

Contents

Preface xi

I SEMANTICS AS MEETINGS OF MINDS 1

1 What Is Semantics? 3

- 1.1 What Does It Mean to Understand Communication? 3
- 1.2 Criteria for a Theory of Semantics 5
- 1.3 The Relation between Perception and Semantics 8
 - 1.3.1 The Translation Problem 8
 - 1.3.2 Image Schemas in Cognitive Linguistics 8
 - 1.3.3 Parallels between Language Understanding and Visual Processes 11
- 1.4 The Relation between Actions and Semantics 15
- 1.5 Semantics as Meetings of Minds 17
 - 1.5.1 Meanings Ain't in the Head 17
 - 1.5.2 Slow and Fast Meetings of Minds 18

2 Conceptual Spaces 21

- 2.1 The Geometry of Meaning 21
- 2.2 Properties versus Concepts 24
- 2.3 The Convexity Requirement 25
- 2.4 Product Spaces 28
- 2.5 Domains in Cognitive Linguistics 30
 - 2.5.1 Basic and Abstract Domains 31
 - 2.5.2 Locational and Configurational Domains 32
 - 2.5.3 Dimensionality 33
 - 2.5.4 Configurations Are Higher-Level Domains 35
- 2.6 Metaphors and Metonymies 39
 - 2.6.1 Characterizing Metaphors and Metonymies 39
 - 2.6.2 The Contiguity Theory of Metonymy 41
- 2.7 Learning in Conceptual Spaces 42
- 2.8 The Vagueness of Concepts 44

2.9	Comparisons with Some Other Approaches to Identifying Concepts	47
2.9.1	Feature Analysis	47
2.9.2	Frame Theories	48
2.9.3	Semantic Maps	50
3	The Development of Semantic Domains	53
3.1	Components of Intersubjectivity	54
3.2	Domains in Semantic Development	57
3.2.1	Emotion Domain	58
3.2.2	Visuospatial Domains	60
3.2.3	Force and Action Domains	61
3.2.4	Object Category Space	62
3.2.5	Value Domain	63
3.2.6	Goal and Intention Domains	63
3.2.7	Age and Time Domains	65
3.2.8	Event Domain	65
3.3	Correlations to Development of Language	66
3.4	Evolution of Semantics	71
4	Pointing as Meeting of Minds	77
4.1	Introduction	77
4.2	Imperative Pointing	78
4.3	Declarative Pointing	79
4.3.1	Emotive Declarative Pointing	80
4.3.2	Information-Requesting Pointing	81
4.3.3	Goal-Directed Pointing	82
4.4	Declarative Pointing Composed with Words	84
4.5	Language without Pointing	85
4.6	The Development of Pointing	87
5	Meetings of Minds as Fixpoints	91
5.1	Meanings as Emergent in Communication	91
5.2	Levels of Communication	93
5.3	The Role of Generics	96
5.4	Coordination as Reaching Fixpoints	97
5.4.1	Coordination of Worlds	97
5.4.2	Coordination of Meanings	98
5.4.3	A Signaling Game	99
5.5	Modeling Fixpoints in Communication Games	102
5.5.1	The Semantic Reaction Function	102
5.5.2	The Fixpoint Theorem	104

- 5.6 Determining the Semantic Reaction Function 106
- 5.7 Expanding the Common Ground 108
- 5.8 Meetings of Minds Do Not Leave the Minds 109
- 5.9 Conclusion 111

II LEXICAL SEMANTICS 113

6 Object Categories and the Semantics of Nouns 115

- 6.1 Cognitive and Communicative Foundations for Word Classes 115
- 6.2 Object Categories 117
- 6.3 Meronomic Relations 120
 - 6.3.1 Marr and Nishihara's Model 121
 - 6.3.2 Zhu and Yuille's Model 122
- 6.4 Object Categories and Their Relations 124
 - 6.4.1 Definition of Object Category 124
 - 6.4.2 Hierarchies of Object Categories 125
- 6.5 Objects 127
 - 6.5.1 Objects as a Special Kind of Categories 127
 - 6.5.2 Fictional Objects 127
 - 6.5.3 Connected Paths 128
- 6.6 Levels of Abstraction in Object Categories 129
- 6.7 Relational Categories 131
- 6.8 The Semantic Function of Nouns 131
 - 6.8.1 Nouns and Names 131
 - 6.8.2 Mass Nouns and Count Nouns 133

