

HUMAN COGNITION

R. KIM GUENTHER



Human Cognition

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Preface

"What a piece of work is man! How noble in reason!" Shakespeare's Hamlet may have been sarcastic in his description of humankind, but cognitive scientists are sincere in their appreciation of the wonder of human cognition. Even in the most mundane of activities, the express and admirable qualities of our mental faculties reveal themselves. A mother of two awakens from a dream of travel in a far-off land to the cries of her newborn infant and immediately perceives that her infant is hungry. Perhaps the awakening reminds her that her firstborn is now a walking, talking child of 4 who finally sleeps through the night without waking up. Perhaps she wonders how she can accommodate the demands of her second child and still get the sleep she needs to function effectively during the day. Maybe she will solicit the help of her husband, the baby's father, asking him to bring the baby to bed, to change the baby's diapers, and to return the baby to the crib.

This example illustrates the amazing capabilities of the human mind. Consciousness, perception, memory, reasoning, problem solving, and language are so much a part of our moment-to-moment lives that we easily overlook the intricate and impressive mental processes that make them possible. It is the cognitive scientist who seeks to explain how we accomplish such mental feats, using the techniques of science—controlled observation and hypothesis testing—to try to find the answers. And it is for writers of textbooks like this one to summarize the accomplishments of those cognitive scientists.

Customarily, textbook writers try to justify their work by demonstrating how their textbook is different from and an improvement on the textbooks that have come before. In this book I cover the same topics covered in most other books on the subject. But this book differs from others in several ways. The most important difference is that I focus on what I regard as the essential themes, issues, and controversies that inspire and shape the field of cognitive science. I hope to instill in you, the reader, an interest in cognitive psychology and a sense of the field's implications for the larger society. I do this by organizing each chapter around an important differing perspectives that inform cognitive scientists' thinking on the chapter's topic.

I'll illustrate what I mean with my chapter on memory. Most textbooks discussing memory describe a collection of models and experimental paradigms that have to do with storing and retrieving data located in a short- or a long-term memory. I try to step back from this morass of information about memory and ask what I think is a key question about memory: What is a good metaphor

for how human memory works? Historically, the dominant answer is that memory is a storage system for keeping records of past experiences, and that remembering involves searching through and “reading” the memory records that are retrieved. In my chapter on memory I criticize this metaphor and suggest instead that memory is designed not to recapitulate the past but to anticipate the future. Memory is a constructive process. The human cognitive systems for perceiving, thinking, and acting change as a function of our experiences but do not keep a record-by-record account of those experiences. Remembering, according to the constructionist metaphor, is not reexperiencing the past but reconstructing a plausible version of the past based on current knowledge. I am able to discuss most of the important research on memory in the context of this contrast between the record-keeping and the constructionist perspectives and so integrate the memory research. A discussion of the constructionist model also enhances an appreciation of how a metaphor for memory has implications for evaluating eyewitness reporting, for understanding problem solving, and for devising educational practices.

In each chapter, then, I look for a theme that represents an interesting and ongoing debate about the essential nature of cognition, and organize the material around that theme. My hope is that each chapter reads as an independent, well-integrated essay. However, I extend themes across chapters. Constructionism, for example, makes its appearance in the chapter on perception (where a constructed view of perception is contrasted with direct perception) and in the chapters on memory, implicit and semantic memory, and the physiology of learning and remembering. In some cases I take a distinct point of view, as, for example, when I write in support of a constructionist model rather than a record-keeping model of memory. I think writing is more interesting and science more realistically portrayed when a scientific text is written with a point of view—provided, of course, that the point of view is warranted by the evidence.

Let me mention five other differences between my textbook and most others on the subject. First, I cover more adequately the neurophysiology of cognitive functions, although at a somewhat more simplified level than ordinarily would be the case in a neurophysiology textbook. In addition to the chapter on the physiology of learning and remembering, I cover the physiology of consciousness, perception, problem solving, individual differences, language, and cognitive development in the chapters in which those topics are discussed.

Second, I make extensive use of ecologically oriented research. For example, in the memory chapter I cite John Dean’s Watergate testimony and an experiment in which participants in a seminar try to recollect who attended the last meeting, in order to make a point about what people ordinarily return from experiences. By focusing on research in natural contexts, I hope to make research ideas clearer and more interesting to students. At the same time, a more ecologically oriented approach reflects the field’s increased emphasis on ecological validity.

