

# CONTENTS

1 Introduction PETER HAGOORT 1

## I COGNITIVE ARCHITECTURES JAMES M. MCQUEEN AND ANTJE S. MEYER

2 Mental Representations for Language RAY JACKENDOFF 7

3 Language Comprehension: Insights from Research on Spoken  
Language DELPHINE DAHAN AND FERNANDA FERREIRA 21

4 The Architecture of Speaking ARDI ROELOFS AND  
VICTOR S. FERREIRA 35

5 The Cognitive Architecture of Reading: The Organization of an  
Acquired Skill SALLY ANDREWS AND ERIK D. REICHLER 51

6 Language in the Visual Modality: Co-speech Gesture and Sign  
Language ASLI ÖZYÜREK AND BENCIE WOLL 67

7 Key Issues and Future Directions: Toward a Comprehensive Cognitive  
Architecture for Language Use  
JAMES M. MCQUEEN AND ANTJE S. MEYER 85

## II THE DEVELOPMENT OF LANGUAGE CAROLINE F. ROWLAND AND EVAN KIDD

8 Six Questions in Infant Speech and Language Development  
ELIZABETH K. JOHNSON AND KATHERINE S. WHITE 99

- 9 How to Learn a Word: The Dynamic Coupling of Words and Referents in Real and Developmental Time SARAH C. KUCKER 113
- 10 Insights into Understanding Human Language from Children's Acquisition of Morphology and Syntax: A Historical and Current Perspective on Central Questions in the Field SHANLEY E. M. ALLEN AND HEIKE BEHRENS 127
- 11 A Neural Blueprint of Language Acquisition MICHAEL A. SKEIDE 147
- 12 Multilingual Development VASILIKI CHONDROGIANNI 163
- 13 Key Issues and Future Directions: How Do Children Acquire Language? CAROLINE F. ROWLAND AND EVAN KIDD 181

### III COMMUNICATION WITH AND BEFORE LANGUAGE STEPHEN C. LEVINSON AND IVAN TONI

- 14 Interactional Foundations of Language: The Interaction Engine Hypothesis STEPHEN C. LEVINSON 189
- 15 The Structure and Timing of Human versus Primate Social Interaction FEDERICO ROSSANO 201
- 16 The Resilience of Language: Homesign SUSAN GOLDIN-MEADOW 221
- 17 Depicting in Communication HERBERT H. CLARK 235
- 18 Conceptual Alignment as a Neurocognitive Mechanism for Human Communicative Interactions IVAN TONI AND ARJEN STOLK 249
- 19 Key Issues and Future Directions: Interactional Foundations for Language STEPHEN C. LEVINSON AND IVAN TONI 257

### IV MODELING LANGUAGE WILLEM ZUIDEMA

- 20 Speech Perception and Production BART DE BOER 265
- 21 Neural Network Models of Language Acquisition and Processing STEFAN L. FRANK, PADRAIC MONAGHAN, AND CHARA TSOUKALA 277
- 22 Cognitive Models of Syntax and Sentence Processing VERA DEMBERG AND FRANK KELLER 293
- 23 Vector-Based and Neural Models of Semantics WILLEM ZUIDEMA AND PHONG LE 313

- 24 Language Processing in the Brain: Mapping Neural Activity to Language Meaning LEILA WEHBE, ALONA FYSHE, AND TOM M. MITCHELL 325
- 25 The Robot Writer EMIEL KRAHMER 337
- 26 Key Issues and Future Directions: Models of Human Language and Speech Processing WILLEM ZUIDEMA AND HARTMUT FITZ 353

## V THE FUNCTIONAL NEUROBIOLOGY OF LANGUAGE

### DAVID POEPPEL

- 27 The Cortical Processing of Speech Sounds in the Temporal Lobe MATTHIAS J. SJERPS AND EDWARD F. CHANG 361
- 28 Functional Anatomy of Speech Production: From Words to Motor Control GREGORY HICKOK 381
- 29 Neural Oscillations and Their Role in Speech and Language Processing JOACHIM GROSS AND DAVID POEPPEL 393
- 30 Explaining Speech Comprehension: Integrating Electrophysiology, Evolution, and Cross-Linguistic Diversity WILLIAM D. MARSLÉN-WILSON 409
- 31 A Cognitive Neuroscience Perspective on Language Comprehension in Context JOS J. A. VAN BERKUM AND MANTE S. NIEUWLAND 429
- 32 Key Issues and Future Directions: Where Have We Been and Where Are We Going? DAVID POEPPEL 443

