
Contents

| | |
|-----------------------------|------|
| <i>List of Contributors</i> | xiii |
| <i>Foreword</i> | xv |
| <i>Preface</i> | xix |

PART I *Language Theory and Foundations*

| | |
|---|---|
| chapter 1 | |
| <i>Language Origin Theories</i> | 3 |
| GORDON WINANT HEWES | |
| Introduction | 3 |
| Early Ideas about Language Origin | 4 |
| Greek, Roman, and Early Christian Views | 5 |
| Seventeenth-Century European Speculations | 7 |
| The Eighteenth-Century Enlightenment Debate on Language Origins | 9 |

| | |
|--|----|
| Nineteenth-Century Glottogonic Arguments | 17 |
| Decline of Interest in the Early Twentieth Century | 28 |
| Pioneer Work on Nonhuman Primates and Language | 29 |
| Glottogonic Speculation from Marr to Révész | 30 |
| Language Origin Ideas: 1950 to the Pongid Breakthrough | 34 |
| The Chimpanzee Era of Glottogonic Research | 38 |
| Concluding Observations | 42 |
| Appendix: The Glottogonic Theories | 43 |
| References | 50 |

chapter 2

| | |
|--|----|
| <i>Linguistic Communication: Theory and Definition</i> | 55 |
|--|----|

ERNST VON GLASERSFELD

| | |
|-------------------------------|----|
| Introduction | 55 |
| Language and Speech | 56 |
| What Is Communication? | 57 |
| The Restoration of Purpose | 61 |
| From Sign to Symbol | 63 |
| The Semantic Aspect of Syntax | 65 |
| The Recognition of Language | 66 |
| References | 69 |

chapter 3

| | |
|--|----|
| <i>Cross-Modal Perception: A Basis for Language?</i> | 73 |
|--|----|

RICHARD K. DAVENPORT

| | |
|-----------------------------------|----|
| Background | 74 |
| Cross-Modal Methods | 75 |
| Experiments with Apes and Monkeys | 77 |
| Significance | 80 |
| References | 81 |

PART II*Design of the LANA Project*

chapter 4

| | |
|---|----|
| <i>The LANA Project: Origin and Tactics</i> | 87 |
|---|----|

DUANE M. RUMBAUGH, HAROLD WARNER, AND

ERNST VON GLASERSFELD

chapter 5

*The Yerkish Language and Its
Automatic Parser*

91

ERNST VON GLASERSFELD

| | |
|--|-----|
| Preliminary Remarks | 91 |
| Design of the Lexigrams | 92 |
| The Lexicon | 95 |
| The Conceptual Lexigram Classes | 98 |
| An Interpretive Correlational Grammar | 103 |
| Correlators: The Connective Functions of Yerkish | 106 |
| Yerkish Sentence Structure | 111 |
| Peculiarities of the Yerkish Grammar | 114 |
| The Multistore Parser | 120 |
| The Grammaticality of Lana's Sentence Production | 126 |
| References | 130 |

chapter 6

Computer Programs

131

PIER PAOLO PISANI

| | |
|---------------------------|-----|
| The Multistore | 131 |
| The Combinatorial Problem | 132 |
| The Multistore Approach | 133 |
| Description of Procedure | 134 |
| Procedure | 137 |
| Reclassification Routine | 138 |
| References | 141 |

chapter 7

*The System:
Design and Operation*

143

HAROLD WARNER AND CHARLES L. BELL

| | |
|--------------------------------------|-----|
| Introduction: An Automated System | 143 |
| The Instrumentation System | 144 |
| The Experimental Chamber | 149 |
| The Instrumentation System Operation | 150 |
| Reference | 155 |

chapter 8

Training Strategy and Tactics

157

TIMOTHY V. GILL AND DUANE M. RUMBAUGH

| | |
|------------------------------|-----|
| Specific Training Strategies | 158 |
|------------------------------|-----|

