

Preface

Cognitive science is the interdisciplinary study of mind and intelligence, embracing philosophy, psychology, artificial intelligence, neuroscience, linguistics, and anthropology. Its intellectual origins are in the mid-1950s when researchers in several fields began to develop theories of mind based on complex representations and computational procedures. Its organizational origins are in the mid-1970s when the Cognitive Science Society was formed and the journal *Cognitive Science* began. Since then, more than sixty universities in North America and Europe have established cognitive science programs and many others have instituted courses in cognitive science.

Teaching an interdisciplinary course in cognitive science is difficult because students come to it with very different backgrounds. Since 1993, I have been teaching a popular course at the University of Waterloo called Introduction to Cognitive Science. On the one hand, the course attracts computationally sophisticated students from computer science and engineering who know little psychology or philosophy; on the other, it attracts students with good backgrounds in psychology or philosophy but who know little about computation. This text is part of an attempt to construct a course that presupposes no special preparation in any of the fields of cognitive science. It is intended to enable students with an interest in mind and intelligence to see that there are many complementary approaches to the investigation of mind.

There are at least three different ways to introduce cognitive science to a multidisciplinary audience. The first is to concentrate on the different fields of psychology, artificial intelligence, and so on. The second is to organize the discussion by different functions of mind, such as problem solving, memory, learning, and language. I have chosen a third approach,

systematically describing and evaluating the main theories of mental representation that have been advocated by cognitive scientists, including logic, rules, concepts, analogies, images, and connections (artificial neural networks). Discussing these fundamental theoretical approaches provides a unified way of presenting the accomplishments of the different fields of cognitive science to understanding various important mental functions.

My goal in writing this book is to make it accessible to all students likely to enroll in an introduction to cognitive science. Accomplishing this goal requires, for example, explaining logic in a way accessible to psychology students, computer algorithms in a way accessible to English students, and philosophical controversies in a way accessible to computer science students.

Although this book is intended for undergraduates, it should also be useful for graduate students and faculty who want to see how their own fields fit into the general enterprise of cognitive science. I have not written an encyclopedia. Since the whole point of this exercise is to provide an integrated introduction, I have kept the book relatively short and to the point, highlighting the forest rather than the trees. Viewing cognitive science as the intersection rather than as the union of all the relevant fields, I have omitted many topics that are standard in introductions to artificial intelligence, cognitive psychology, philosophy of mind, and so on. Each chapter concludes with a summary and suggestions for further reading.

The book is written with great enthusiasm for what theories of mental representation and computation have contributed to the understanding of mind, but also with awareness that cognitive science has a long way to go. The second part of the book discusses extensions to the basic assumptions of cognitive science and suggests directions for future interdisciplinary work.

I have been grateful for the reception of the first edition of this book, especially its translation into Italian, German, Czech, Portuguese, Japanese, Korean, and two variants of Chinese. For this second edition, I have brought part I up to date and substantially revised part II, adding new chapters on brains, emotions, and consciousness. Other additions include a list of relevant Web sites at the end of each chapter, and a glossary at the end of the book. My anthology, *Mind Readings: Introductory Selections on Cognitive Science* (MIT Press, 1998) remains a useful accompaniment.