Third, I highlight neural net models (also known as connectionist or parallel distributed processing models). Neural nets are models of an idealized

brain, designed to simulate the brain's essential properties that are thought to give rise to mental phenomena. Neural net modeling has certainly become a dominant influence in the field in the last fifteen years. Neural nets are featured prominently in the introductory chapter, where you will find a beer-guzzling neural net, and in the chapter on the physiology of learning and remembering, where you will find a neural net that discriminates between the music of two fictional rock-and-roll bands. Neural nets also make brief appearances in the chapters on consciousness and on implicit and semantic memory. I also discuss some of the limitations of neural net approaches to human cognition.

Fourth, I include topics important to the field but usually covered minimally, if at all, in most other textbooks. These topics include the neural basis of consciousness, sleep and dreams, repression, individual differences in cognition, and the evolution of human language and cognitive capacity. The latter topic reflects another growing influence in the field—namely, the idea that many properties of human cognition are adaptive in a Darwinian sense.

Fifth, I end each chapter with a summary and set of recommended readings. My summaries are a bit longer than those in most other textbooks in order to help you better integrate and remember the material in the chapter. I tried to pick readings that would be interesting as well as informative. You will even find a couple of films and works of fiction among my recommendations. The book itself is summarized in the epilogue, where I review the essential themes discussed throughout the book.

Customarily, prefaces end with the author acknowledging those who helped with the book. I would like to thank the original acquisitions editor, Susan Brennan, for her faith in this project, and the editors who helped me see the book through to completion, Nicole Signoretti, Virginia Rubers, Ilene Kalish, and Randy Pettit. Ilene was especially helpful in the last frantic weeks before the manuscript was due, Virginia's copyediting greatly improved the prose, and Randy did a superb job in overseeing the final production of the textbook. I would also like to thank the following reviewers who read drafts of the manuscript and offered advice on how to improve it: Robert G. Crowder, Yale University; Susan Dutch, Westfield State College; Ira Fischler, University of Florida; Peter Gordon, University of North Carolina—Chapel Hill; David K. Hogberg, Albion College; Paul E. Jose, Loyola University of Chicago; F. Philip Rice, University of Maine; Edward S. Wood, University of Wisconsin, La Crosse. If you, the reviewers, manage to read it again, you will see that the book incorporates many of your suggestions. Most of all I thank my family—my wife Donna, who loves me and believes in me more than I do in myself; my son Jacob, who is my real creation; and my father Robert, who instilled in me a sense of love of and enthusiasm for education. God bless you all.

