

CONTENTS

PREFACE	v
I. INTRODUCTION	
1. The Structuralist Approach.....	1
2. The Special Role of Mathematics.....	7
3. Plato's Lecture on The Good.....	8
II. GENERAL STRUCTURE CONCEPTS	
4. The Definition Problem.....	11
5. Structuralist Notions of Structure.....	11
6. A Simple Example.....	15
7. The Basic Definitions.....	17
8. Isomorphisms of Structures.....	21
9. Analogies and Isomorphisms.....	23
10. An Analysis of Point-Line Structures.....	27
11. Special Kinds of Relations.....	29
12. Structural Stability.....	30
13. Structural Information.....	33
14. On Abstract Structures.....	35
III. SOME EXAMPLES OF STRUCTURES	
15. Introduction.....	39
16. Atoms and Machines.....	40
17. Line Drawings by Josef Albers.....	42
18. Configurations.....	44
19. The Pascal Configuration.....	46
20. The Triangle Group.....	48
21. Group Structures.....	50
22. The Real Number System.....	54
IV. MANAGEMENT OF COMPLEX STRUCTURES	
23. The Analysis of Structures.....	57
24. The Approximation of Structures.....	58
25. Axiomatics and Approximation.....	58
26. Structural Determinism and Reductionism.....	60
27. Contractions.....	65
28. Contraction of Group Structures.....	71

V. LANGUAGE AND STRUCTURE

29. The Role of Language	73
30. Simple Communication	75
31. Structural Linguistics	77
32. Semiotics	82
33. The Language Faculty	88

VI. STRUCTURES IN MENTAL PHENOMENA

34. Introduction	93
35. The Central Role of Structures	94
36. The Drive for Intelligibility	97
37. Philosophical Questions	100
38. The Background Structure and Understanding	105
39. Teaching and Learning	108

VII. MATHEMATICAL STRUCTURES

40. Introduction	115
41. Mathematical Language	116
42. How to Recognize a Mathematical Structure	119
43. Research and Development of Mathematics	120
44. The Role of Insight in Research	122
45. A Structural Interpretation of Creativity	128
46. How Mathematics is Applied	131
47. The Effectiveness of Mathematics in Physics	133
48. Other Applications of Mathematics	138

VIII. BIOLOGICAL STRUCTURES

49. Introduction	145
50. Classification of Organisms	146
51. The Genetic Structure	148
52. The Environment of a Structure	152
53. The Evolutionary Process	153
54. Complexity in Evolution	157
55. Multiple Function	163
56. Biological Catastrophes	168
57. Determining Structures	173
58. Convergent Evolution	174
59. Anthropomorphism	175

IX. SPACE STRUCTURES AND STABILITY

60. Introduction.....	179
61. Euclidean Spaces.....	180
62. Substructures of Euclidean Space.....	181
63. The Conic Sections.....	182
64. Stability in a Family of Conics.....	186
65. Catastrophe Theory.....	188
66. Zeeman's Catastrophe Machine.....	190
67. A Mathematical Example.....	191
68. Attack or Retreat.....	196
69. Metric Spaces.....	199
70. Stability of Point-Line Structures.....	201
BIBLIOGRAPHY	207
INDEX	211