

Contents

List of Figures

Acknowledgments

Introduction

PART I BACKGROUND

1 The Strangeness of Functions

- 1.1 Functions and Explanations
- 1.2 Backwards Causation
- 1.3 Theism and Fictionalism
- 1.4 Being There
- 1.5 Rules of the Game

2 Function and Selection

- 2.1 The Traditional Selected Effects Theory
- 2.2 Mutation, Drift, Design
- 2.3 Criticisms of the Traditional Selected Effects Theory

3 Feedback and Functions

- 3.1 Forward-Looking Functions
- 3.2 Invoking the Wrong History
- 3.3 Organizational Functions
- 3.4 Weak Etiological Functions

PART II THEORY

4 An Explosion of Selection Processes

- 4.1 The Breadth of Selection
- 4.2 Functions and Antibody Selection
- 4.3 Is Learning a Selection Process?

page x

xii

I

7

9

11

16

17

20

22

25

25

29

32

43

43

46

47

57

63

65

66

69

74

5	Selection and Construction	78
5.1	How to Build a Brain	79
5.2	Selection and Construction	80
5.3	War of the Synapses	82
5.4	The Function of Selection	86
5.5	How the Brain Makes Functions	89
6	A Generalized Selected Effects Theory of Function	93
6.1	The Theory	93
6.2	Six Problems for GSE	96
6.3	Functions and Populations	103
6.4	A Harder Liberty Problem	106
7	Proper Functions Are Proximal Functions	109
7.1	What Function Indeterminacy Is and Why It Matters	111
7.2	Distal and Proximal Functions	114
7.3	An Objection to Proximal Functions	117
7.4	Functions and Functional Analysis	118
7.5	Functions and Mechanistic Explanation	121
8	When Functions Go Wrong	124
8.1	Constitution and Circumstance	125
8.2	Normal Environment and Selective Environment	129
8.3	Can the Biostatistical Theory Explain Dysfunction?	134
PART III APPLICATIONS		139
9	Function Pluralism	141
9.1	Selected Effects and Causal Roles	144
9.2	SE-Disciplines and CR-Disciplines?	148
10	What Are Mechanisms?	152
10.1	The Functional Sense of Mechanism	153
10.2	Two Senses of "Mechanism"	156
10.3	Convergence and Divergence	158
10.4	How Mechanisms Break	161
10.5	How to Explain Disease	164
10.6	Is Natural Selection a Mechanism?	168
11	What Are Mental Disorders?	170
11.1	Mental Disorders and Biological Dysfunctions	172
11.2	Mismatch or Dysfunction?	174
11.3	Developmental Mismatches	176
11.4	Generalized Selection Processes and Mental Disorders	178
11.5	Objections and Replies	181

12	A New Kind of Teleosemantics	187
12.1	Meaning and Selection	188
12.2	Producers and Consumers	191
12.3	Neural Selection and Novel Representations	195
12.4	Proximal-Distal Content Indeterminacy	200
	A Programmatic Epilogue	213
	References	216
	Index	233

202	page	1. An example of a noncomplex self-reproducing system.
20		2. An example of a complex self-reproducing system.
22		3. Parity disorder as a complex self-reproducing system.
		4. Invasion of skeletal muscle of newborn rats. The first
		panel (a) depicts the multiple invasion of muscle fibers by
		motor neurons; the second panel (b) depicts the one-to-one
		pattern of connectivity that emerges by two weeks after birth.
83		Redrawn from Purves and Lichtman (1980, 112).
		5. A simple example of synapse selection. The first panel (a)
		shows a neuron N_1 innervating two target neurons, N_2 and
		N_3 , yielding two synapses, S_1 and S_2 . As a result of
88		experience, S_1 is inhibited, leaving S_2 (as shown in [b]).
		6. A simple example of synapse selection. Panel (a) shows two
		different neurons, N_1 and N_2 , innervating the same target N_3
		and yielding two synapses, S_1 and S_2 . After synapse selection,
97		only S_2 remains (panel [b]).
		6.2 An example of normal constructionist growth. N_1 innervates
		N_2 yielding S_1 ; N_1 innervates N_3 yielding S_2 ; S_2 atrophies as
		a result of disuse. There is a kind of differential retention but
		it is not synapse selection and hence does not create a new
98		function.
107		6.3 A pile of rocks represented as an undirected graph.
		7.1 The hierarchical form of the function indeterminacy
110		problem.
120		7.2 Functional and systemic hierarchies.
121		12.1 Producer and consumer mechanisms for a representation.
122		12.2 A simple case of synapse selection.
128		12.3 Representational capacities of sets of neurons.
200		12.4 A simple input-output mechanism.
203		