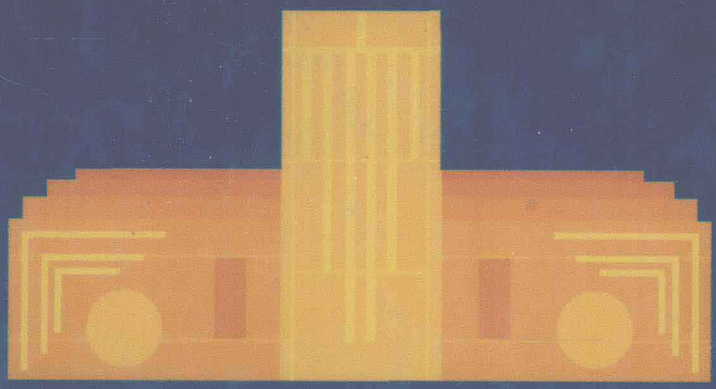

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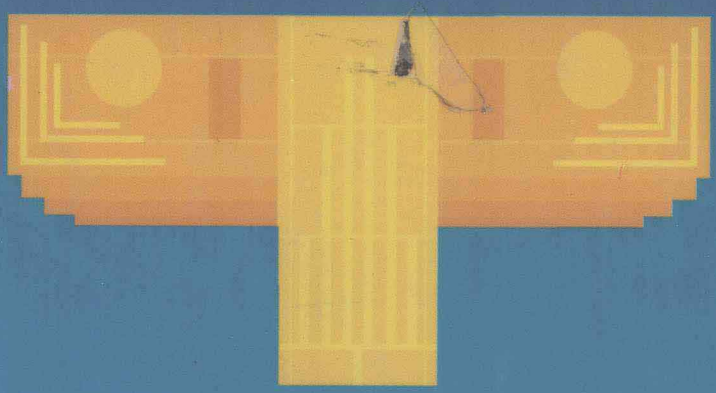
SECOND EDITION



JOHN B. BEST

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SECOND EDITION

John B. Best

Eastern Illinois University

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PREFACE

For an author, it's very gratifying to know that so many people apparently found the first edition to be a useful and satisfying text. Recognizing this, I have retained most of the elements of the first edition's organization and its pedagogical features. It seems clear that features such as the glossary, the overviews, the chapter headings at the beginning of each chapter, and the key terms aided the students by making many of the (to them) bewildering differences in terminology and viewpoints more comprehensible.

Of course, researchers in cognition have not been silent during the three years since the first edition appeared, and consequently, this edition also contains a great deal of new material. In my view, such changes have taken place on at least two levels. First, there are at least a couple of "large-scale" issues whose influences have been infused in many ways throughout the book. First is the issue of cognitive psychology's relationship to the broader discipline of cognitive science. One of my objectives in this edition was to create within the student an appreciation of the great range and diversity of background among the researchers who are currently investigating cognition. Quite frankly, it would be distasteful to me, and a genuine offense to the field as a whole, to present a text that implies that psychological perspectives on cognition exist in a vacuum. Of course, I want the student to have an appreciation of the psychological processes underlying cognition (in terms of the findings and theories used by psychologists), but I also want the reader to see how these terms relate to the perspectives of other researchers.

This brings us to the second large-scale change, and that concerns the treatment of neuropsychological research: I have chosen not to concentrate this material in a single chapter. I believe that such an organizational scheme might imply that such lines of evidence are somehow "different" and unrelated to the concerns of the psychologist. To counteract that notion, I have brought neuropsychological findings into play at those points in various chapters where such findings seem to shed the most light on the cognitive processes under discussion.

At a lower level, and in some sense propelled by these large-scale concerns, each of the book's chapters has undergone some change in content, and sometimes a substantial change, from that which appeared in the first edition. What follows is a more detailed look at those changes.

Chapter 1—Definitions and Problems. This chapter now contains some material linking cognitive psychology to its allied disciplines. The historical background material has been expanded somewhat and clarified. The material outlining the "problems" studied by cognitivists also has been rewritten.

Chapter 2—Attention and Pattern Recognition. This chapter now

includes some coverage of computational approaches to pattern recognition, especially as such efforts were realized in the work of David Marr.

Chapter 3—Constructive and Direct Theories of Perception. I've expanded the coverage of direct or ecological approaches.

Chapter 4—Basic Theories and Issues in Memory Research. This chapter now represents an amalgamation of the previous edition's Chapter 4 and Chapter 7. This chapter now covers some of the basic terms and issues in the memory literature with greater clarity than did the first edition. For example, the dual-code position is now presented much more clearly than it was in the initial edition.

Chapter 5—Encoding and Storing. This represents an expansion of the previous edition's Chapter 5. The revised chapter presents detailed discussions concerning such phenomena as automatic (nonstrategic) encoding, neuropsychological factors in encoding and storing, and an up-to-date discussion of "overwriting" in memory.

