

Kathleen M. Galotti

edition five

COGNITIVE PSYCHOLOGY

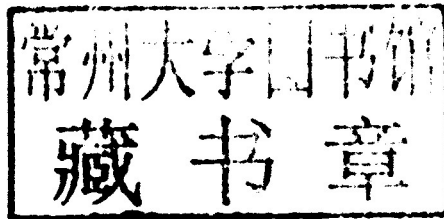
In and Out of the Laboratory



edition five

COGNITIVE PSYCHOLOGY

In and Out of the Laboratory



Kathleen M. Galotti

Carleton College



Los Angeles | London | New Delhi
Singapore | Washington DC



Los Angeles | London | New Delhi
Singapore | Washington DC

FOR INFORMATION:

SAGE Publications, Inc.
2455 Teller Road
Thousand Oaks, California 91320
E-mail: order@sagepub.com

SAGE Publications Ltd.
1 Oliver's Yard
55 City Road
London EC1Y 1SP
United Kingdom

SAGE Publications India Pvt. Ltd.
B 1/I 1 Mohan Cooperative Industrial Area
Mathura Road, New Delhi 110 044
India

SAGE Publications Asia-Pacific Pte. Ltd.
3 Church Street
#10 -04 Samsung Hub
Singapore 049483

Vice President and Editorial Director: Michele Sordi
Senior Acquisitions Editor: Reid Hester
Associate Editor: Eve Oettinger
Digital Resources Editor: Lauren Habib
Editorial Assistant: Sarita Sarak
Production Editor: Eric Garner
Copy Editor: Paula L. Fleming
Typesetter: C&M Digitals (P) Ltd.
Proofreader: Theresa Kay
Indexer: Kathleen Galotti and J. Naomi Linzer
Cover Designer: Scott Van Atta
Marketing Manager: Lisa Sheldon Brown
Permissions Editor: Karen Ehrmann
Art Director: Anthony Paular

Copyright © 2014 by SAGE Publications, Inc.

All rights reserved. No part of this book may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the publisher.

Printed in Canada

Library of Congress Cataloging-in-Publication Data

Galotti, Kathleen M.

Cognitive psychology in and out of the laboratory /
Kathleen M. Galotti. — Fifth Edition.

pages cm
Includes bibliographical references and index.

ISBN 978-1-4522-3032-0 (hbk. : alk. paper)

1. Cognitive psychology. 2. Cognition. I. Title.

BF201.G35 2013
153—dc23 2012043933

This book is printed on acid-free paper.

12 13 14 15 16 10 9 8 7 6 5 4 3 2 1

PREFACE

When I wrote the first edition of this book, more than 20 years ago, I had yet to become a mother and had just been tenured at Carleton College. I was still excited to get paid for doing a job that I loved enough to do for free. I still feel that way about what I do for a living—there is nothing better than teaching, and there are no better students than the Carleton kids I’ve grown so fond of. Many of them have influenced this and previous editions—in the examples I use to illustrate a concept, in their own independent projects that extend our understanding of those concepts, and in their feedback to me on previous editions. (They particularly enjoy finding my mistakes.)

Still, much has changed since 1992. I’ve birthed one son (now in college) and adopted an infant daughter from Vietnam (she’s now 11). The students and campus have changed as well—we’ve all become much more adept with and dependent on technology, for example. And the field of cognitive psychology has changed a lot, placing much more emphasis both on neuroscience and situated cognition as well as making advances in the basic research that informs our understanding of how people acquire and use information. These changes certainly merit periodic revisions of the book, and voilà!—we have the fifth edition!

Undergraduate students studying psychology have different reactions to the field of cognitive psychology. Some find it exciting and elegant, covering topics essential to understanding the human mind. Cognitive psychology, after all, raises questions about how the mind works—how we perceive people, events, and things; how and what we remember; how we mentally organize information; how we call on our mental resources to make important decisions. Other students find the field of cognitive psychology technical and “geeky”—filled with complicated models of phenomena far removed from everyday life.

My goal throughout the writing of all editions of this book has been to bridge that gap—to try to reach out to students who are in the latter camp to show them what this field offers to be excited about. I think much of the problem is due to the disconnection of laboratory phenomena from everyday life. Too often, cognition texts focus exclusively on the laboratory research, without showing students how that work bears on important, real-world issues of consequence. I hope when students finish reading this book, they see why cognitive psychologists are so passionate about their topic and their research.

