

Contents

Preface ix

General Introduction 1

PART I

Some Elementary Neuroscience

Chapter 1

The Science of Nervous Systems: A Historical Sketch 13

1.1 *Introduction* 13

1.2 *Historical Sketch* 15

Selected Readings 33

Chapter 2

Modern Theory of Neurons 35

2.1 *Introduction* 35

2.2 *The Cellular Components of Nervous Systems* 36

2.3 *How Do Neurons Work?* 48

2.4 *Neurotransmitters and Other Neurochemicals* 77

Selected Readings 97

Chapter 3

Functional Neuroanatomy 99

3.1 *Introduction* 99

3.2 *Principal Anatomical Divisions* 100

3.3 *Pathways and Tracts* 106

3.4 *The Laminar Structure of the Cortex* 117

3.5 *Topographic Maps in Nervous Systems* 119

3.6 *Vertical Columns* 131

3.7 *Neural Development* 137

3.8 *A Brief Remark Concerning Invertebrates* 144

3.9 *Conclusions* 145

Selected Readings 146

Chapter 4

Higher Functions: Early Work	147
4.1 Introduction	147
4.2 Cerebral Specialization and Naturally Occurring Lesions	154
4.3 Mapping the Brain by Electrical Stimulation	165
Selected Readings	168

Chapter 5

Higher Functions: Neuropsychology and Neurology	171
5.1 Introduction	171
5.2 Hemispheric Lateralization of Functions: Split-Brain Studies	174
5.3 Hemispheric Lateralization: Neuropsychological Techniques	193
5.4 Techniques for Intrahemispheric Localization of Functions	201
5.5 Imaging Techniques	217
5.6 A Sample from Neurological Studies	222
5.7 Conclusions	234
Selected Readings	235

PART II

Recent Developments in the Philosophy of Science

Chapter 6

Introduction and Historical Sketch	239
6.1 Introduction	239
6.2 Early Epistemology	242
6.3 Logical Empiricism	252
6.4 What Happened to Logical Empiricism?	259
6.5 Implications for a Theory of the Mind	271
Selected Readings	276

Chapter 7

Reduction and the Mind-Body Problem	277
7.1 Introduction	277
7.2 Intertheoretic Reduction	278
7.3 Mental States and Folk Psychology	295
7.4 Conclusions	310
Selected Readings	312

Chapter 8

Are Mental States Irreducible to Neurobiological States?	315
8.1 Introduction	315
8.2 Substance Dualism	317

8.3	<i>Property Dualism and Subjective Experience</i>	323
8.4	<i>Intentionality and Intertheoretic Reduction</i>	335
8.5	<i>Concluding Remarks</i>	346
	<i>Selected Readings</i>	347

Chapter 9

	<i>Functionalist Psychology</i>	349
9.1	<i>Introduction</i>	349
9.2	<i>Antireductionism in Functionalist Theories of the Mind</i>	351
9.3	<i>In Defense of Reductionism</i>	356
9.4	<i>The Co-evolutionary Research Ideology</i>	362
9.5	<i>Representations and Reduction</i>	376
9.6	<i>Information Processing and the Sentential Paradigm</i>	386
9.7	<i>Conclusions</i>	399
	<i>Selected Readings</i>	399

PART III

A Neurophilosophical Perspective

Chapter 10

	<i>Theories of Brain Function</i>	403
10.1	<i>Introduction</i>	403
10.2	<i>In Search of Theory</i>	407
10.3	<i>Tensor Network Theory</i>	412
10.4	<i>Cartoon Story of What a Tensor Does in Sensorimotor Control</i>	420
10.5	<i>Tensor Network Theory and the Vestibulo-Ocular Reflex</i>	433
10.6	<i>Phase Space Sandwiches</i>	441
10.7	<i>Tensor Network Theory: Further Questions</i>	446
10.8	<i>What Has Motor Control Got to Do with Mental States?</i>	450
10.9	<i>Parallel Models of Neuronal Computation</i>	458
10.10	<i>The Neurobiology of an Attentional Operation</i>	474
10.11	<i>Concluding Remarks</i>	478
	<i>Selected Readings</i>	479

Chapter 11

	<i>Closing Remarks</i>	481
--	------------------------	-----

	<i>Notes</i>	483
--	--------------	-----

	<i>Bibliography</i>	491
--	---------------------	-----

	<i>Index</i>	525
--	--------------	-----