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Introduction

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Imagery and Spatial Cognition: Methods, models and cognitive assessment
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Introduction

The interest of cognitive neuroscience and of neuropsychology on imagery and spatial cognition is remarkably increased in the last decades. Different areas of research contribute to the clarification of the multiple cognitive processes subserving spatial perception and exploration, and to the definition of the neurophysiological mechanisms underpinning these cognitive functions. Observation of normal subjects and patients' behaviour allows to better clarify these different aspects implicated in spatial processing also considering the important contribution of neuroimaging. Theoretical issues involved in space processing include different levels such as: perception, exploration and mental representation.

An adequate use of spatial competencies needs the balanced interaction of perception, working memory and action. Moving through the world, in fact, implies the ability to integrate different signals (visual, acoustic, somatosensory, vestibular). These elementary stimuli, continuously presented to the brain, have to be integrated in order to build up a complex space representation which takes into account the relationship between our body movements in the environment.

The aim of this book is to provide the reader (post-graduate students as well as experts) with a complete overview of this field of research. It illustrates the way how brain, behaviour and cognition interact in normal and pathological subjects in perceiving, representing and exploring space.

Each chapter provides and updated review of the relevant literature as well as illustrates empirical data some of them collected by the authors themselves, addressing practical and/or theoretical issues in this domain.

The first section is dedicated to the methodology of both imagery and visuo-spatial functions. Experimental methods and instruments to assess imagery and spatial abilities are illustrated for both adults and children. Particular aspects of object-location memory are also explored. The interaction between experimental and neurophysiological components have also been investigated with special attention to transcranial magnetic stimulation

The second part of the book is centred on the theoretical aspects of mental imagery from the cognitive and the neural point of view. Particular attention is devoted to different models of working memory subserving visuo-spatial mechanisms. The spatial representation of numbers is also extensively described.

Age-related differences in visuo-spatial abilities represent an important issue of debate in the literature, and the third section is completely devoted to this topic pro-

viding a review addressing differences both in normal subjects and in patients suffering from cognitive deterioration.

The last part of the book focuses on the cognitive/neuropsychological processing involved in the representation of personal, peripersonal and extrapersonal space. Further, theoretical issues concerning the body representation are treated from both semantic (body-parts-knowledge) and more spatial aspects (body-segments-relationship). Evidence of different cognitive processes and neurophysiological mechanisms is provided from experiments on normal and brain damaged humans. Part of this section illustrates the role of neuroimaging techniques in exploring the neurophysiological correlates of different spatial components, involving bodily, peripersonal (allocentric), and extrapersonal (retinotopic) coordinates. Data from functional and morphological studies in normal subjects and in brain damaged patients are largely discussed.

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