7 Properties and the Semantics of Adjectives 135

- 7.1 Adjectives and Domains 135
- 7.2 Evidence for the Convexity Thesis: Color Properties 136
- 7.3 Evaluating the Single-Domain Thesis 137
- 7.4 Classifications of Adjectives 138
- 7.5 Scalable and Nonscalable Domains 139
- 7.6 Developmental Aspects of Properties and Adjectives 141

8 Actions 145

- 8.1 Actions Based on the Force Domain 145
- 8.2 Representing Actions by Patterns of Forces 147
 - 8.2.1 Patterns of Forces 147
 - 8.2.2 Empirical Evidence 149
- 8.3 Action Categories 153
- 8.4 Representing Functional Properties in Action Space 156

9 Events 159

- 9.1 A Two-Vector Model of Events 159
- 9.2 Agents and Patients 165
- 9.3 More Thematic Roles 167
- 9.4 Event Categories 169
- 9.5 Three Conceptualizations of Events in Linguistics 171
 - 9.5.1 Localist Approach 171
 - 9.5.2 Aspectual Approach 172
 - 9.5.3 Causal Approach 174
- 9.6 From Event Representations and Construals to Sentences 176

10 The Semantics of Verbs 181

- 10.1 Verbs Refer to Vectors in Events 181
- 10.2 Similarity of Verb Meanings 182
- 10.3 The Single-Domain Thesis for Verbs 183
 - 10.3.1 A Central Thesis for Verbs 183
 - 10.3.2 Putative Counterexamples 186
- 10.4 Manner and Result Verbs 187
 - 10.4.1 Manner/Result Complementarity 187
 - 10.4.2 Putative Counterexamples 188
 - 10.4.3 Syntactic Differences 190
 - 10.4.4 Semantic Implications 191
- 10.5 The Role of Instruments 193
- 10.6 Intentional Verbs 194
- 10.7 Perception Verbs 197
- 10.8 Concluding Remarks 198

11 The Geometry of Prepositional Meaning 201

- 11.1 Semantic Transformations 201
 - 11.1.1 Minimal versus Full Specification of Meaning 201
 - 11.1.2 Main Transformations 202
 - 11.1.3 Iterated Transformations 203
- 11.2 The Semantics of Prepositions 205
- 11.3 Spatial Representation Using Polar Coordinates 205
 - 11.3.1 Polar Coordinates and Convexity 205
 - 11.3.2 Motion along Paths 208
- 11.4 Locative Prepositions 208
 - 11.4.1 Regions for Locative Prepositions 209
 - 11.4.2 Convexity of Locative Prepositions 213
- 11.5 Directional Prepositions 214
 - 11.5.1 Representing Directional Prepositions as Sets of Paths 215
 - 11.5.2 Convexity of Directional Prepositions 216

11.6	Domains of Prepositions	217
11.7	A Force-Dynamic Analysis of “In,” “On,” and “Against”	218
11.8	“Over” as a Force Relation	224
11.9	Conclusion	228
12	A Cognitive Analysis of Word Classes	231
12.1	Semantic versus Syntactic Accounts of Word Classes	231
12.2	Event Structure and the Roles of Words	232
12.3	Adverbs	233
12.4	Pronouns, in Particular Demonstratives	234
12.5	Introducing Anycat: Quantifiers and Negation	236
12.6	The General Single-Domain Thesis	239
13	Compositionality	241
13.1	Direct Composition	241
13.2	Modifier-Head Composition	243
13.3	Metaphorical Composition	246
13.4	Noun-Verb Composition	249
III	ENVOI	253
14	Modeling Meanings in Robots and in the Semantic Web	255
14.1	Robot Semantics	255
14.2	Why the Semantic Web Is Not Semantic	257
14.3	Conceptual Spaces as a Tool for the Semantic Web	259
14.4	Conceptual Space Markup Language	262
15	Taking Stock	265
15.1	Main Achievements	265
15.2	What Is Missing in the Edifice?	268
15.3	Conclusion	269
	Appendix: Existence of Fixpoints	271
	Notes	277
	References	303
	Index	337