# COGNITIVE PSYCHOLOGY

## THEORY, PROCESS, AND METHODOLOGY

## Dawn M. McBride

Illinois State University

# J. Cooper Cutting \

Illinois State University



Los Angeles | London | New Delhi Singapore | Washington DC | Boston

Preface		xvii
Acknowledgments		xix
About the Authors		xxi
Chapter 1 ° introduction to Cognitive Psychology		1
Chapter 2 o cognitive Neuroscience		21
Chapter 3 ° Perception		43
Chapter 4 0 Attention		69
Chapter 5 o Memory Structures and Processes		95
Chapter 6 ° Long-Term Memory: influences on Retrieval		127
Chapter 7 ° Memory Errors		151
Chapter 8 ° imagery		181
Chapter 9 ° Language		203
Chapter 10 ° Concepts and Knowledge		239
Chapter 11 ° Problem Solving		267
Chapter 12 ° Reasoning and Decision Making		297
Glossary	١	329
References		333
Authoiindex		349
Subject index		357

# **Detailed Contents**

Preface		xvii
Acknowledgments		xix
About the Authors		xxi
Chapter 1 • Introduction to Cognitive Psychology		
Introduction: Cognition and Shopping		
What IsCognitive Psychology?		
Development of Cognitive Psychology		
Current Approaches to the Study of Cognition		
Representationalism		
Embodied Cognition		6
Biological Perspective		6
Research in Cognitive Psychology		7
The Scientific Method		7
Research Methodologies		8
Case Studies		8
Correlational Studies		9
Experimental Studies		10
Commonly Used Measures Within Cognitive Psychology		12
Accuracy		13
Response Time		13
Beyond Accuracy and Response Time		14
Thinking About Research		15
Chapter Review-		16
Summary		16
Chapter Quiz		17
Key Terms	»	18
Stop and Think Answers	%	18
Chapter 2 • Cognitive Neuroscience		21
Introduction: Knowledge From Cognitive Deficits		22
Clinical Case Studies in Cognitive Neuroscience		22
Structure of the Nervous System		25
The Neuron		25
The Brain		23
Measures in Cognitive Neuroscience		28
Single-Cell Recording		29
Electroencephalography (EEG)		29

Magnetoencephalography (MEG)	31
Electrical Stimulation/Inhibition of Neurons	31
Brain ImagingTechniques	32
Magnetic Resonance Imaging (MRI)	32
Positron Emission Tomography (PET)	32
Functional MagneticResonance Imaging(fMRI)	32
Recording Activity in the Living Brain	33
Can AllMental ProcessesBe Explained in Terms of Brain Activity?	36
Thinking About Research	37
Chapter Review	39
Summary	39
Chapter Quiz	39
KeyTerms	40
Stop and Think Answers	40

Chapter 3 • Perception		43
Introduction: Perception in Everyday Tasks		44
Sensory Systems: How Sensations Become Perceptions		44
Approaches to the Study of Perception		46
Computational Approaches		46
Ponzo Illusion Activity		49
Visual Perspective Illusion Activity		49
Top-Down Processing Activity		49
Gestalt Approaches		50
Triangle and Circle Activity		50
Similarity Activity		51
Proximity Activity		51
Principle of Pragnanz Activity		52
What Do You See Activity		53
Figure Ground Activity		53
Configured Superiority Activity	^	53
Perception/Action Approaches	^	54
Walking Through a Room Activity		55
Comparison of Approaches to Perception: Motion Perception		60
* Thinking About Research		62
Chapter Review		64
Summary		64
Chapter Quiz		65
KeyTerms		65
Stop and Think Answers		65

#### **Chapter 4 • Attention**

Introduction: How We PayAttention Views of Attention Attention asan Information Filter Attention as a Limited Resource Attention as a Spotlight Attention as a Mental Capacity Attention as a Feature Binder Visual Search Activity How Attention AffectsOur Perceptions The Gorilla in the Room: Inattentional Blindness Asking Directions Activity Noticing Changes Activity Incompatibilities Tax Attention: The Simon Effect Simon Effect Activity Effects of Automatic Processes on Attention: The Stroop Task Stroop Effect Activity Automatic and Controlled Processing: A Cognitive Dichotomy **Thinking About Research** Chapter Review Summary Chapter Quiz Key Terms Stop and Think Answers

