Color variation 85

Orientation variation 93

Shape variation 95

Table of properties of the retinal variables 97

III. The rules of the graphic system 99

A. The basic graphic problem 100
A hundred different graphics for the same information 100
Diagrams 103
Maps 117

- B. Image theory: Efficiency 139
 - (1) Stages in the reading process 140
 - (2) Possible questions 141
 - (3) Definition of an image 142
 - (4) Construction of an image 148
 - (5) Limits of an image 154
- C. Three functions of graphic representation 160
 - (1) Recording information (inventory drawings) 160
 - (2) Communicating information (simplified drawings or "messages") 162
 - (3) Processing information (graphics used for processing) 164
- D. General rules of construction 171

Diagrams 172

Networks 173

Maps 173

- E. General rules of legibility (or rules of separation) 175
 - (1) Graphic density 176
 - (2) Angular legibility 178
 - (3) Retinal legibility 180

Summary of the rules of legibility 190

PART TWO: UTILIZATION OF THE GRAPHIC SIGN-SYSTEM

Classification of graphic problems 192

I. Diagrams 193

- A. Diagrams involving two components 195
 - 1. Nonquantitative problems 196
 - 2. Quantitative problems 199
- B. Diagrams involving three components 217
 - 1. Nonquantitative problems 218
 - 2. A quantitative component 223
 - 3. Several quantitative components 251
- C. Problems involving more than three components 254
 - 1. Graphic information-processing 254
 - 2. The reorderable matrix 256
 - 3. The image-file 258
 - 4. The matrix-file 263
 - 5. An array of curves 263
 - 6. An ordered table 265
 - 7. A collection of ordered tables 265
 - A collection of maps or a matrix permutation? 268

II. Networks 269

Construction and transformation of a network 271
Application of networks to classifications 275
Trees 276
Areas, inclusive relationships 282
Perspective drawings 283

III. Maps 285

- A. External geographic identification 287
 Situational identification: Projections 287
 Dimensional identification: The scale 296
- B. Internal geographic identification 298
 Cartographic accuracy 298
 Cartographic generalization 300
 Base maps 308
- C. Maps involving one component (the geographic component) 318GEO (point, line, or area) 318

- D. Maps involving two components 321
 - 1. Maps GEO ≠ 323
 - Maps GEO O 336 GEO O: The representation of movement on the plane 342
 - 3. Maps GEO Q 356
 - 4. Maps GEO Q area 366
 A regular pattern of graduated circles 369
 Perspective representation 378
 Isarithms 385
- E. Cartographic problems involving more than two components 389
 - 1. Inventory maps (comprehensive figurations) 391
 - Processing maps (collection of comprehensive images) 397
 - Cartographic message (superimposition of simplified images) 408

Appendix: Area-radius table-graph 413
Brief Presentation of Graphics 418
Epilogue: The origins of Semiology of Graphics 415
Index 437