

Contents

1	Introduction	1
1.1	Embodied Cognition, Grounded Cognition and Action-Related Representations	1
1.2	Representationalism	11
1.2.1	Narrow or Wide Definition of Representation	13
1.2.2	Higher-Order Cognitive Functions Presuppose Representations	14
1.2.3	A Special Case: Action-Related Representations	16
1.3	Overview	17
2	Being in and Toward the World: Body Schema and Motor Intentionality	23
2.1	The Body Schema	24
2.2	Motor Intentionality	31
3	Perceiving Possible Actions: Gibson's Affordances	35
3.1	Introduction	35
3.2	Short Introduction to Gibson's Theory of Perception	38
3.3	Gibson's Affordances: Relational Animal-Environment Properties	45
3.4	Problems in Gibson's Account of Affordance Perception	57
3.5	Gibson's Successors	69
3.5.1	Affordances as Dispositions	70
3.5.2	Affordances as Relations or Emergent Properties	74
3.5.3	Non-Gibsonian Accounts of Affordances	82
3.6	Affordances Represent Possible Actions	94

4	Action Representation is Essentially Egocentric	97
4.1	Essential Self-Relation and Action	98
4.1.1	The Essential Indexical	98
4.1.2	Self-Relativity Enables Basic-Level Action	100
4.1.3	Deictic Representations	102
4.2	Causal Indexicals – Action-Related Representations	
	Referring to the Self and the World	105
4.2.1	Representations in a Movement Format	107
4.2.2	Implicit Representation of the Agent and Environmental Features	115
4.2.3	The Role of the Body Schema	117
4.2.4	Developmental Aspects of Causal Indexicals and the Body Schema	123
4.3	Summary	124
5	Action-Guiding Representations	127
5.1	Pushmi-Pullyu Representations	128
5.2	The Guidance Theory of Representation	134
5.3	Action-Oriented Representation	142
5.4	Summary	144
6	Vision for Action: The Two Visual Systems	147
6.1	The Two Visual Pathways Hypothesis	148
6.2	Two Types of Visuomotor Pragmatic Processing	151
7	Action Constitutes Thinking: Interactive Constructivism	157
7.1	The Role of Sensorimotor Processes in the Development of Thinking	157
7.2	Interactive Representation	160
8	A General Account of Action-Related Representation	171
8.1	Features of Action-Related Representations	173
8.1.1	Goal Representation	173
8.1.2	Egocentricity	175

8.1.3	Action-Related Representation Does not Presuppose Concepts	175
8.1.4	Intention for Action	177
8.2	Empirical Support for Action-Related Representation . . .	180
8.2.1	Body Schema	180
8.2.2	Vision for Action	182
8.2.3	Mirror Neurons	183
8.3	Foundational Aspects of Action-Related Representation . .	185
8.4	Summary	189
9	Development of Abstract Concepts	191
9.1	Basic Level Action-Related Representation	193
9.2	Intermediate and Higher Level Action-Related Representations	195
9.2.1	Implicit and Explicit Representation of Objects and Agents	196
9.2.2	Transition from Egocentric to Allocentric	198
9.3	Developing Object Concepts on the Basis of Action-Related Representation	206
9.3.1	Non-Conceptual Action-Related Representations	210
9.3.2	Conceptual Action-Related Representations	212
9.3.3	Analyzing Object Concepts in Action-Frames	215
9.4	Development of Non-Object Concepts Based on Action-Related Representation	223
9.4.1	Abstraction Mechanisms for Classification	226
9.5	Summary	230
10	Conclusion: Grounding Cognition in Action?	231
	Bibliography	237