—R. Kim Guenther

Contents

***Preface* xvi**

***1 Introduction and Historical Overview* 1**

SECTION 1: THE EMERGENCE OF THE NATURAL PERSPECTIVE 2

THE WORLD BECOMES NATURAL 2

LIFE BECOMES NATURAL 3

DUALISM OR MATERIALISM?—THE MIND BECOMES NATURAL 4

 Dualism 4

 Materialism 6

SECTION 2: THE EMERGENCE OF COGNITIVE SCIENCE 7

COGNITIVE SCIENCE IN THE NINETEENTH CENTURY 8

COGNITIVE SCIENCE IN THE TWENTIETH CENTURY 10

SECTION 3: MIND AS MACHINE 11

INFORMATION PROCESSING 12

 Information Processing Claims 12

 Problems with the Computer Metaphor 15

NEURAL NET MACHINES 17

 A Beer-Guzzling Neural Net 18

 Differences between Neural Net and Information

 Processing Models of Human Cognition 20

SECTION 4: IS COGNITIVE PSYCHOLOGY NECESSARY? 21

THE BEHAVIORIST CHALLENGE 21

THE COGNITIVE PSYCHOLOGIST'S RESPONSE TO THE BEHAVIORIST
CHALLENGE 22

SUMMARY AND SPECULATIONS 24

RECOMMENDED READINGS 27

2 Consciousness 28

SECTION 1: MATERIALISM AND THE PHYSIOLOGICAL BASIS OF CONSCIOUSNESS 29

DISSOCIATIONS AND THE DISTRIBUTED NATURE OF CONSCIOUSNESS 30

Blindsight 31

Neglect 31

Amnesia 32

Split Brains 32

Sleepwalking 32

Regulatory Malfunctions 34

IMPLICATIONS OF DISSOCIATIONS 35

SECTION 2: DREAMING AS A STATE OF CONSCIOUSNESS 36

A TYPICAL NIGHT OF SLEEP 36

THE FUNCTION OF REM SLEEP 39

Learning and REM 40

Priming and REM 42

EXPLAINING THE CONTENTS AND CHARACTERISTICS OF DREAMS 43

Dreams as Extensions of Waking Concerns 43

Freud's Theory of Dreams 44

ACTIVATION-SYNTHESIS AND THE PHYSIOLOGICAL BASIS OF DREAM CONTENT 45

SECTION 3: CONSCIOUSNESS IS LIMITED 47

SELECTIVE ATTENTION 47

Filter Models of Selective Attention 48

Limited Resource Model 49

Attention and Perception 50

SHORT-TERM MEMORY 51

Older Models of Short-Term Memory 52

The Demise of the Duplex Model
of Short-Term Memory 53

Newer Models of Short-Term Memory 54

Retrieval of Recently Encountered
Information 56

Baddeley's Tripartite Working Memory 58

Brain Location of Short-Term Memory 59

THE EFFECTS OF PRACTICE ON ATTENTION AND SHORT-TERM MEMORY 60

PHYSIOLOGICAL BASIS OF LIMITED RESOURCES 62

SECTION 4: THE FUNCTION OF CONSCIOUSNESS 64

CONSCIOUSNESS AS CONTROL 65

THE PUZZLE OF CONSCIOUSNESS 67

SUMMARY AND CONCLUSIONS 68

RECOMMENDED READINGS 70

3 Visual Perception 71PERSPECTIVES ON PERCEPTION: DIRECT
OR CONSTRUCTED? 72**SECTION 1: THE PHYSIOLOGY OF VISION 74**

VISUAL PROCESSING BY THE EYE 74

SENSORY MEMORY 76

VISUAL PROCESSING IN PRIMARY VISUAL CORTEX 77

VISUAL PERCEPTION IN SECONDARY VISUAL CORTEX 78

MYSTERIES 80

Binding 81

Externalization in Visual Perception 81

SECTION 2: DEPTH PERCEPTION 83

THE INVARIANTS OF DEPTH 83

Monocular Cues for Depth 83

Binocular Cues for Depth 84

THE CONSTRUCTION OF DEPTH: THE INFLUENCE
OF CULTURE ON DEPTH PERCEPTION 86**SECTION 3: PATTERN RECOGNITION 88**THE DIRECT PERCEPTION APPROACH
TO PATTERN RECOGNITION 88

MODELS OF PATTERN RECOGNITION 89

Feature Models of Pattern Recognition 90

Geons 90

Prototype Models of Pattern Recognition 93

Average Is Beautiful 94

THE EFFECT OF CONTEXT ON PATTERN RECOGNITION 95

HOW DIRECT IS PATTERN RECOGNITION? 98

SECTION 4: IMAGINED PERCEPTIONS 99

VISUAL IMAGINATION SIMULATES VISUAL PERCEPTION 100

Mental Rotation 101

Imagined Size 102

Reaction Time on Demand?	103
The Causal Role of Images in Cognition	104
NEUROPHYSIOLOGY OF VISUAL IMAGINATION	105
THE CONSTRUCTION OF VISUAL IMAGES	
FROM KNOWLEDGE	106
SUMMARY AND CONCLUSIONS	107
RECOMMENDED READINGS	110

4 Memory 112

SECTION 1: PERSPECTIVES ON MEMORY 112

RECORD-KEEPING VERSUS CONSTRUCTIONIST ACCOUNTS OF MEMORY	112
HISTORICAL SUPPORT FOR RECORD-KEEPING THEORIES OF MEMORY	115
HISTORICAL SUPPORT FOR CONSTRUCTIONIST THEORIES OF MEMORY	117

SECTION 2: RETAINING EXPERIENCES IN MEMORY 119

A CONSTRUCTIONIST ACCOUNT OF RETENTION	119
EVIDENCE FOR THE CONSTRUCTIONIST ACCOUNT OF RETENTION	122
Empirical Evidence that Memory Preserves Patterns but Not Details of Experiences	122
Accurate Memory	123
Brain Stimulation and Accurate Memory	126
Recognition and Accurate Memory	126
Autobiographical Memory	127
"Photographic" Memory?	128
THE ASSIMILATION PRINCIPLE	130
Experimental Support for Assimilation	131
Levels of Processing and the Assimilation Principle	132
INDIVIDUAL DIFFERENCES IN MEMORY	133