A textbook author can choose either to be comprehensive and strive for encyclopedic coverage or to be selective and omit many worthwhile topics and studies. I hope I’ve struck a balance between these extremes but must confess I prefer the latter. This reflects my own teaching goals; I like to supplement textbook chapters with primary literature from journals. I have tried to keep chapters relatively short in the hope instructors will supplement the text with other readings. My firm belief is that the best courses are those in which instructors are enthusiastic about the material; the relative brevity of the text is intended to encourage instructors to supplement and customize it with added coverage on topics they find especially interesting.

My further hope is to encourage instructors and students alike to consider cognitive phenomena as having contexts that both foster and constrain their occurrence. Universals assumed or generalized from the laboratory do not always translate to every person in every situation. Too often, topics in cognitive psychology are presented as absolute, unchanging aspects of everyone’s experience. Recent work in developmental psychology, cross-cultural psychology, and individual differences strongly suggests that this presentation is, at best, oversimplification and, at worst, fiction. I hope newer work in cognitive psychology can retain its rigor and elegance but can frame questions and issues more inclusively, reflecting a recognition of the ways in which people and situations differ as well as share similarities.

ORGANIZATION OF THIS BOOK

Cognitive Psychology In and Out of the Laboratory is intended for a one-semester or one-term course for students who have already completed an introductory psychology course. We begin with a chapter that surveys the field and describes its research methods and paradigms. A chapter reviewing the structure and function of the brain comes next. These two introductory chapters are followed by chapters covering topics that would generally be regarded as

core aspects of cognition: perception, attention, and memory. The emphasis in these chapters is to review both the “classic” studies that define the field and the newer approaches that challenge long-standing assumptions. Next come chapters on knowledge representation and organization. These chapters center on questions of how we mentally represent and store the vast amounts of information we acquire throughout our lives. The next few chapters, covering topics in “higher-order” cognition, include discussions of language, problem solving, reasoning, and decision making.

It is in the last three chapters where this book departs most from a “prototypical” cognitive psychology textbook. Chapter 12 gives an overview of the development of cognition from infancy through adolescence. The last two chapters, on individual differences and cross-cultural approaches, include material not often covered in cognitive psychology courses. I feel strongly that these topics belong in a thorough examination of cognitive phenomena. Although traditional cognitive psychologists don’t always consider these issues in their work, I believe they ought to and, in the future, will.

All important material is integrated into the text rather than pulled out into boxes, asides, or extras that students might skip. This choice reflects my own experience as a student, as well as feedback from my students who say they find boxed material distracting and often treat it as optional. I hope that omitting these extras reinforces the message to students that their learning and mastery will be best enhanced through their own careful reading and note-taking rather than more superficial approaches such as highlighting or skimming.

NEW TO THIS EDITION

This is the most significant revision of the book to date. Not only has the book gone to a four-color presentation, but almost all of the photos, the entire interior design, and many of the figures are new. This gives the book a very new look and feel that help make it even more inviting to a diverse group of undergraduates.

Editorially, there has been much streamlining in this edition. Sections and chapters have been combined to improve the organization and to shorten the text. The 16 chapters of the fourth edition have been condensed into 14. The separate chapters on semantic memory and concepts and categorization have been integrated into one on knowledge representation. Similarly, the topics of reasoning and decision making, considered to be related examples of higher-order cognition, are now merged into a single chapter.

Throughout the book, discussion of recent work has been incorporated. To take just a few examples, there is now exposition of the configural superiority effect in Chapter 3 and the testing effect in Chapter 6 and coverage of the evaluation of work on learning styles in Chapter 13.

SUPPLEMENTS FOR STUDENTS AND INSTRUCTORS

STUDENT STUDY SITE: www.sagepub.com/galotticp5e

This open-access Student Study Site provides a variety of additional resources to build on students’ understanding of the book content and extend their learning beyond the classroom. Students will have access to the following resources:

- Each chapter in the text is accompanied by **self-quizzes**, which include 10–15 true/false and multiple-choice questions for students to independently assess their progress in learning course material.
- **eflashcards** reinforce student understanding and learning of key terms and concepts that are outlined in the book.
- Carefully selected **web resources** feature relevant content for use in independent and classroom-based exploration of key topics.
- **Video links** feature relevant interviews, lectures, personal stories, inquiries, and other content for use in independent or classroom-based explorations of key topics.
- Each chapter includes **audio links**, covering important topics and designed to supplement key points within the text.