PART III*Lana's Mastery of Language-Type Skills*

chapter 9

Lana's Acquisition of Language Skills 165

DUANE M. RUMBAUGH AND TIMOTHY V. GILL

| | |
|---|-----|
| "Reading and Writing" | 167 |
| Elimination of Errors: First Ten Months | 168 |
| Yes and No | 169 |
| Naming Training | 170 |
| Use of "Stock" Sentences for Other Than the Originally Intended Purpose | 172 |
| Conversations | 173 |
| Move It to the Vending Device | 174 |
| Give Name-of This | 176 |
| Use of "To" | 177 |
| A Request for a Nonpresent Object | 178 |
| Orange (Fruit) = The Apple Which-Is Orange (Colored) | 178 |
| Drink Milk; Eat Bread | 183 |
| Sensitivity to the Limits of Sentence Length | 183 |
| Put the Milk in the Machine | 184 |
| Learning the Use of "More" | 185 |
| Cross-Modal Tasks | 188 |
| Discussion | 190 |
| References | 192 |

chapter 10

*Language Relevant Object-
and Color-Naming Tasks* 193

SUSAN ESSOCK, TIMOTHY V. GILL, AND DUANE M. RUMBAUGH

| | |
|--|-----|
| Method | 194 |
| Experiment I. Color versus Object Naming of Projected Photographs | 195 |
| Experiment II. Color Naming of Novel Objects | 198 |
| Experiment III. Color Naming of Requested Object When Several Objects Are Present | 199 |
| Experiment IV. Naming of Object Requested by Color When Several Objects Are Present | 202 |
| Experiment V. Intermingled Color and Object Naming Questions of a Requested Object with Six Objects Present | 203 |
| Discussion | 204 |
| Summary | 205 |
| References | 206 |

chapter 11

Color Perception and Color Classification 207

SUSAN M. ESSOCK

| | |
|---------------|-----|
| Experiment I | 210 |
| Experiment II | 218 |

| | |
|---|-----|
| Discussion | 220 |
| Implications and Conclusions | 223 |
| References | 223 |
| | |
| chapter 12 | |
| <i>Conversations with Lana</i> | 225 |
| TIMOTHY V. GILL | |
| Experiment I | 227 |
| Experiment II | 240 |
| General Discussion | 241 |
| References | 246 |
| | |
| chapter 13 | |
| <i>Acquisition and Use of Mathematical Skills by a Linguistic Chimpanzee</i> | 247 |
| GWENDOLYN B. DOOLEY AND TIMOTHY V. GILL | |
| Experiment 1A: Ability to Select the Greater Quantity with Fruit Loop Ratios 1:2-4:5 | 250 |
| Experiment 1B: Ability to Select the Greater Quantity with Fruit Loop Ratios 1:2-9:10 | 252 |
| Discussion | 254 |
| Experiment 2: Mathematical Ability to Distinguish "More" and "Less" in Terms of Relative Number | 255 |
| Discussion | 258 |
| References | 259 |
| | |
| PART IV | |
| <i>Projects for the Future</i> | |
| | |
| chapter 14 | |
| <i>The Conversation Board</i> | 263 |
| HAROLD WARNER, CHARLES L. BELL, AND JOSEPHINE V. BROWN | |
| Introduction | 263 |
| A Conversation Board System | 265 |
| The Conversation Board System Operation | 267 |
| Procedures for Employing the CB as a Language Learning Tool | 268 |
| | |
| chapter 15 | |
| <i>Implications of the Yerkes Technology for Mentally Retarded Human Subjects</i> | 273 |
| DOROTHY A. PARKEL, ROYCE A. WHITE, AND HAROLD WARNER | |
| Selection of the Target Population | 274 |

| | |
|--|-----|
| Summary of Relevant Literature | 274 |
| Speculations on the Technological Advantages of the System | 275 |
| Modifications of the System | 277 |
| Overview of the Program Plans | 278 |
| References | 282 |

PART V

Language and Communication: A Perspective

chapter 16

Communication, Language, and Lana: A Perspective

287

E. SUE SAVAGE AND DUANE M. RUMBAUGH

| | |
|--|-----|
| Introduction | 287 |
| Definitions of Communication | 289 |
| Categorical Schemata and Sequential Analyses | 290 |
| Communication as Rule-Governed Exchanges | 292 |
| Cognitive Structures and Communication | 295 |
| Classification of Communicative Acts | 297 |
| Summary and Conclusions | 303 |
| Projections of Ape Language Projects | 305 |
| A Final Perspective | 307 |
| References | 307 |

Chronological Bibliography of LANA Project Publications

311