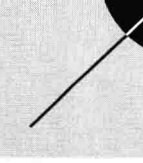


Cognitive Psychology

SECOND EDITION



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Cognitive Psychology

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Preface

For most of us, our everyday experience seems quite unremarkable. We move about pursuing goals, interacting with others, and responding to objects and events in our environment. Sometimes we are surprised, but for the most part we have no difficulty making sense of the world. When we look beneath the surface of everyday experience, however, we see that what our cognitive system accomplishes is nothing short of amazing. In this book we will examine the what, why, and how of these accomplishments. Cognitive psychology is the study of the human mind; its domain includes questions concerning how people perceive the world, remember information, use knowledge, understand language, learn, reason, and solve problems. In each area one can show that an intelligent organism that objectively considers all possibilities is doomed to failure. It will not be able to learn a language, solve complex problems, or understand events in the world as meaningful. For example, as we shall see in the chapter on perception, *any* visual input is consistent with an unlimited number of interpretations. The challenging question is how the perceptual system functions such that we are normally unaware of any ambiguity. Indeed, our guesses about the world are so accurate that our experience is of simply seeing the world as it is, more or less directly.

Ambiguity is actually a quite general problem in cognition. In a sense, we have organized this entire book around challenges posed by ambiguity. The world continually confronts us with situations that offer too little information about what is going on and too many possibilities about what to do. Rather than try to consider all the possibilities, we come prepared with certain biases or expectations that greatly influence what we consider and how we act. We may not experience ambiguity because we do not consider alternative possibilities. Expectations or “constraints” occur in all facets of cognition and, we believe, are responsible for the successful performance of the cognitive system. Finally, one should note that constraints represent an adaptation to our world and, therefore, should be thought of more as “guiding principles” rather than limitations. Although we often compare minds to computers, it is critically important to realize that our cognitive system is *not* a general-purpose computing device. Instead, our cognitive resources are exquisitely “tuned” to the demands of our unique environment.

We believe that ambiguity and responses to it provide some broad organizing themes. We hope that the framework we describe will allow the student to better appreciate not just each individual accomplishment of the mind (perception, language, and so on), but some basic commonalities that cut across these accomplishments.

In elaborating these themes, we bring in evidence from a variety of areas of psychology, as well as from other cognitive sciences. The book contains many sections explaining research on artificial intelligence (AI), connectionist or parallel distributed processing (PDP) models, and cognitive neuroscience. We believe that our unifying themes grow in part out of developments in other cognitive science disciplines and that cognitive science students from outside psychology will be able to learn about cognitive psychology from this book. We have not shied away from presenting technical details in many sections. Some discussions are complex, but we believe that current work in cognitive psychology requires detailed analysis. At the same time, we have tried to be careful about allowing the reader to understand the issues and their implications even without a grasp of the technical details.

To further help in giving some structure to the research areas, the book is organized into five large sections. The first section (Chapters 1 and 2) provides an overview of the themes and the approaches to studying the mind. The second section (Chapters 3, 4, and 5) examines how information is acquired, including basic learning processes, attention, and perception. The third section (Chapters 6, 7, 8, and 9) addresses fundamental issues of representation of knowledge and its use, with investigation of imagery and memory. The fourth section (Chapters 10, 11, and 12) provides information about language and concepts, including coverage of language comprehension, acquisition, and production. The final section (Chapters 13, 14, 15, and 16) addresses thinking, with information on reasoning, problem solving, expertise, creativity, and decision making.

This book is intended for a one-semester course in cognitive psychology. In our experience, it is not possible to cover all of the material in a single quarter. Although we have attempted to place the chapters in logical sequence, other orderings are possible. It is probably important that the introductory chapter outlining the themes be read first. Other than that it would probably be best to read 7 before 8 and 14 before 15. Although we tie together material across chapters, the overall themes permit an instructor to skip certain early chapters (e.g. Learning, Perception) without too much loss of continuity. In addition, non-psychology students interested in cognitive science may get an overview of cognitive psychology by reading selected chapters related to their interests.

The second edition represents a major revision. Most importantly, the edition is much more instructor- and student-friendly. Every chapter has been rewritten, reorganized, and systematically updated. We

have spent much time trying to make the complex topics more readable and to draw connections across topics. There is also a considerable amount of new material on topics ranging from repressed memories to the cognitive neuroscience of attention.

We have received much help throughout the writing of this book. For help with the first edition we thank Marcus Boggs, the editor who expressed confidence through the early drafts and gave us much freedom in letting the book evolve. When he became President of Academic Press, he was succeeded at Harcourt Brace by Phil Curson and then Tina Oldham. John Haley provided support and guidance in preparing the second edition. Carol O'Connell combined skill, taste, and a sense of humor that made the production side of things go very smoothly.

A number of colleagues and external reviewers have left their mark on the book. We thank Woo-Kyoung Ahn, Neal Cohen, Gary Dell, Stephanie Doane, Evan Heit, Phillip Johnson-Laird, Gordon Logan, Gregory Murphy, Harold Pashler, Javier Sainz, Edward Smith, David Swinney, and Edward Wisniewski for thoughtful advice on what we wrote. We would also like to thank people who may not have helped directly with this book but who have had large influences on our thinking about cognition: John Anderson, Larry Barsalou, Gordon Bower, William K. Estes, Thomas Landauer, Elissa Newport, Edward Smith, (and each other). In addition, we received much help with how the material was presented from Leigh Elkins, Keith Magnus, Joshua Medin, Rebecca Medin, Linda Powers, Edward Smith, Tom Spalding, and Cheryl Sullivan. Special thanks are due to Ulyses S. Grant IV who helped in all phases of manuscript preparation.

We have noticed that it is traditional to thank significant others for their patience and support throughout a project of this sort. Now we know why. Linda and Cheri, thanks for your continuing, multifaceted support.

Douglas Medin and Brian Ross

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**PART
I**

OVERVIEW

Chapter 1

**Possibilities, Information, and
Experience**

Chapter 2

Approaches to the Study of the Mind