Preface

In the late spring of 1998, a conference was held in the wonderful and rustic town of Banff, Alberta, situated deep in the heartland of the Canadian Rockies. There, over the course of three days and two nights, cognitive neuroscientists gathered to discuss and argue about issues that concerned the functional neuroimaging of cognitive processes. A great deal of data was presented, and a plethora of views were advanced. At times, people were convinced by the data and interpretations being put forward, but just as often, people were skeptical. So, the discussions and arguments would begin again. All in all, it was tremendous fun, and a very stimulating weekend!

Now, typically that would be the end of the story. Usually, when an intense meeting comes to a close, the participants brush themselves off, pick up their things, and head off for home; more tired than when they first arrived, and, hopefully, a little wiser as well. But this conference would prove to be very different. The discussions and arguments had highlighted to all that there was a very real need to put together a book on the functional neuroimaging of cognition. This book would have to do at least two things. It would have to provide a historical perspective on the issues and imaging results in a number of different cognitive domains. And for each domain, it would have to articulate where things stood currently, and where they might be heading. That is the goal of the present handbook.

The handbook was written with two types of readers in mind: those who are relatively new to functional neuroimaging and/or cognitive neuroscience, and those who are seeking to expand their understanding of cognitive and brain systems. It is our hope, and intention, that this unique combination of depth and breadth will render the book suitable for both the student and the established scientist alike. With a balanced blend of theoretical and empirical material, the handbook should serve as an essential resource on the functional neuroimaging of cognitive processes, and on the latest discoveries obtained through positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). Indeed, in recent years the field of functional neuroimaging of cognition has literally exploded. From less than a dozen papers in 1994, the number of publications in this area increased to about 70 in 1995, and to more than 300 in 1999 (Cabeza & Nyberg, 2000, *Journal of Cognitive Neuroscience*, 12, 1–47). This handbook provides the reader with a comprehensive but concise account of this rapidly growing literature.

During its rapid development, functional neuroimaging has transformed itself several times, in terms of methods, topics of research, and subject populations. The handbook reviews and evaluates the progress of functional neuroimaging research along these three dimensions. The first part covers the history and methods of PET and fMRI, including physiological mechanisms (chapter 1), event-related paradigms (chapter 2), and network analysis techniques (chapter 3). The second part covers PET
and fMRI findings in specific cognitive domains: attention (chapter 4), visual recognition (chapter 5), semantic memory (chapter 6), language (chapter 7), episodic memory (chapter 8), and working memory (chapter 9). The third and final part addresses the effects of aging on brain activity during cognitive performance (chapter 10) and research with neuropsychologically impaired patients (chapter 11).

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