

Contents

Introduction	1
I Signs and interpretative processes	11
1 Signs and sign interpretation	13
1.1 The basic terminology of Peircean semiotics	14
1.2 The sign in itself	16
1.3 The sign in relation to its object	17
1.4 The sign in relation to its interpretant	22
1.4.1 Comparable terms	24
1.5 A sign type as a combination of the three types of relation	26
2 From signs to interpretants	29
2.1 Strong and weak sameness	29
2.2 The interpretation of the sign taken in itself	31
2.3 The interpretation of what a sign reveals	32
3 A semiotic account of interpretation processes	37
3.1 Matching sign aspects with interpretant aspects	37
3.2 Semiotic sheets	40
3.3 Sign processing on semiotic sheets	41
3.3.1 Towards a theory of interpretation	47
3.3.2 The case of the candy	48
II Modeling cognitive information processing	51
4 A world of signs	55
4.1 The nature of observation	55
4.1.1 Sample phenomena	56
4.1.2 Interactions	57
4.1.3 The concept of <i>re</i> -presentation	58
4.2 Towards a model of <i>re</i> -presentation	59

4.3	Processing schema	60
4.3.1	Process view	62
4.4	Input, memory and output representation	63
4.4.1	Memory representation	63
4.4.2	Natural representation	64
4.4.3	Towards an experimental validation	64
5	Perception and cognition	67
5.1	Perception process	68
5.2	Cognition process	69
5.3	Logical analysis	71
5.3.1	Semiotic analogy	74
5.3.2	Towards 'naive' logic as a calculus	75
5.4	Combinatory relations and properties	76
5.5	An extended example	78
5.5.1	Perception	79
5.5.2	Cognition	80
5.6	Related research	82
III	Applications	85
6	Language signs	89
6.1	Modeling complex phenomena	90
6.1.1	Properties of sequential sign processing	91
6.2	Towards a model of language signs	94
6.3	Syntactic signs	94
6.3.1	Relational needs	95
6.4	Towards a formal model	96
6.4.1	An example	97
6.4.2	Complementary syntactic signs	98
6.4.3	Nested analysis	99
6.5	Coordination phenomena	99
6.6	Morpho-syntactic signs	100
6.7	Semantic-syntactic signs	103
6.7.1	Lexical definition	104
6.7.2	Memory representation revisited	104
6.7.3	'Naive' semantic sign processing	106
6.7.4	Trichotomic specification	107
6.7.5	Semantic-syntactic relational needs	107
6.7.6	Psycholinguistic evidence	108
6.8	Merging knowledge from different domains	109
6.9	Summary and related work	110

CONTENTS

7 Reasoning signs	111
7.1 Logica Utens	111
7.1.1 The three modes of inference	112
7.2 Towards a model for ‘naive’ reasoning	113
7.2.1 Sign interactions and inferences	114
7.3 An extended example	115
7.4 Towards a process model of abduction	120
7.4.1 A revised schematic model of perception	121
7.5 Sample abduction	123
7.6 Interpretation ‘game’	126
7.6.1 The explorative nature of abduction	127
7.7 Logica Docens	128
7.7.1 Structural analysis	129
7.7.2 A classification of reasoning symbols	130
7.8 Summary	131
8 Mathematical signs	133
8.1 Introduction	133
8.2 Cardinality and numbers	134
8.3 Finite numbers	136
8.3.1 Iconic number signs	136
8.3.2 Inclusion ordering	139
8.3.3 Symbolic number signs	140
8.4 A ‘real world’ of mathematics	141
8.4.1 ‘Naive’ mathematical types	142
8.5 Infinite numbers	143
8.6 Naught	144
8.7 The secondness of ‘naive’ mathematics	144
8.7.1 Levels of mathematical conceptualization	145
8.8 Meta-mathematical signs	146
8.8.1 Mathematical induction	147
8.8.2 An example	149
8.9 Summary	150
9 Text summarization	151
9.1 Introduction	151
9.2 Sentences as state transitions	153
9.3 An extended example	156
9.4 Conclusion	164
10 Reflexive analysis	165
10.1 A meta-theory of knowledge representation	165
10.2 Potential cognitive relevance	172
10.3 Conclusions	175
A The Peircean categorical schema	177

B	The ten classes of signs according to Peirce	181
C	Towards a computational implementation	185
C.1	Input signs revisited	185
C.2	The S_S as a graph system	187
C.3	Interpretation moments	189
D	A derivation of ‘naive’ logic	193
E	Sample language parsing	197
E.1	PP-attachment	197
E.2	Coordination	200
E.3	Discontinuous modification	201
E.4	Parsing complex sentences	201
F	Towards a syntactic lexicon	205
F.1	A formal definition	206
	BIBLIOGRAPHY	209
	INDEX	213