INSTRUCTOR TEACHING SITE: www.sagepub.com/galotticp5e

A password-protected Instructor Teaching Site offers the following resources for each chapter:

- A **test bank** available in Microsoft Word offers a diverse set of test questions and answers to aid instructors in assessing students’ progress and understanding.

- **PowerPoint presentations** designed to assist with reviews and lectures highlight essential content, features, and artwork from the book.
- **Classroom activities and discussion questions** are provided to reinforce active learning.

ACKNOWLEDGMENTS

The actual writing of the first edition of this book was a 5-year project. However, the groundwork for the book evolved over 15 years, stretching back to my own undergraduate and graduate education. I was fortunate to have benefited from the rigorous and dynamic teaching of Blythe Clinchy at Wellesley College and of Jonathan Baron, John Sabini, and Henry and Lila Gleitman at the University of Pennsylvania. My education and thinking about cognitive and developmental issues continued to profit from interactions with colleagues at Carleton College. Colleagues in Carleton's Cognitive Studies program—especially Roy Elveton and Susan Singer—as well as colleagues from other disciplines, including Deanna Haunsperger, Steven Kennedy, Marion Cass, Martha Paas, Steven Kozberg, and others, have sharpened my pedagogical philosophy and helped me maintain a sense of humor and balance about the craziness that periodically invades Carleton.

One of the real joys of working at Carleton has been the privilege of teaching some incredibly talented, motivated, and energetic students. Students in my Cognitive Processes courses over the past 25 years have been kind enough to give me feedback on which chapters worked well and which ones didn't, and I thank them for their candor. Other current and former Carleton students have helped me with the mundane but necessary tasks of checking references and writing for permissions throughout all of the editions; they include April Anderson, Stephanie Aubry, Julie Greene, Andy Hebrank, Simin Ho, Allison Logeman, Diane Mistele, Matt Maas, Kitty Nolan, Emily Snyder, Scott Staupe, Jennifer Tourjé, Elizabeth White, and James Whitney. My current and former administrative assistants, Marianne Elofson, Pamela Gaggioli, Ruby Hagberg, and Lorie Tuma, all have helped with one or more of these editions and just generally make the workplace much more inviting than it would otherwise be.

Several current and former students posed for some of the photographs in this edition, including Zoe Cohen, Zack Delpier, Jonathan Rowe, Jane Tandler, and Jessa Youso. Because my students have contributed so much to my thinking and professional development, it is special to me to be able to make them a tangible part of the book!

Carleton College has supported this book through various sabbaticals and faculty development grants. Then Dean of the College Roy Elveton enthusiastically endorsed and funded this endeavor from the start. A dean can really make a difference in a faculty member's professional development, and Roy often went above and beyond the call of duty for me and several of my talented colleagues at Carleton during his brief administrative tenure. His belief in my ability to write this book is something I will always be grateful for. As a colleague in our Cognitive Science Program and the Philosophy Department, Roy remains a most trusted mentor.

I owe a special debt to Vicki Knight, editor of the first and third editions. Her wise counsel, sharp sense of humor, love of animals, and excellent taste in restaurants made our collaboration a very engaging one. I never would have been able to finish the first book without her, and without the first book, there would not have been any subsequent ones! For the fourth edition, Michele Sordi took the reins, and I am again extremely fortunate to have her as editor for this edition (even though the book—and she—have migrated to a new publisher). As I've gotten to know Michele, I've been impressed by her good communication, her willingness to listen and negotiate, and her savvy knowledge of current trends in textbook publishing.

For this edition, I also enjoyed excellent collaboration with Eve Oettinger, Sarita Sarak, and Reid Hester. I can't say enough about how great they are to work with! They are on top of a myriad of details, they are patient as I try to learn a new system; they are fun to talk with on the phone, and they are so highly competent at their jobs it is almost frightening. Eve has been my go-to contact at Sage Publishing from the first set of reviews through production of this edition, and she's a real gem.