#### Chapter 5 • Memory Structures and Processes

Introduction: The Pervasivenessof Memory Memory as Structure or Process Encoding, Storage, and Retrieval Modal Model of Memory Sensory Memory Short-Term Memory (STM) *Memory Span Activity* Capacity of STM Duration of STM Long-Term Memory (LTM) Types of LTM Memories The Working-Memory (WM) System Baddeley s Model *Visuospatial Sketchpad Phonological Loop* 

Word Length Effect Activity	111
Episodic Buffer	112
Central Executive	113
Beyond Baddeleys Model	114
Retrieval FromLong-Term Memory	114
Recall Tasks	115
Recognition Tasks	115
Comparing Recall and Recognition Tasks	116
Implicit-Memory Tasks	117
Prospective-Memory Tasks	117
Memory Overview	119
'Thinking About Research	119
Chapter Review	120
Summary	120
Chapter Quiz	121
KeyTerms	122
Stop and Think Answers	122

Chapter 6 • Long-Term Memory: Influences on Retrieval	127
Introduction: Superior Memory	128
Why We Forget	128
Encoding Effects	130
Levels of Processing	131
Levels of Processing Effect Activity	131
Spacing Effects	132
Serial Position Curve	133
Retrieval Effects	135
The Testing Effect	135
Using the Testing Effect	136
Encoding-Retrieval Interactions	137
Environmental ContextEffects	137
Mood-Dependent Effects	139
Transfer-Appropriate Processing	140
Summary of Encoding-Retrieval Interactions	142
Mnemonics	143
Image Mnemonic Activity	143
Method of LociActivity	144
Superior Autobiographical Memory	144
Thinking About Research	145
Chapter Review	147
Summary	147
Chapter Quiz	147

Key Terms Stop and Think Answers

#### **Chapter 7 • Memory Errors**

Introduction: The Inaccuracy of Memory The Seven "Sins" of Memory Error #1Transience Error #2 Absentmindedness Error #3Blocking Error #4Source Misattribution Error #5Suggestibility Error #6Bias Error #7Persistence Summary The ReconstructiveNature of Memory Bartletts Studies Identify the Task Activity Schemata and Scripts Memory Errors in the Laboratory The DRM Procedure False Memory Activity Eyewitness MemoryStudies Applications of Eyewitness Memory Research Summary and Conclusions Clinical Memory Failures-Amnesia Types of Amnesia Amnesia and Implicit Memory Amnesia in Alzheimer's Disease Amnesia in Childhood **Thinking About Research** Chapter Review Summary Chapter Quiz Key Terms Stop and Think Answers

#### Chapter 8 • Imagery

Introduction: Visual Imageryin EverydayLife •MentaMmages and Cognition The Debateon Propositional and Spatial Representations Imagery and Memory Imagery and Memory Activity

The PictureSuperiorityEffect	186
The Concreteness Effect'	187
The Bizarreness Effect	188
Bizarreness Effect Activity	188
Imagery and Mnemonics	189
The DarkSide of Imagery	190
Imagery in Problem Solving and Wayfinding	190
Pick a Card Activity	190
Imagery in Problem Solving	191
Pulley System Problem Activity	191
Imagery in Wayfinding	193
Nonvisual Imagery	193
Imagery and Simulation	196
Thinking About Research	197
Chapter Review	198
Summary	198
Chapter Quiz	199
KeyTerms	199
Stop and Think Answers	199

Chapter 9 • Language		203
Introduction: A Simple Conversation		204
What IsLanguage?		205
Structure of Language		205
Language Form: Phonology and Orthography		205
Morphology: Language Interface of Form, Synto	ax, and Semantics	206
Syntax (Grammar)		206
Semantics (Meaning)		208
Pragmatics (UsingLanguage)		208
ListeningforNonliteral MeaningActivity		208
How Do We Process Language?		209
Language Comprehension	*	210
Listening for Ambiguity Activity	^	210
Language Perception		211
Using Top-Down Information Activity		212
Lexical Recognition and Access		213
Interpreting Sentences: Syntactic Analysis		215
Interpreting Syntax Activity		215
Beyond the Sentence: Texts and Discourse		217
Language Production		220
Making Mistakes: Speech Errors		221