Chapter 6—Retrieving and Forgetting. This chapter continues the discussion begun in Chapter 5, focusing on several retrieval phenomena that were not covered in the first edition. The chapter now includes a detailed discussion of Baddeley's model of working memory, an examination of retrieval theories, and an exposition of the variables involved in recognition memory. The distinction between episodic and semantic memory is introduced in this chapter, not as a theoretical construct, but as an organizational device, enabling a discussion of autobiographical memory and "flashbulb" memories. The chapter also contains a discussion of the tip-of-the-tongue (TOT) phenomenon.

Chapter 7—Organization of Knowledge in Permanent Memory. In addition to the coverage of all the "local" network models of memory described in the first edition, the chapter now includes a lengthy discussion of "distributed" or parallel processing models of memory.

Chapter 8—Linguistic Knowledge: Its Acquisition and Development. This chapter is a condensation of the previous edition's Chapters 8 and 9. I've cut back quite a bit on the material in the previous edition's Chapter 9; I think it can be better covered in a developmental psychology course. However, the material on Chomsky's theory has been clarified and expanded in this chapter.

Chapter 9—Cognitive Processes in Speech Perception and Production. This is a substantial expansion from the previous edition's Chapter 10. This chapter now covers the acoustics of the speech signal and includes a discussion of pragmatics that was missing from the first edition.

Chapter 10—Cognitive Processes in Reading and Writing. This almost completely new chapter features an expanded discussion of reading and a treatment of the seldom discussed role of cognition in writing.

Chapter 11—Reasoning and Concept Attainment. This chapter features an expanded treatment of conditional reasoning, including a complete discussion of the variables in the Wason selection task.

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Chapter 12—Problem Solving. This chapter now features a more extensive look at the issue of expertise in thinking.

Chapter 13—Artificial Intelligence. This chapter continues the theme taken up in Chapter 12 through a discussion of expert systems. The chapter presents some of the techniques used by knowledge engineers to model human expertise and also presents some criticisms of the whole concept of artificial expertise.

I commented in the Preface to the First Edition that writing a book requires a tremendous amount of support: This time I found out that revising one also requires a tremendous amount of support. First, I'd like to thank again all of the people who helped with the first edition; their efforts are still clearly discernible here. I'd also like to thank the many users of the first edition who commented upon, and thereby helped me to correct, the defects or disappointments they detected.

The chapters of the second edition were strengthened considerably by the comments of the reviewers, and I owe them my thanks too. They include:

Susan Brady, University of Rhode Island
Dennis L. Byrnes, University of Massachusetts, Boston
Ian Dennis, Plymouth Polytechnic, England
Peter Derks, College of William and Mary
David G. Elmes, Washington and Lee University
Peter Graf, The University of British Columbia, Canada
John S. Klein, Castleton State College
John Kounios, Tufts University
John Kulig, Plymouth State College
J. McShane, London School of Economics and Political Science
Patricia Mullins, University of Wisconsin
Ron Nowaczyk, Clemson University
Phillip L. Rice, Moorhead State University
John T. E. Richardson, Brunel University, West London
Nicholas L. Rohrman, Colby College
Teresa A. Sawyer, Gettysburg College
Roger Schvaneveldt, New Mexico State University

In the revision effort, I was helped by my undergraduate assistants Lisa Carlisle and Kathy Swinson, and by my graduate assistants, Kristen Davison and Mary Dillon, all of whom ran subjects in my lab, proctored tests in my classes, chased down the truly obscure references I requested, and in general ran interference for me so that I could get downfield with the manuscript. My family played a vital role in the completion of the revision. My wife, Lorraine, cheerfully tolerated my negligence of my household commitments, and I appreciate that. Finally, my stepson, Frank D. Tarantino, took away my cares whenever he described the progress of his computer-generated band of

hobbits, rangers, and wizards in their attempts to vanquish a host of dastardly foes. Thanks to all of you. My efforts have come to a close, while your task is just beginning. But I truly hope this book helps you to enjoy your study of cognition. And now, as author Maurice Sendak said in a different context, let the wild rumpus start . . . .

John B. Best
Charleston, Illinois
30 May 1988
Memorial Day

PREFACE TO FIRST EDITION

What, do you imagine that I would take so much trouble and so much pleasure in writing, do you think that I would keep so persistently to my task, if I were not preparing—with a rather shaky hand—a labyrinth into which I can venture, in which I can move my discourse, opening up underground passages, forcing it to go far from itself, finding overhangs that reduce and deform its itinerary, in which I can lose myself and appear at last to eyes that I will never have to meet again. I am no doubt not the only one who writes in order to have no face. (Foucault, 1972)

This is a chilling passage, but it's a good depiction of what might be called the textbook author's dilemma. Like every other text writer, I'm interested in giving you an accurate and objective account of a particular field—in this case, cognitive psychology. And I've tried hard to produce such an account—in a metaphorical sense, writing as if I had no opinions of my own, as if I had no face. On the other hand, I recognize that all authorship requires interpretation. That is, I've chosen for you the studies, the terms, and the theories that are about to be described. In some cases, I've simplified the findings to make them easier to understand. Further, I've tried to present the material so that its underlying logic seems clear. This is an undisguised attempt to persuade you of cognitive psychology's plausibility and helpfulness in explaining some human actions. In other words, the "labyrinth" you're about to explore has been deliberately designed to lead you deeper and deeper within it. And like a real labyrinth, much in this book has been designed to challenge and puzzle you.