The cover designer, Scott Van Atta, worked with my plea to use the Robert Neffson painting, integrating text and elements beautifully. Paula Fleming is, no kidding, the best copy editor I've ever had, with eagle eyes and an attention to detail that never fails to astound. I like to believe her undergraduate experiences at Carleton have a lot to do with her excellence. I was told ahead of time that I would really enjoy working with Eric Garner, my production editor—and the prediction was spot on. I admire his ability to juggle multiple facets of a project, see the

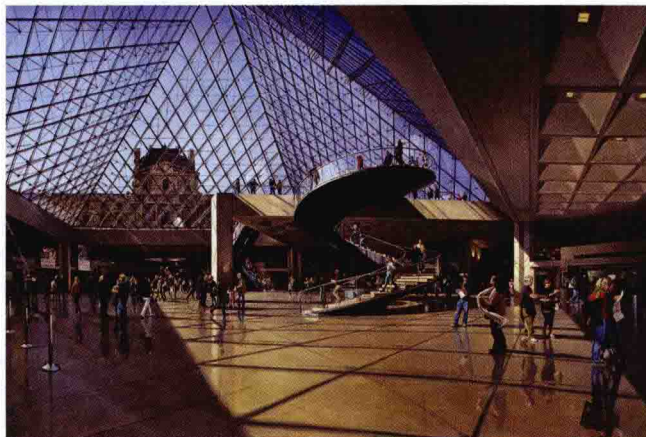
trees and the forest, and stay in a good mood throughout the process. Anthony Paular, the art director, has shown extraordinary patience with my complete lack of artistic ability and my lack of good vocabulary to describe the new figures I envision in my head.

Reviewers of past editions of the book, who have also made important contributions, include for the first edition Sharon Armstrong, Central College (Pella, Iowa); Terry Au, University of California, Los Angeles; Ira Fischler, University of Florida; John H. Flowers, University of Nebraska–Lincoln; Margery Lucas, Wellesley College; Robert Seibel; Steven M. Smith, Texas A&M University; and Margaret Thomas, University of Central Florida; and for the second edition Brenda J. Byers, Arkansas State University; Robert Campbell, Clemson University; L. Mark Carrier, Florida State University; David G. Elmes, Washington and Lee University; Ira Fischler, University of Florida; John H. Flowers, University of Nebraska–Lincoln; Nancy Franklin, SUNY–Stony Brook; Peter Graf, University of British Columbia; Morton A. Heller, Winston-Salem State University; Lorna Jarvis, Hope College–Peale Science Center; Douglas Johnson, Colgate University; James Juola, University of Kansas; Richard Metzger, University of Tennessee; John Pani, University of Louisville; Aimee M. Surprenant, Purdue University; Joseph Thompson, Washington and Lee University; and Lori R. Van Wallendael, University of North Carolina. For the third edition, I received many very constructive and helpful suggestions and insights for strengthening the book from Lisa Abrams, University of Florida; Nancy Alvarado, California State Polytechnic University, Pomona; Jeffrey Anastasi, Arizona State University; Krystine Batcho, Le Moyne College; Stephanie Buchert, Kent State University; Walt Chromiak, Dickinson College; John Flowers, University of Nebraska–Lincoln; Allen Keniston, University of Wisconsin–Eau Claire; Kristy Nielson, Marquette University; Evelyn Schaefer, University of Winnipeg; Elizabeth Spievak, Hanover College; Mark Stewart, Willamette University; Brian Sundermeier, University of Minnesota–Minneapolis; and Lori Van Wallendael, University of North Carolina–Charlotte. Fourth edition reviewers are Sue Astley, Cornell College; Robert Boughner, Rogers State University; Laura Bowman, Central Connecticut State University; Myra Fernandes, University of Waterloo; Allen Keniston, University of Wisconsin; James MacDougall, Eckard College; Chuck Robertson, North Georgia College & State University; Linda Rueckert, Northeastern Illinois University; Dennis Shaffer, Ohio State University; Alycia Silman, Wake Forest University; Ami Spears, Mercer University; and Frank Yeatman, Stonehill College.