Listening to Speech Activity		221
Separation of Semantics, Syntax, and Form		222
Dialogue: Productionand Comprehension Together		225
Acquiring Language		226
Typical Language Development		226
Nature or Nurture: Mechanisms for Learning Words and Syntax		228
Human Languageand AnimalCommunication		230
Comparing Human Language to Animal Communication		230
Attempts to Teach Animals Human Language		231
Thinking About Research		232
Chapter Review		233
Summary .		233
Chapter Quiz		234
Key Terms		235
Stop and Think Answers		235
Chapter 10 • Concepts and Knowledge		239
Introduction: Game Night		240
What AreConcepts?		241
The Classical Approach: Concepts as Definitions		241
Theoretical Problems With Definitions as Concepts		241
What Isa Chair? Activity		241
Empirical Problems With Definitions as Concepts		242
Birds Activity		242
Alternative Approaches to Concepts		244
Prototype Approach		244
Exemplar Approach		246
Concepts Based on World Knowledge Approach		249
Other Alternative Approaches to Concepts		252
Organizing Our Concepts		252
Conceptual Hierarchies		252
Basic-Level Concepts		253
Basic Concepts Activity	*	253
Organizational Approaches	$\mathbf{X}$	254
Stored-Network Approaches		254
Feature Comparisons Approaches		255
Neuroscience-Inspired Approaches		255
Summary of Conceptual Organization		256
Using Concepts: Beyond Categorization		257
Category Induction		258
Stereotypes		258
Expertise		259
Conceptual Combination		260

The Future of Research and Theory of Concepts	260
Thinking About Research	261
Chapter Review	263
Summary	263
Chapter Quiz	263
Key Terms	264
Stop and Think Answers	264

Chapter 11 • Problem Solving	267
Introduction: Problem Solving in Daily Life	268
Recognizing and Identifying a Problem	268
Defining and Representing Problems	270
Moving Pennies Activity	270
Dominos and a Chessboard Activity	270
Functional Fixedness	272
Two Strings Problem Activity	272
Developing Solutions to Problems: Approaches and Strategies	273
Sudoku Activity	273
Associationist Approach: Trial-and-Error Strategy	274
Gestalt Approaches	274
Insight	275
9-Dot Problem Activity	275
Mental Set	276
Cups and Water Problem Activity	276
Analogical Transfer	277
Radiation Problem Activity	Til
Summary	279
Problem Solving as Problem Space Searches	280
Means-Ends Strategy	281
Hill-Climbing Strategy	282
Working-Backward Strategy	282
Summary of Approaches and Strategies	283
Allocating Mental Resources for Solving the Problem »	283
Matchstick Math Activity	285
Expertise	286
Experts Versus Novices	287
Perception and Attention	287
Memory	287
Better Strategies	287
Becoming aBetter ProblemSolver	288
Thinking About Research	289
Chapter Review	291
Summary	291

Chapter Quiz Key Terms Stop and Think Answers

#### Chapter 12 • Reasoning and Decision Making

Introduction: A Night at the Movies Deductive Reasoning Syllogistic Reasoning Syllogisms Activity Conditional Reasoning Conditional Arguments Activity Wason 4-Card Task Activity Adapted Wason4-Card Task Activity Deductive-Reasoning Approaches **Conclusion Interpretation Approaches** Representation-Explanation Approaches Surface Approaches Combining These Approaches: Dual-Process Framework Approach Inductive Reasoning Types of Inductive Reasoning Analogical Reasoning Category Induction Causal Reasoning Hypothesis Testing Hypothesis TestingActivity Counter/actual Thinking Everyday Reasoning Making Decisions A General Model of Decision Making Ideal Decision Making: A Normative Model Heuristics and Biases Representativeness Bias Tom's JobActivity Availability Bias FramingBias s Descriptive Decision-MakingApproaches Prospect Theory **Dual-Process Framework** Future Advances in Theories of Reasoning and Decision Making **Thinking About Research** 

Chapter Review

Summary

Chapter Quiz Key Terms Stop and Think Answers

Glossary References Author Index Subject Index