Under the circumstances, you're entitled to ask what you've gotten yourself into. I've intended the book to be read by upper-division students taking their first course in cognitive psychology. The book can be comfortably read in a course that is either a quarter or a semester long. The book should be understandable to those who have not had much background in psychology, but the introductory course would be helpful. Also, I've used some statistical and experimental design terms, such as *indepenent variable.* Students who have not had a statistics or research methods course should review these terms in their intro books. Although I think the book's chapters should be read in order from cover to cover, the enterprising teacher will no doubt think of other valid ways to cover the material. For example, Chapter 13 can be left out without significantly affecting the rest of the book. Similarly, in a course that emphasizes the constructive aspects of cognition, the teacher might wish to combine some elements of Chapter 3 with some of the material in Chapter 11. Reading Chapter 7 "Imagery" in the context of perception rather than memory gives a completely different slant to that material. However, the chapters are not completely independent of each other. Almost every chapter contains references both back and ahead to other chapters. If you read the chapters in a different

order, some of these signposts may seem incongruous, but I don't think that you will find them too disorienting.

Cognitive psychologists are becoming increasingly allied with researchers in other fields such as neuropsychology and computer science. This interdisciplinary effort, known as cognitive science, has already begun to make its influences felt, and I've tried to address its issues in various chapters. For example, where biological or neuropsychological findings seem to contribute to our understanding of the cognitive processes involved in language, perception, or memory, I brought such findings into play. Similarly, cognitive psychology has become strongly allied with workers in the field of artificial intelligence—and for good reasons. Workers in both fields are concerned with the underlying nature of intelligence, and they tend to believe that our mental lives are "decomposable." By this term, they mean that our mental lives can be compared to the activities of computers. That is, the cognitive psychologist might speak of the memory system as a collection and of routines with inputs, buffers, outputs, and so on. This doesn't mean that your mind is just like a computer—far from it. But the comparison is appropriate because it helps us to better understand some mental events. This trend—that of incorporating cognitive psychology into a broader context called cognitive science—has begun only in the last few years, but it's a development that is sure to accelerate.

The book has some features that are designed to help you deal with the material. Each section begins with a part opener that provides you with a brief orientation to the important questions that I'll describe in the next several chapters. Each chapter opens with an overview. Here, an anecdote illustrates some phenomenon and serves as a springboard into the questions and issues of that chapter. Each chapter contains summary sections at various points. Each chapter also contains a focus section. These focuses deal with real-world phenomena in which the principles of cognitive psychology have been applied or in which cognitive research has shed some light. At the end of each chapter is a list of key terms. I suggest that you learn these terms completely. Finally, each chapter closes with some concluding comments and suggestions for further reading. The concluding comments are in part a summary of the chapter, but they also describe that chapter's implications, both for other areas of cognition and for future research. In the suggested readings, I've listed some books and articles that truly devoted students might consider as sources for paper topics or perhaps might use to satisfy their intellectual curiosity. If you use these features actively, you'll learn substantially more in the course.

All books are team efforts, and I was fortunate to play on a great team. My editors at West, Clark G. Baxter and Nancy Hill-Whilton, were extremely helpful. Like all good editors, they've obviously studied theories of motivation (principally the carrot and stick theory, which they've raised to a high art). Bill

Gabler, the production editor at West, did a wonderful job in producing the beautifully designed book you're holding.

I benefited from the knowledge of my reviewers, all of whom made quite a contribution to whatever good qualities the book now has. Of course, I'm responsible for whatever errors of fact or interpretation may remain in the book. I've listed the reviewers in alphabetical order:

James I. Chumbley, University of Massachusetts, Amherst
Joseph H. Danks, Kent State University
Peter Derks, College of William and Mary
Robert Gregory, University of Idaho, Moscow
Edward Johnson, University of North Carolina, Chapel Hill
Connie Juel, University of Texas, Austin
Michael W. O'Boyle, Iowa State University
Fred Schwantes, Northern Illinois University
Steven Smith, Texas A & M University
Richard Wagner, Florida State University, Tallahassee

An awesome amount of clerical work is involved in making a book. I had several terrific helpers. Jeanne Hartmann proofed, typed, worked on permissions from publishers, photocopied, and did other tasks—all of them well. Janet Ryner and Rhonda Wolfe helped track down the references. The secretarial staff at Eastern—Julia Robinson, Pam Gutowski, and Opal Kelly—typed much of the earlier drafts before I started using a word processor. My colleagues at Eastern kept nudging me (in a nice way) to complete the book. My chairman, Paul Panek, released me from some of my teaching duties so that I could finish writing. My wife, Lorraine, was very supportive, as were my parents, Jack and Marie Best. Finally, I thank my stepson, Frankie Dominic Tarantino, who helped me relax by playing Stratego with me. Thanks to all of you.

For me, so much trouble and so much pleasure have come to an end. For you, I hope your troubles with this book are minimal and your pleasure great.

John B. Best
Charleston, Illinois
27 May 1985
Memorial Day

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