I have always benefitted from the wise comments of good reviewers, but I have to say that the set of prerevision reviews Sarita Sarak obtained for me this time were truly the best I've ever seen. The following reviewers all provided useful commentary and feedback on portions of this fifth edition at various stages: Michael Dodd, University of Nebraska–Lincoln; Rhiannon E. Hart, Rochester Institute of Technology; Kendall J. Eskine, Loyola University New Orleans; Conor T. McLennan, Cleveland State University; Stephen Dopkins, The George Washington University; Ruth Tincoff, Bucknell University; and Rolf Nelson, Wheaton College.

The remaining gaps and shortcomings in the book reflect my own stubbornness.

SAGE would like to thank Robert Neffson for the permission to use his beautiful painting for the book's cover and several interior pages:



LOUVRE, PYRAMID, oil/linen, 44" x 64", private collection, by Robert Neffson

ABOUT THE AUTHOR

Kathleen M. Galotti holds a BA in psychology and economics from Wellesley College, as well as an MA and a PhD in psychology and an MSE in computer and information sciences from the University of Pennsylvania. At Carleton College she holds the title Professor of Cognitive Science and serves as the director of that interdisciplinary program, which she helped establish in 1989. She also is a former chair of the Psychology Department. She teaches courses in cognitive and developmental psychology and cognitive science and has also taught courses in statistics and introductory psychology.

Dr. Galotti's research centers on the development of reasoning and decision-making skills from the preschool period through adulthood and on the styles with which adolescents and adults plan for the future, make important life commitments, and learn new information. Her research has been funded through the National Science Foundation, the Spencer Foundation, and the National Institutes of Health. She is the author of *Making Decisions That Matter: How People Face Important Life Choices* (Erlbaum, 2002), as well as the textbook *Cognitive Development: Infancy Through Adolescence* (Sage, 2011). She has also authored or co-authored dozens of articles in peer-reviewed journals.

Dr. Galotti is the parent of two children, Timothy and Kimberlynn, and spends much of her time enjoying their youthful exuberance and energy. In her spare time, she raises and trains Bernese mountain dogs and shows them in competition in licensed obedience trials, and she is an approved obedience and rally judge for the American Kennel Club.

1

COGNITIVE PSYCHOLOGY

History, Methods, and Paradigms

CHAPTER OUTLINE

Influences on the Study of Cognition

- Structuralism
- Functionalism
- Behaviorism
- Gestalt Psychology
- The Study of Individual Differences
- The “Cognitive Revolution” and the Birth of Cognitive Science
- General Points

Research Methods in Cognitive Psychology

- Experiments and Quasi-Experiments
- Naturalistic Observation
- Controlled Observation and Clinical Interviews
- Introspection
- Investigations of Neural Underpinnings
- General Points

Paradigms of Cognitive Psychology

- The Information-Processing Approach
- The Connectionist Approach
- The Evolutionary Approach
- The Ecological Approach
- General Points

This book is about cognitive psychology—that branch of psychology concerned with how people acquire, store, transform, use, and communicate information (Neisser, 1967). Put differently, cognitive psychology deals with our mental life: what goes on inside our heads when we perceive, attend, remember, think, categorize, reason, decide, and so forth.



BRIEF CONTENTS

Preface	xiii
About the Author	xvii
CHAPTER 1: Cognitive Psychology: History, Methods, and Paradigms	1
CHAPTER 2: The Brain: An Overview of Structure and Function	24
CHAPTER 3: Perception: Recognizing Patterns and Objects	38
CHAPTER 4: Attention: Deploying Cognitive Resources	66
CHAPTER 5: Working Memory: Forming and Using New Memory Traces	98
CHAPTER 6: Retrieving Memories From Long-Term Storage	120
CHAPTER 7: Knowledge Representation: Storing and Organizing Information in Long-Term Memory	158
CHAPTER 8: Visual Imagery and Spatial Cognition	186
CHAPTER 9: Language	214
CHAPTER 10: Thinking and Problem Solving	250
CHAPTER 11: Reasoning and Decision Making	278
CHAPTER 12: Cognitive Development Through Adolescence	320
CHAPTER 13: Individual Differences in Cognition	348
CHAPTER 14: Cognition in Cross-Cultural Perspective	374
Glossary	407
Credits and Sources	425
References	431
Author Index	457
Subject Index	465

