

Contents

List of Contributors	ix
 1. Introduction	
<i>Andy Clark and Rudi Lutz</i>	1
Architecture and Properties	1
A Copernican Revolution	9
Distributed Representations and Context Dependence	10
The Nature of Thought	11
 2. Action, Connectionism and Enaction: A Developmental Perspective	
<i>Julie C. Rutkowska</i>	17
Background	17
Symbols, Connectionism and Innate Knowledge	20
System Scale and the Control of Action	23
Development, Emergence and Enaction	28
Conclusion	32
 3. Connectionism and Cognition: Why Fodor and Pylyshyn Are Wrong	
<i>James H. Fetzer</i>	37
The Case Against Connectionism	38
Fodor and Pylyshyn's Four Conditions	38
Systems that Satisfy these Conditions	39
Fodor and Pylyshyn's Argument	40
What's Wrong with this Argument	41
What's Wrong with Premise (T3)?	41
What's Wrong with Premise (T2)?	42
What's Wrong with Premise (T1)?	46
What's Wrong with this Defence?	47
The Turing Machine Paradigm	47
Minds as Semiotic Systems	48
Cognitive Architecture	52
On Behalf of Neural Networks	53
Dispositions and Predispositions	53
The Proper Comparison	55

4. Connectionism, Classical Cognitive Science and Experimental Psychology

<i>Mike Oaksford, Nick Chater and Keith Stenning</i>	57
Classicism Versus Connectionism	57
The Psychological Data	59
Memory	59
Inference	61
Theory	62
Memory	63
Inference	65
Modelling	67
Memory	67
Inference	68
Conclusions	70

5. Connecting Object to Symbol in Modelling Cognition

<i>Stevan Harnad</i>	75
Symbol Systems	75
The Symbolic Theory of Mind	76
The Symbol Grounding Problem	78
Neural Nets	78
Transducers and Analogue Transformations	79
Robotic Capacities: Discrimination and Identification	80
Philosophical Objections to Bottom-Up Grounding of Concrete and Abstract Categories	82
Categorical Perception and Category-Learning	83
Neural Nets and CP	84
Analogue Constraints on Symbols	87

6. Active Symbols and Internal Models: Towards a Cognitive Connectionism

<i>Stephen Kaplan, Mark Weaver and Robert M. French</i>	91
Criticisms of Connectionism	92
Connectionism Equals Behaviourism	93
Are FFPA Models Behaviourist?	94
Connectionism Equals Associationism	95
The Active Symbol	96
Active Symbols and Control Mechanisms	98
Symbol Formation and Properties	99
Higher-Level Processes	100
First-Order Knowledge Structures	100
Second-Order Knowledge Structures	105
Toward Structure-Sensitive Operations	105
Summary and Concluding Remarks	106
The Continuum of Cognitive Models	106
Logic, Difficulty and Adaptation	107

7. Thinking Persons and Cognitive Science

<i>Martin Davies</i>	111
Extending Content	111
The Credentials of Cognition	112
Consciousness and What It Is Like	114
Conceptualized Content and the Structure of Thinking	116
Inference and Causal Systematicity	118
Reconstructing the Mind	120

8. A Brief History of Connectionism and Its Psychological Implications

<i>Stephen F. Walker</i>	123
Connectionist Assumptions in Earlier Psychologies	124
<i>Spencer's Principles of Psychology</i> (1855/1899)	124
<i>William James' Principles of Psychology</i>	127
Thorndike's Connectionism	130
Pavlov's Theory of the Cerebral Cortex	131
Watsonian and Skinnerian Behaviourism	133
Hullian Stimulus–Response Theory	134
Comparisons of Old and New Connectionism	138
Neural Plausibility	138
Thought and the Thinking Self	138
Empiricism	139
Practical Implications of Connectionism	140
Conclusions	141

9. Connectionism and Artificial Intelligence as Cognitive Models

<i>Daniel Memmi</i>	145
Artificial Intelligence	146
Level of Explanation	147
Processing Style	149
Representational Structure	151
Connectionism	152
Classification of Neural Networks	153
Level of Explanation	156
Processing Style	158
Representational Structure	159
Classical AI and Connectionism	162
Segregation	162
Compilation	163
Hybridization	164
Subsumption	164

10. The Neural Dynamics of Conversational Coherence

<i>Bruce F. Katz and Marcy H. Dorfman</i>	167
Previous Research	168
Conversation Analysis: Sequencing Rules Approach	168

Speech Acts	169
Computational Models	171
A Neurally Inspired Model of Coherence	172
Some Experimental Results	174
How Associative Is Conversation?	178
Final Thoughts on the Purpose of Conversation	179