



Robert S. Siegler Martha Wagner Alibali

Contents

What Is Children's Thinking? 2
Key Questions about Children's Thinking 3
Are some capabilities innate? 4
Does development progress through stages? 6
How does change occur? 8
How do individuals differ? 10
How do changes in the brain contribute to cognitive development? 13
How does the social world contribute to cognitive development? 18
The Book's Organization 22
The chapter-by-chapter organization 22
The central themes 24
Summary 25
Recommended Readings 25
PIAGET'S THEORY OF DEVELOPMENT 26
An Overview of Piaget's Theory 28

The sensorimotor period (birth to roughly 2 years) 34

The preoperational period (roughly 2 years to 6 or 7 years) 39

The theory as a whole 28
The stages of development 29
Developmental processes 30
Orienting assumptions 32

The Stage Model 34

Preface xiii

The concrete operations period (roughly 6 or 7 years to 11 or 12 years) 42 The formal operations period (roughly 11 or 12 years onward) 44

The Development of Some Critical Concepts 46

Conservation 46

Classes and relations 48

An Evaluation of Piaget's Theory 54

How accurately does the theory describe particular aspects of children's thinking? 54

How stagelike is children's thinking? 57

How well do Piaget's general characterizations fit children's thinking? 60

The current status of Piaget's theory 62

Summary 62

Recommended Readings 64

3 INFORMATION-PROCESSING THEORIES OF DEVELOPMENT 65

An Overview of the Information-Processing System 68

Structural characteristics 68

Processes 72

Information-Processing Theories of Development 75

Neo-Piagetian theories 75

Psychometric theories 82

Production system theories 86

Connectionist theories 92

Theories of cognitive evolution 97

Summary 104

Recommended Readings 106

4 SOCIOCULTURAL THEORIES OF DEVELOPMENT 107

Central Themes of Sociocultural Approaches to Cognitive Development 109

Cognitive development occurs in social interaction 110

Psychological functioning is mediated by language and other cultural tools 112

Cultural norms and other people influence children's opportunities for learning 115

Social and cultural learning require particular cognitive abilities 116 Summary 118

5

6

Modern Empirical Research in the Sociocultural Tradition 118
Learning in interaction with adults 119
Learning in interaction with peers 121
Guided participation in cultural activities 125
Language as a psychological tool 128
Educational Implications of Sociocultural Theories 133
Sociocultural approaches to assessing children's knowledge 133
Educational interventions based on sociocultural principles 134
Learning to use psychological tools 135
Sociocultural interpretations of classroom processes 137
Summary 138
Recommended Readings 140
O Company of the Comp
PERCEPTUAL DEVELOPMENT 141
Vision 144
Attending to visual patterns 147
Identifying objects and events 152
Locating objects 161
Hearing 164
Attending to sounds 165
Identifying sounds 166
Auditory localization 170
Intersensory Integration 172
Attending 172
Identifying objects and events 173
Locating 174
Chronological Summary 174
Perception and Action 176
Perception guides action 176
Actions generate perceptual information 177
Summary 180
Recommended Readings 181
LANGUAGE DEVELOPMENT 183
General Issues Regarding Language Development 186
Is language special? 186
What is the biological basis of language? 188

Phonology 190

Development of knowledge about the sounds of language 190 Development of the ability to produce sounds 192

Meaning 195

Early words and word meanings 196

Development beyond the earliest words and word meanings 200

Grammar 208

Early grammatical development 209

Later grammatical development 211

Explanations of grammatical development 214

Communication 218

Communication through spoken language 218

Communication through signed language 220

Summary 223

Recommended Readings 224

7 MEMORY DEVELOPMENT 226

Children's Eyewitness Testimony 227

Encoding 228

Storage 229

Retrieval 230

Conclusions about children's eyewitness testimony 231

What develops in memory development? 232

Basic Processes and Capacities 232

Explicit and implicit memory 234

Association 235

Recognition 235

Imitation and recall 236

Insight, generalization, and integration of experiences 237

Inhibition 238

Processing capacity 240

Processing speed 241

Evaluation 242

Basic processes and the puzzle of infantile amnesia 243

Strategies 246

Searching for objects 247

Rehearsing 247

8

9

Organizing 248 Selective attention 249 Alternative explanations of strategic change 250 Evaluation 252 Metacognition 253 Explicit metacognitive knowledge 253 Implicit metacognitive knowledge 254 Evaluation 256 Content Knowledge 258 Effects on how much children remember 258 Effects on what children remember 259 Scripts 260 Content knowledge as an explanation for other memory changes 261 How does content knowledge aid memory? 262 Evaluation 263 What Develops When in Memory Development 263 Summary 265 Recommended Readings 267 CONCEPTUAL DEVELOPMENT 268 Conceptual Representations in General 271 Defining-features representations 272 Probabilistic representations 274 Theory-based representations 279 Development of Some Particularly Important Concepts 283 *Time* 283 Space 286 Number 292 Biological concepts 297 Summary 302 Recommended Readings 304 THE DEVELOPMENT OF SOCIAL COGNITION 305 Foundations of Social Cognition 307 Understanding of others 307 Understanding of the self 311

Knowledge about Mental States and Activities 313

Understanding of intention 315

Understanding of desires 317

Understanding of beliefs 318

Understanding of thinking 322

Understanding of knowing 323

Understanding of pretending 323

Understanding of fantasy 325

Sources of development of understanding of mind 328

Understanding of the Social World 331

Understanding of social rules 332

Understanding social categories and groups 333

Summary 338

Recommended Readings 340

10 PROBLEM SOLVING 341

An Overview of Problem Solving 343

Central themes 343

An example of the development of problem solving 349

Some Important Problem-Solving Processes 357

Planning 357

Causal inference 360

Analogy 363

Tool use 366

Scientific and logical reasoning 372

Summary 378

Recommended Readings 380

11 DEVELOPMENT OF ACADEMIC SKILLS 381

Mathematics 384

Single-digit arithmetic 384

Complex arithmetic 394

Algebra 396

Computer programming 399

Reading 400

The typical chronological progression 400

Prereading skills 401

Identifying individual words 403 Comprehension 409 Instructional implications 411

Writing 413

The initial drafting process 414
The process of revision 418

Summary 419 Recommended Readings 421

12 CONCLUSIONS FOR THE PRESENT; CHALLENGES FOR THE FUTURE 422

Current knowledge about what develops and how development occurs 424

Future issues 425

Current knowledge about change processes 428

Future issues 430

Current knowledge about early competence 431

Future issues 433

Current knowledge about differences between age groups 435

Future issues 437

Current knowledge about the effects of existing knowledge 439

Future issues 440

Current knowledge about the development of intelligence 443

Future issues 445

Current knowledge about social influences on children's thinking 448

Future issues 450

Current practical contributions about research on children's thinking 451

Future issues 453

Summary 455

Recommended Readings 456

REFERENCES 457

AUTHOR INDEX 497

SUBJECT INDEX 508