DETAILED CONTENTS

Preface	xiii
About the Author	xvii
CHAPTER 1 COGNITIVE PSYCHOLOGY: <i>History, Methods, and Paradigms</i>	1
Influences on the Study of Cognition	2
Structuralism	3
Functionalism	4
Behaviorism	5
Gestalt Psychology	6
The Study of Individual Differences	7
The "Cognitive Revolution" and the Birth of Cognitive Science	8
General Points	11
Research Methods in Cognitive Psychology	12
Experiments and Quasi-Experiments	12
Naturalistic Observation	13
Controlled Observation and Clinical Interviews	14
Introspection	14
Investigations of Neural Underpinnings	15
General Points	15
Paradigms of Cognitive Psychology	15
The Information-Processing Approach	15
The Connectionist Approach	17
The Evolutionary Approach	18
The Ecological Approach	19
General Points	20
CHAPTER 2 THE BRAIN: <i>An Overview of Structure and Function</i>	24
Structure of the Brain	25
The Hindbrain and Midbrain	25
The Forebrain	26
Localization of Function	27
Faculty Psychology and Phrenology	28
Studies of Aphasia and Other Mapping Techniques	28
Lateralization of Function	29
Studies of Split-Brained Patients	30
Brain Imaging Techniques	31
CAT (CT) Scans	32
Magnetic Resonance Imaging (MRI)	32
Positron Emission Tomography (PET)	33
Functional Magnetic Resonance Imaging (fMRI)	33
Other Brain-Recording Techniques	34
Electroencephalography (EEG)	34
Event-Related Potential (ERP)	34
Transcranial Magnetic Stimulation (TMS)	35





CHAPTER 3 PERCEPTION: <i>Recognizing Patterns and Objects</i>	38
Gestalt Approaches to Perception	40
Bottom-Up Processes	45
Template Matching	46
Featural Analysis	47
Prototype Matching	50
Top-Down Processes	52
Perceptual Learning	54
The Word Superiority Effect	54
A Connectionist Model of Word Perception	56
Direct Perception	57
Disruptions of Perception: Visual Agnosias	60
CHAPTER 4 ATTENTION: <i>Deploying Cognitive Resources</i>	66
Selective Attention	68
Bottleneck Theories	70
Spotlight Approaches	74
Schema Theory	75
Inattentional Blindness	76
Neural Underpinnings of Attention	79
Networks of Visual Attention	80
Event-Related Potentials and Selective Attention	81
Automaticity and the Effects of Practice	81
The Stroop Task	82
Automatic Versus Attentional (Controlled) Processing	83
Feature Integration Theory	86
Attentional Capture	88
Divided Attention	89
Dual-Task Performance	89
The Attention Hypothesis of Automatization	91
Divided Attention Outside the Laboratory:	
Cell Phone Usage While Driving	92
CHAPTER 5 WORKING MEMORY:	
<i>Forming and Using New Memory Traces</i>	98
Traditional Approaches to the Study of Memory	99
Sensory Memory	101
Iconic Memory	102
Echoic Memory	103
Short-Term Memory	104
Capacity and Coding	105
Retention Duration and Forgetting	106
Retrieval of Information	108
Working Memory	110
Executive Functioning	114
Neurological Studies of Memory Processes	115

CHAPTER 6 RETRIEVING MEMORIES FROM LONG-TERM STORAGE

Aspects of Long-Term Memory

- Capacity 121
- Coding 122
- Retention Duration and Forgetting 122
- Retrieval of Information 126
 - The Use of Mnemonics* 126
 - Other Retrieval Principles* 128
 - The Testing Effect* 130

Subdivisions of Long-Term Memory

- Semantic Versus Episodic Memory 130
- Implicit Versus Explicit Memory 132
- Declarative Versus Procedural Memory 134

The Levels-of-Processing View

The Reconstructive Nature of Memory

- Autobiographical Memory 140
- Flashbulb Memories 142
- Eyewitness Memory 144
- The Recovered/False Memory Debate 146

Amnesia

- Anterograde Amnesia 151
- Retrograde Amnesia 152

CHAPTER 7 KNOWLEDGE REPRESENTATION:

Storing and Organizing Information in Long-Term Memory

Organizing Knowledge

- Network Models 160
- ACT Models 164
- Connectionist Models 166

Forming Concepts and Categorizing New Instances

- The Classical View of Concepts and Categorization 169
- The Prototype View of Concepts and Categorization 171
- The Exemplar View of Concepts and Categorization 175
- The Schemata/Scripts View of Concepts and Categorization 177
- The Knowledge-Based View of Concepts and Categorization 180

120

121

130

135

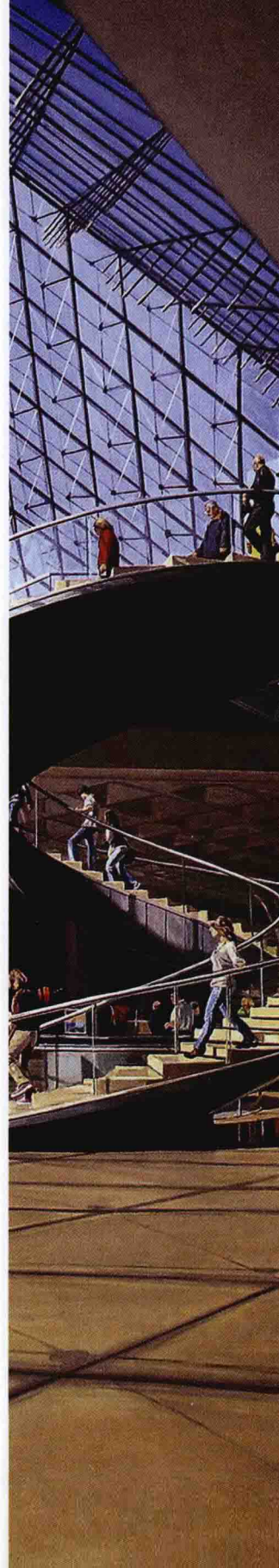
138

150

158

159

168

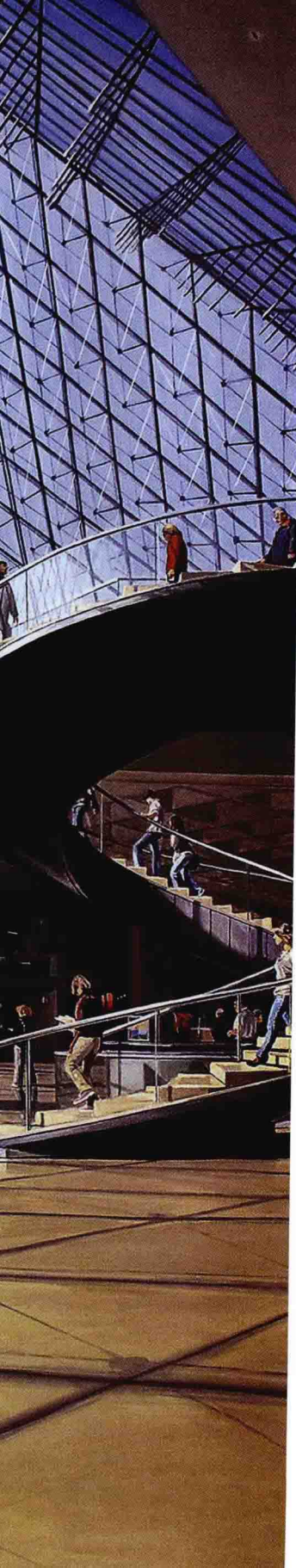




CHAPTER 8 VISUAL IMAGERY AND SPATIAL COGNITION	186
Codes in Long-Term Memory	187
The Dual-Coding Hypothesis	188
The Relational-Organizational Hypothesis	188
Empirical Investigations of Imagery	189
Mental Rotation of Images	190
Scanning Images	193
The Nature of Mental Imagery	196
Principles of Visual Imagery	197
<i>Implicit Encoding</i>	197
<i>Perceptual Equivalence</i>	197
<i>Spatial Equivalence</i>	198
<i>Transformational Equivalence</i>	199
<i>Structural Equivalence</i>	199
Critiques of Mental Imagery Research and Theory	200
<i>Tacit Knowledge and Demand Characteristics</i>	200
<i>The Picture Metaphor</i>	201
<i>Propositional Theory</i>	203
Neuropsychological Findings	205
Spatial Cognition	206
CHAPTER 9 LANGUAGE	214
The Structure of Language	216
Phonology	218
Syntax	220
Semantics	223
Pragmatics	224
Language Comprehension and Production	225
Speech Perception	225
Speech Errors in Production	228
Sentence Comprehension	229
Comprehending Text Passages	232
Story Grammars	236
Gricean Maxims of Conversation	237
Language and Cognition	241
The Modularity Hypothesis	241
The Whorfian Hypothesis	242
Neuropsychological Views and Evidence	245