SECTION 3: RECOLLECTING THE PAST 135

RECORD-KEEPING AND CONSTRUCTIONIST MODELS OF RECOLLECTING THE PAST	135
RECONSTRUCTING THE PAST	136
Eyewitness Memory and Reconstruction	137
Hypnosis and Memory	140
The Influence of Beliefs on Memory	141
CONFIDENCE AND ACCURACY	142
THE OVERLAP PRINCIPLE	144

Experimental Evidence for the Overlap Principle	145
Problem Solving and the Overlap Principle	146
Recognition Versus Recall	147

SECTION 4: FORGETTING 148

INTERFERENCE	148
EXPLAINING INTERFERENCE	150
SUMMARY AND CONCLUSIONS	153
RECOMMENDED READINGS	156

5 *Implicit and Semantic Memory* 157

SECTION 1: IMPLICIT MEMORY 158

TERMINOLOGY	158
DEMONSTRATIONS OF IMPLICIT MEMORY	159
WHAT UNDERLIES THE EXPLICIT-IMPLICIT MEMORY DISTINCTION?—A CONSTRUCTIONIST ACCOUNT	160
Factors That Affect Explicit but Not Implicit Memory	162
Factors Undermining Implicit but Not Explicit Memory	165

SECTION 2: REPRESSION AND MEMORY FOR DISTURBING EXPERIENCES 166

REPRESSION	166
Clinical and Forensic Evidence for Repression	167
Assessing the Clinical and Forensic Evidence for Repression	168
False Memories of Abuse?	170
EXPERIMENTAL INVESTIGATIONS OF REPRESSION	172
Experiments Purporting to Demonstrate Repression	172
Repression and Implicit Memory	174
Experimental Evidence That Contradicts Repression	175
Conclusions About Repression	176

SECTION 3: SEMANTIC MEMORY 178

WHAT IS THE NATURE OF A CONCEPT?	179
The Classical Approach to Concepts	180
The Prototype Approach to Concepts	181
HOW ARE CONCEPTS PROCESSED?	182
The Feature Comparison Model	182

The Spreading Activation Model	185
NEW DEVELOPMENTS IN SEMANTIC MEMORY	187
Neural Nets and Distributed Accounts of Semantic Memory	187
Concepts as Implicit Theories	191
SUMMARY AND CONCLUSIONS	194
RECOMMENDED READINGS	197

6 *The Physiology of Learning and Remembering* 199

NEURAL TRANSMISSION	199
SECTION 1: THE PHYSIOLOGY OF LEARNING	202
LONG-TERM POTENTIATION	203
Experimental Evidence for Long-Term Potentiation	203
The Synaptic Basis for Long-Term Potentiation	205
NEURAL RESPONSES TO EXPERIENCE	207
NEURAL BASIS OF FORGETTING	208
SECTION 2: THE PHYSIOLOGY OF MEMORY	210
THE PHYSIOLOGY OF EXPLICIT MEMORY	210
The Distributed Nature of Memory	211
Integrating the Disparate Neural Centers: The Role of the Hippocampus	213
How Does the Hippocampus Produce an Explicit Memory?	215
THE PHYSIOLOGY OF IMPLICIT MEMORY	218
SECTION 3: NEURAL NET MODELS OF LEARNING AND MEMORY	219
A ROCK-AND-ROLL EXAMPLE OF A NEURAL NET MODEL	220
HOW NEURAL NET MODELS LEARN AND REMEMBER	222
Back Propagation, Teachers, and Learning	222
Neural Net Models and Human Memory	224
PROBLEMS WITH NEURAL NET MODELS	226
SUMMARY AND CONCLUSIONS	228
RECOMMENDED READINGS	231

7 *Reasoning and Rationality* 232

PERSPECTIVES ON REASONING: ARE PEOPLE RATIONAL OR IRRATIONAL ANIMALS?	232
--	-----

SECTION 1: REASONING FROM PREMISES: ARE PEOPLE INTUITIVE LOGICIANS? 234

CONDITIONAL REASONING PROBLEMS 235

EXPERIMENTS INVESTIGATING CONDITIONAL REASONING 237

Evaluating Conclusions Given Premises 238

Deciding Which Observations Determine
Whether a Premise Is True 238WHAT UNDERLIES THE DEVIATIONS FROM LOGIC
IN CONDITIONAL REASONING PROBLEMS? 240The Availability Hypothesis: Irrationality
as Availability 240An Adaptive Approach to Conditional
Reasoning 241

