

PREFACE

Welcome to the second edition! When new enterprises like cognitive neuroscience emerge, it is not always clear if they will survive. The youthful enthusiasm of a new field is not unlike a young doe standing up for the first time after birth. Can she make it? Will this new life develop and grow? Will true meaning emerge from the new life?

Five years later, we are confident that cognitive neuroscience has not only survived its infancy, it has blossomed in a spectacular fashion. This can be measured in many ways. Leading universities have undertaken major initiatives to develop dedicated cognitive neuroscience programs. The number of journals devoted to the field has increased exponentially. The annual meeting of the Society for Cognitive Neuroscience has burst its seams with attendance increasing 600% between 1994 and 2001.

What constitutes the first principles that make cognitive neuroscience distinct from physiological psychology, neuroscience, cognitive psychology, or neuropsychology? This question was our first challenge in laying the groundwork for our first edition, and constituted our defining point. We concluded that it is indeed a critical question—but paradoxically, not a question at all. Cognitive neuroscience certainly overlaps with and synthesizes these traditional approaches, but our book went beyond that function to define how cognitive neuroscientists will address the neural bases of cognition in the years ahead.

Our approach remains to balance cognitive theory with neuropsychological and neuroscientific evidence, plus add examples of the use of computational techniques to complete the story. We make liberal use of patient case studies, but this is to illustrate essential points, not to provide an exhaustive description of brain disorders. In every section, we strive to include the most current information and theoretical views, supported by cutting-edge technology that is such an important part of cognitive neuroscience. In contrast to purely cognitive or neuropsychological approaches, this text emphasizes the convergence of evidence that is a crucial aspect of any science, particularly studies of higher mental function.

Cognitive neuroscience takes on cognitive concepts and studies mind/brain matters with psychophysical and brain imaging techniques such as fMRI, MR, PET, and ERPs. The field requires one to become knowledgeable in each of these areas and to practice several different approaches when undertaking a single study. This book is intended to prepare students of cognitive neuroscience to do just that.

Since the first edition, there have been many major developments, both methodological and theoretical. There has been an explosion of brain imaging studies, almost 1,500 a year for the past four years. Other technologies such as transcranial magnetic stimulation have been added to the arsenal of the cognitive neuroscientist. New links have emerged with genetics, comparative anatomy, and robotics. All of the chapters in the second edition have been updated to capture these changes.

In addition, we have added two new chapters to the textbook. First, we now include a chapter on emotion. This information was interspersed across a number of chapters in the first edition. With the emergence of affective neuroscience as an important subfield, it became clear that the book needed a dedicated chapter. Second, the growth and importance of the fundamentals of neuroscience that are essential for any student of cognitive neuroscience led us to split this chapter into two, one focused on the basics of molecular and cellular neurobiology and the other on gross and functional anatomy.

Throughout this second edition we have updated each topic with new information. All of the chapters have undergone major revisions with the additions mostly devoted to incorporating results and ideas that have emerged from new studies. The second edition also allowed us to correct any errors in the first edition.

As usual, we are indebted to a number of people. Of special note are three colleagues who lent their expertise to specific chapters of the text, as noted in the table of contents. We thank Elizabeth Phelps for her contribution to Chapter 13, Emotion. Not only has Liz produced some of the most spectacular work in this field over the past few years, she provides a broad perspective to the topic and deep understanding of the issues. Leah Krubitzer wrote the first section of Chapter 14, Evolutionary Perspectives. She provides a convincing argument for why cognitive neuroscientists should understand comparative anatomy. As with the first edition of this textbook, Chapter 9, Language and the Brain, was coauthored by Tamara Swaab whose ability to lead the reader from current psycholinguistic theory to brain physiology and language dysfunction makes a complex field accessible.

As in the first edition, we make a special effort to bring cognitive neuroscience alive with color. Frank Forney is again the book's artist and is to be congratulated for his continued fine work. We also thank our many colleagues who have provided original artwork or scientific figures.

In sum, this book has been an interactive effort between ourselves, our colleagues, our students, and our reviewers! The product has benefited immeasurably from these interactions, but we will not rest here. We stand ready to modify and improve any and all of our work. In our first edition, we asked our readers to contact us with your suggestions and questions, and we do so again. We live in an age where interaction is swift and easy. We are to be found as follows: gazzaniga@dartmouth.edu; mangun@duke.edu; ivry@socrates.berkeley.edu. Good reading and learning.