



# The neurophysiological foundations of mental and motor imagery

*By Aymeric Guillot, Christian Collet*

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Mental imagery is the ability to form perceptual-like representations of objects or events on the basis of information stored in memory. Motor imagery is often used when the human body is involved, where subjects imagine the body moving or manipulating objects. The use of mental practice, including motor imagery for the rehabilitation of patients with cerebral motor impairments, is one of the most active areas in the field of motor imagery research. Such data provide evidence for imagery as a method in stroke rehabilitation, leading to reliable reconstruction of neural networks and thus to functional recovery.

In recent years, our understanding of imagery has advanced greatly thanks to functional imaging studies using, for example, PET and fMRI. There is now ample evidence that a common neural substrate (albeit not identical) underlies mental imagery and visual perception, on the one hand, and motor performance and motor imagery, on the other.

This book, the first of its kind, examines three main aspects of mental imagery. In the first part, the chapters address the neural basis of mental and motor imagery, the relationships between mental imagery and perception, and between motor imagery and physical execution. In the second part, the chapters focus on the evaluation of mental/motor imagery accuracy, including both central and peripheral nervous system recordings. The final chapters address the effects of mental practice on motor recovery after stroke.

Providing a state of the art review along with in-depth summaries, meta-analyses, and research syntheses, this book will be important for those in the fields of cognitive neuroscience, physiology, and rehabilitation.

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## **Editorial Review**

### **Review**

"This book provides an intriguing look at an oft-neglected area of mental imagery research. The theoretical and practical applications are well laid out and provide a balanced viewpoint on the current state of the science in this field."--*Doody's*

### **About the Author**

Aymeric Guillot has a Ph.D. in Sport Sciences from the Claude Bernard University of Lyon (2003) and is currently an Assistant Professor in the Center of Research and Innovation in Sport in Lyon (France). Using notably the techniques of autonomic nervous system recordings, functional magnetic resonance imaging, mental chronometry and electromyography recordings, he has worked on numerous mental/motor imagery studies, investigating primarily the effect of motor imagery in motor learning and motor performance, but also in motor recovery after stroke, and during mental rotation. He has published over 50 journal articles and book chapters, including extensive reviews and meta-analyses of the motor imagery literature. Christian Collet received a Ph.D. in Neurophysiology in 1995, from the Claude Bernard University of Lyon (France). He is currently Professor at the Center of Research and Innovation in Sport (France) and leader of the research team "Mental processes and Motor Performance". During the last ten years, he has conducted research in the areas of human factors in ergonomics and sports behaviour. His main research interests include mental processes in professional and sporting activities. The main topics are concerned with the general field of motor imagery (learning, mental abilities, rehabilitation) and workload (emotional reactivity control, arousal, vigilance and mind concentration).

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