CHAPTER 10 THINKING AND PROBLEM SOLVING	250
Classic Problems and General Methods of Solution	253
Generate-and-Test Technique	253
Means–Ends Analysis	254
Working Backward	256
Backtracking	256
Reasoning by Analogy	258
Blocks to Problem Solving	260
Mental Set	260
Using Incomplete or Incorrect Representations	262
Lack of Problem-Specific Knowledge or Expertise	264
The Problem Space Hypothesis	266
Expert Systems	268
Finding Creative Solutions	270
Unconscious Processing and Incubation	270
Everyday Mechanisms	271
Critical Thinking	272
CHAPTER 11 REASONING AND DECISION MAKING	278
Reasoning	279
Types of Reasoning	281
Deductive Reasoning	281
Propositional Reasoning	282
Syllogistic Reasoning	286
Inductive Reasoning	288
Analogical Reasoning	289
Hypothesis Testing	290
Everyday Reasoning	291
Decision Making	293
Setting Goals	295
Gathering Information	295
Structuring the Decision	296
Making a Final Choice	296
Evaluating	296
Cognitive Illusions in Decision Making	296
Availability	297
Representativeness	300
Framing Effects	301
Anchoring	302
Sunk Cost Effects	303
Illusory Correlation	303
Hindsight Bias	304
Confirmation Bias	305
Overconfidence	306





Utility Models of Decision Making	307
Expected Utility Theory	308
Multiattribute Utility Theory	310
Descriptive Models of Decision Making	313
Image Theory	313
Recognition-Primed Decision Making	313
Neuropsychological Evidence on Reasoning and Decision Making	314
CHAPTER 12 COGNITIVE DEVELOPMENT THROUGH ADOLESCENCE	320
Piagetian Theory	322
General Principles	322
Stages of Development	323
<i>The Sensorimotor Stage</i>	323
<i>The Preoperational Stage</i>	325
<i>The Concrete Operations Stage</i>	327
<i>The Formal Operations Stage</i>	328
Reactions to Piaget's Theory	329
Non-Piagetian Approaches to Cognitive Development	330
Perceptual Development in Infancy	331
Toddlers' Acquisition of Syntax	332
Preschoolers' Use of Memorial Strategies	335
The Development of Reasoning Abilities in Middle and Late Childhood	336
Some Post-Piagetian Answers to the Question "What Develops?"	338
Neurological Maturation	338
Working-Memory Capacity and Processing Speed	339
Attention and Perceptual Encoding	340
The Knowledge Base and Knowledge Structures	341
Strategies	343
Metacognition	344
CHAPTER 13 INDIVIDUAL DIFFERENCES IN COGNITION	348
Individual Differences in Cognition	349
Ability Differences	349
Cognitive Styles	353
Learning Styles	355
Expert/Novice Differences	357
The Effects of Aging on Cognition	358
Gender Differences in Cognition	359
Gender Differences in Skills and Abilities	361
<i>Verbal Abilities</i>	362
<i>Visuospatial Abilities</i>	363
<i>Quantitative and Reasoning Abilities</i>	366
Gender Differences in Learning and Cognitive Styles	368
<i>Motivation for Cognitive Tasks</i>	368
<i>Connected Learning</i>	370

CHAPTER 14 COGNITION IN CROSS-CULTURAL PERSPECTIVE

Examples of Studies of Cross-Cultural Cognition

Cross-Cultural Studies of Perception 378

Picture Perception 379

Visual Illusions 382

Cross-Cultural Studies of Memory 383

Free Recall 383

Visuospatial Memory 385

Cross-Cultural Studies of Categorization 386

Cross-Cultural Studies of Reasoning 389

Cross-Cultural Studies of Counting 392

Effects of Schooling and Literacy

Situated Cognition in Everyday Settings

Glossary

Credits and Sources

References

Author Index

Subject Index

374

378

395

400

407

425

431

457

465