Social Reasoning 243

SECTION 2: PREDICTING UNCERTAIN EVENTS: ARE PEOPLE INTUITIVE STATISTICIANS? 245

STATISTICAL FALLACIES 246

The Conjunctive Fallacy 246

Neglect of Base Rate 247

EXPLAINING THE STATISTICAL FALLACIES 248

Representativeness and Availability 249

An Adaptive Approach to Statistical
Fallacies 249**SECTION 3: CRITICALLY EVALUATING BELIEFS: ARE PEOPLE INTUITIVE SCIENTISTS? 251**

HUMANS AS SPINOZIANS 252

Degrading the Judgment Process 252

Failure to Examine Potentially Disconfirming
Data 254

Quantity versus Quality of Arguments 256

WHY ARE PEOPLE SPINOZIANS? 258

Availability, Yet Again 258

An Adaptive Analysis of The Spinozian
Model 259**SECTION 4: DECISION MAKING: ARE PEOPLE INTUITIVE ECONOMISTS? 261**

LACK OF INVARIANCE IN DECISION MAKING 262

Framing 262

Anchoring 263

WHAT ACCOUNTS FOR APPARENTLY IRRATIONAL DECISION
MAKING? 264

Once Again, Availability	264
An Adaptive Approach to Decision Making	264
SUMMARY AND CONCLUSIONS	266
RECOMMENDED READINGS	269

8 Problem Solving 270

TYPES OF PROBLEMS	270
APPROACHES TO PROBLEM SOLVING: GENERIC, INFORMATION PROCESSING MODELS VERSUS DOMAIN-SPECIFIC MODELS	271

SECTION 1: NEWELL AND SIMON'S GENERAL PROBLEM SOLVER 273

OVERVIEW OF THE GENERAL PROBLEM SOLVER MODEL	273
REACTIONS TO GPS	277

SECTION 2: UNDERSTANDING THE PROBLEM 277

CONSTRUCTING PROBLEM REPRESENTATIONS	278
The Connect-the-Nine-Dots Problem	278
Changing Perceptions	279
Functional Fixation	280
SUDDEN INSIGHT AND INCUBATION	282
Insight Problems	282
Incubation	284

SECTION 3: APPLYING STRATEGIES TO SOLVE PROBLEMS 286

INEFFICIENT STRATEGIES	286
Problem Solving Set	286
Falsification Strategies	287
EXPERTISE AND PROBLEM SOLVING	289
Conceptual Understanding of the Problem Domain	289
Experts Versus Novices	292
PRIOR PRACTICE ON SIMILAR PROBLEMS	294
Analogies and Problem Solving	295
Difficulties in Making Use of Analogies	296
Under What Circumstances Do People Successfully Transfer Problem-Solving Knowledge?	296
GENERAL STRATEGIES	298
Adding Structure to Ill-Defined Problems	299
Question Asking	300
Applying General Strategies to Specific Domains	300
CREATIVITY	301

SECTION 4: THE BRAIN AND PROBLEM SOLVING 304**SECTION 5: EDUCATION AND THE TRANSFER OF PROBLEM SOLVING 305**

PROBLEM-SOLVING COURSES 305

TRANSFER OF PROBLEM SOLVING FROM SCHOOLS
TO EVERYDAY LIFE 306

SUMMARY AND CONCLUSIONS 309

RECOMMENDED READINGS 311

9 Individual Differences in Cognition 313PERSPECTIVES ON INDIVIDUAL DIFFERENCES IN INTELLIGENCE: HEREDITARIAN,
UNITARY MODELS VERSUS MULTIFACETED, DOMAIN-SPECIFIC
MODELS OF INTELLIGENCE 313**SECTION 1: HISTORICAL BACKGROUND AND THE RISE OF THE HEREDITARIAN THEORY OF INTELLIGENCE 314**

THE RISE OF THE INTELLIGENCE TESTING MOVEMENT 314

Francis Galton 314

Alfred Binet 316

CORRELATES OF IQ 317

SECTION 2: IS INTELLIGENCE UNITARY? 318

EVIDENCE FOR THE UNITARY VIEW 318

WHAT UNDERLIES UNITARY INTELLIGENCE?: CONTRIBUTIONS
OF INFORMATION PROCESSING 319An Example of Research Based on Information
Processing: Inspection Time 320Problems with the Information Processing
Perspective on Intellectual Differences 321RESEARCH ON THE PHYSIOLOGICAL BASIS
OF INTELLIGENCE 322