## VI NEUROANATOMY OF LANGUAGE

### PETER HAGOORT AND CHRISTIAN F. BECKMANN

- 33 Receptor and Cytoarchitecture of Language-Related Cortical Areas NICOLA PALOMERO-GALLAGHER AND KARL ZILLES 451
- 34 The Human Language Connectome IZABELA PRZEŹDZIK, KOEN V. HAAK, CHRISTIAN F. BECKMANN, AND ANDREAS BARTSCH 467
- 35 The “Speech Ready” Auditory Cortex ELIA FORMISANO 481
- 36 The Speech-Ready Organization of the Motor Cortex SERENA BIANCHI AND KRISTINA SIMONYAN 499
- 37 Insights into the Neurobiology of Language from Individuals Born Blind or Deaf MARINA BEDNY AND MAIRÉAD MACSWEENEY 509

- 38 Key Issues and Future Directions: The Neural Architecture for  
Language PETER HAGOORT AND CHRISTIAN F. BECKMANN 527

## VII THE GENETICS OF LANGUAGE

SIMON E. FISHER

- 39 Mapping Genes Involved in Reading and Language Skills  
MICHELLE LUCIANO AND TIMOTHY C. BATES 533
- 40 Deciphering Genetics of Speech-Motor Disorders  
ANGELA MORGAN 557
- 41 Neuromolecular Approaches to the Study of Language  
SONJA C. VERNES 577
- 42 The Genetic Bases of Brain Lateralization CLYDE FRANCKS 595
- 43 Key Issues and Future Directions: Genes and Language  
SIMON E. FISHER 609

## VIII ANIMAL MODELS OF LANGUAGE

CAREL TEN CATE AND CONSTANCE SCHARFF

- 44 The Comparative Approach to the Biology and Evolution of Language  
W. TECUMSEH FITCH 623
- 45 Primate Vocalization as a Model for Human Speech: Scopes and  
Limits JULIA FISCHER AND STEFFEN R. HAGE 639
- 46 Vocal Learning and Spoken Language: Insights from Animal Models  
with an Emphasis on Genetic Contributions CONSTANCE SCHARFF,  
MIRJAM KNÖRNSCHILD, AND ERICH D. JARVIS 657
- 47 The Grammatical Abilities of Animals: A Comparative Overview  
CAREL TEN CATE AND CHRISTOPHER I. PETKOV 687
- 48 Speech Perception: What Do Nonhuman Animals Have to Say?  
BUDDHAMAS P. KRIENGWATANA AND GABRIËL J. L. BECKERS 701
- 49 Key Issues and Future Directions: The Comparative Approach  
to Language CAREL TEN CATE AND CONSTANCE SCHARFF 713
- Contributors 719
- Index 723

- 38 Key Issues and Future Directions: The Neural Architecture for Language    PETER HAGOORT AND CHRISTIAN F. BECKMANN    527

## VII THE GENETICS OF LANGUAGE

SIMON E. FISHER

- 39 Mapping Genes Involved in Reading and Language Skills  
MICHELLE LUCIANO AND TIMOTHY C. BATES    533
- 40 Deciphering Genetics of Speech-Motor Disorders  
ANGELA MORGAN    557
- 41 Neuromolecular Approaches to the Study of Language  
SONJA C. VERNES    577
- 42 The Genetic Bases of Brain Lateralization    CLYDE FRANCKS    595
- 43 Key Issues and Future Directions: Genes and Language  
SIMON E. FISHER    609

## VIII ANIMAL MODELS OF LANGUAGE

CAREL TEN CATE AND CONSTANCE SCHARFF

- 44 The Comparative Approach to the Biology and Evolution of Language  
W. TECUMSEH FITCH    623
- 45 Primate Vocalization as a Model for Human Speech: Scopes and Limits  
JULIA FISCHER AND STEFFEN R. HAGE    639
- 46 Vocal Learning and Spoken Language: Insights from Animal Models with an Emphasis on Genetic Contributions    CONSTANCE SCHARFF, MIRJAM KNÖRNSCHILD, AND ERICH D. JARVIS    657
- 47 The Grammatical Abilities of Animals: A Comparative Overview  
CAREL TEN CATE AND CHRISTOPHER I. PETKOV    687
- 48 Speech Perception: What Do Nonhuman Animals Have to Say?  
BUDDHAMAS P. KRIENGWATANA AND GABRIËL J. L. BECKERS    701
- 49 Key Issues and Future Directions: The Comparative Approach to Language    CAREL TEN CATE AND CONSTANCE SCHARFF    713
- Contributors    719
- Index    723