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Introduction; 6.2 SPM Software Overview; 6.2.1 Requirements; 6.2.2 Installation; 6.2.3 Interface; 6.2.4 File Formats; 6.3 Spatial Transformations; 6.3.1 Data Preparation; 6.3.2 Realignment; 6.3.3 Coregistration; 6.3.4 Spatial Normalisation; 6.3.5 Spatial Smoothing; 6.4 Modelling and Statistical Inference; 6.4.1 The General Linear Model; 6.4.2 Contrasts; 6.4.3 Topological Inference; 6.4.4 Population-Level Inference; 6.5 Conclusions; References; 7: Meta-Analyses in Basic and Clinical Neuroscience: State of the Art and Perspective; 7.1 An Introduction to Quantitative Meta-Analysis in Neuroimaging Science; 7.2 Preconditions and Preliminaries of Quantitative Meta-Analysis; 7.3 Activation Likelihood Estimation; 7.4 Applying Quantitative Meta-Analysis; 7.5 Perspectives and Future Directions; References; Part II : Clinical Applications; 8: Preoperative Blood Oxygen Level-Dependent (BOLD) Functional Magnetic Resonance Imaging (fMRI) of Motor and Somatosensory Function; 8.1 Rationale for fMRI in Rolandic Neurosurgery; 8.2 Review of Literature; 8.3 General Considerations; 8.4 Diagnostic Aims; 8.5 Selection of Candidates for Preoperative fMRI; 8.6 Paradigms for Clinical Motor and Somatosensory fMRI; 8.7 Preoperative fMRI in Patients with Rolandic Brain Tumors; 8.7.1 Somatotopic Mapping of the Primary Motor Cortex (Standard Protocol); 8.7.2 Somatotopic Mapping of the Primary Somatosensory Cortex; 8.7.3 Localization of the Precentral Gyrus in Patients with Paresis; 8.8 Limitations and Pitfalls; References; 9: The Functional Anatomy of Speech Processing: From Auditory Cortex to Speech Recognition and Speech Production

Sommario/riassunto

Since functional MRI (fMRI) and the basic method of BOLD imaging were introduced in 1993 by Seiji Ogawa, fMRI has evolved into an invaluable clinical tool for routine brain imaging, and there have been substantial improvements in both the imaging technique itself and the associated statistical analysis. This book provides a state of the art overview of fMRI and its use in clinical practice. Experts in the field share their knowledge and explain how to overcome diverse potential technical barriers and problems. Starting from the very basics on the origin of the BOLD signal, the book covers technical issues, anatomical landmarks, the full range of clinical applications, methods of statistical analysis, and special issues in various clinical fields. Comparisons are made with other brain mapping techniques, such as DTI, PET, TMS, EEG, and MEG, and their combined use with fMRI is also discussed. Since the first edition, original chapters have been updated and new chapters added, covering both novel aspects of analysis and further important clinical applications.