Are Smart Brains Metabolically Efficient? 322

Neural Conduction Rate and Smart Brains 323

SECTION 3: BUILDING THE CASE FOR A MULTIFACETED APPROACH TO INTELLIGENCE 324INTERPRETING THE EVIDENCE FOR UNITARY MODELS
OF INTELLIGENCE 324EXPANDING THE CONCEPT OF INTELLIGENCE: CREATIVITY,
SOCIABILITY, PRACTICALITY 324

Creativity 325

Social Skill 325

Practical Intelligence 326

GARDNER'S FRAMES OF MIND 327

Evidence for Gardner's Frames 328

Criticisms of Gardner's Frames 329

SECTION 4: IS INTELLIGENCE DETERMINED PRIMARILY BY GENES? 330

EVIDENCE FOR A GENETIC BASIS FOR INTELLIGENCE 331

Familial IQ Correlations 331

Problems with the Evidence Supporting
a Genetic Basis for Intelligence 332

THE ROLE OF ENVIRONMENTAL FACTORS IN INTELLECTUAL
DIFFERENCES 333

Family and School Environments 334

Generational Environmental Changes: IQ Scores
Are Rising 335

ETHNIC DIFFERENCES IN IQ PERFORMANCE 335

Evidence Against a Genetic Basis for Ethnic IQ
Differences 336

Why Are There Ethnic Differences in IQ
Performance? 337

CULTURAL DIFFERENCES IN PRIZED INTELLECTUAL
COMPETENCIES 338

SEX DIFFERENCES IN INTELLECTUAL COMPETENCIES 339

Genetic Basis of Sex Differences in Cognition 341
Environmental Explanations of Sex Differences
in Cognition 342

CONCLUSIONS ABOUT THE GENETIC BASIS
OF INTELLIGENCE 343

SUMMARY AND CONCLUSIONS 344

RECOMMENDED READINGS 346

10 Language 347

PERSPECTIVES ON LANGUAGE: A CULTURAL INVENTION
OR A HUMAN COGNITIVE INSTINCT? 347

SECTION 1: THE PROPERTIES OF LANGUAGE 348

VOCABULARY 349

GENERATIVE GRAMMAR 351

Phonology 351

Morphology 353

Syntax 354

Phrases 354

Verbs and Their Roles 356

Transformations and Deep Structure 357

LANGUAGE USES THE ORAL/AUDITORY SYSTEM 359

HUMAN LANGUAGE AS A UNIQUE SYSTEM
OF COMMUNICATION 360

SECTION 2: THE BIOLOGY OF LANGUAGE 362

BROCA'S AREA AND THE CONTROL OF GRAMMAR 363
 WERNICKE'S AREA AND THE ASSOCIATION BETWEEN IDEAS
 AND WORDS 365

SECTION 3: LANGUAGE COMPREHENSION 367

THE PERCEPTION OF SPEECH 367
 THE COMPREHENSION OF WORDS 370
 THE COMPREHENSION OF SENTENCES 372
 Syntactic Ambiguity 372
 Minimal Attachment 373
 Traces of Roles 374
 DISCOURSES AND PRAGMATICS 376
 Discourses and Causal Bridging 376
 Pragmatics and the Maxims
 of Conversation 378
 The Neurology of Discourse and Pragmatics 380

SECTION 4: THE EVOLUTION OF LANGUAGE 380

OVERVIEW OF HUMAN EVOLUTION 381
 Australopithecus 381
 Homo habilis and *Homo erectus* 383
 Homo sapiens 384
 HOW DID LANGUAGE EVOLVE? 385

SECTION 5: LANGUAGE AND THOUGHT 385

LINGUISTIC RELATIVITY 386
 RESEARCHING THE LINGUISTIC RELATIVITY HYPOTHESIS 388
 Hypothetical Reasoning 388
 Math and Morphology 390
 SUMMARY AND CONCLUSIONS 391
 RECOMMENDED READINGS 394

11 *Cognitive Development* 395

PERSPECTIVES ON COGNITIVE DEVELOPMENT: GENERIC
 OR DOMAIN-SPECIFIC? 395

**SECTION 1: PIAGET'S GENERIC THEORY OF COGNITIVE
 DEVELOPMENT 396**

STAGES OF COGNITIVE DEVELOPMENT 397
 Sensorimotor Stage 397