

fMRI

Basics and Clinical Applications

Stephan Ulmer
Olav Jansen
Editors

Third Edition

 Springer

Fmri Basics And Clinical Applications

Scott H. Faro, Feroze B. Mohamed



Fmri Basics And Clinical Applications:

fMRI Stephan Ulmer, Olav Jansen, 2020-05-11 This book now in its revised and updated third edition 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 methods of statistical analysis and special issues in various clinical fields Comparisons are made with other brain mapping techniques and their combined use with fMRI is also discussed Existing chapters have been updated and new chapters have been added in order to account for new applications further clinical fields and methods e g resting state fMRI Based on the clinical focus this book will be of great value for

Neuroradiologists Neurologists Neurosurgeons but also Researchers in Neuroscience **fMRI** Stephan Ulmer, Olav Jansen, 2010-01-18 Functional MRI fMRI and the basic method of BOLD imaging were introduced in 1993 by Seiji Ogawa From very basic experiments fMRI has evolved into a clinical application for daily routine brain imaging There have been various improvements in both the imaging technique as such as well as in the statistical analysis In this volume experts in the field share their knowledge and point out possible technical barriers and problems explaining how to solve them Starting from the very basics on the origin of the BOLD signal the book covers technical issues anatomical landmarks presurgical applications and special issues in various clinical fields Other modalities for brain mapping such as PET TMS and MEG are also compared with fMRI This book is intended to give a state of the art overview and to serve as a reference and guide for clinical applications of fMRI **fMRI** Stephan Ulmer, Olav Jansen, 2013-06-12 Over the past two decades fMRI has evolved

into an invaluable clinical tool for routine brain imaging 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 Functional MRI Scott H. Faro, Feroze B. Mohamed, 2006-11-22 Drs Scott H Faro and Feroze B Mohamed of Drexel University College of Medicine have succeeded in translating benchmark research on functional MRI into clinical applications for the non scientist physician providing those unfamiliar with fMRI physics with much needed background This practical and timely volume presents an overview of the principles of fMRI and explains experimental research design outlines the challenges and limitations of fMRI provides a detailed neuroanatomic atlas and describes the clinical applications of fMRI in cognitive sensory motor and pharmacological cases Contributors to this comprehensive text include internationally recognized neurologists radiologists and psychologists

Abundant illustrations most in color complete the book *Functional MRI* Ramachandran Ramani, 2019-01-23 *Functional MRI Basic Principles and Emerging Clinical Applications* provides an overview of the basic principles of fMRI for clinicians with minimal knowledge of the imaging technique and its research potential and clinical applications The text is divided into two parts with Section I covering the primary signal measured in fMRI BOLD the correlation between neuronal activity and the BOLD signal and how the data is analyzed and interpreted in fMRI Section II explores applications of fMRI in cognitive neuroscience and common psychiatric disorders surgical planning in neurosurgery anesthesia and the intensive care unit and more Timely and highly accessible this book is a valuable resource for researchers and clinicians interested in understanding what fMRI is how it works and its applications **Clinical Applications of Functional Brain MRI** Serge A. R. B. Rombouts, Frederik Barkhof, Philip Scheltens, 2007-11-08 Over the past few years FMRI has become one of the most widely used methods for imaging normal brain function in turn becoming a valuable tool in the study of many psychiatric and neurological disorders This book provides an overview of the latest FMRI research in a number of these disorders

Clinical Functional MRI Christoph Stippich, 2021-12-03 The third revised edition of this successful book describes up to date preoperative fMRI and complementary advanced imaging methods DTI MEG PET etc to diagnose and treat patients with brain tumors and epilepsy It presents the state of the art fMRI and complementary imaging procedures and discusses practical aspects imaging and data processing steps normal and pathological findings and diagnostic possibilities and limitations Experts in the field explain relevant information on brain physiology functional neuroanatomy and imaging techniques All chapters of the second edition have been fully updated to reflect the latest developments Multimodality functional neuroimaging was rewritten by new authors Further chapters address brain plasticity and pitfalls tips and tricks

Neuromodulation in Basic, Translational and Clinical Research in Psychiatry Ryouhei Ishii, Keiichiro Nishida, Nagy A. Youssef, Kay Jann, Shun Takahashi, 2020-01-20 **Functional Neuroimaging in Clinical Populations** Frank G. Hillary, John DeLuca, 2007-06-06 Bringing together leading experts this volume reviews cutting edge applications of neuroimaging techniques in the study of brain injury brain disease and normal aging It provides up to date descriptions of EEG MEG PET and fMRI discusses salient methodological issues and presents significant clinical advances that have been brought about through the use of these procedures Specific disorders addressed include epilepsy aphasia traumatic brain injury multiple sclerosis alcoholism autism schizophrenia and stroke Analyzing what functional imaging has revealed about the causes and mechanisms of sensory motor and cognitive disturbances associated with these conditions the book also explores implications for improving cognitive rehabilitation More than 60 illustrations including 24 in full color

International Neurolaw Tade Matthias Spranger, 2012-01-05 Whereas the past few years have repeatedly been referred to as the era of biotechnology most recently the impression has emerged that at least the same degree of attention is being paid to the latest developments in the field of neurosciences It has now become nearly impossible to maintain an overview of

the number of research projects dealing with the functionality of the brain for example concerning its organizational structure or projects dealing with the topics of legal responsibility brain computer interface applications neuromarketing lie detection or mind reading These procedures are connected to a number of legal questions concerning the framework conditions of research projects as well as the right approach to the findings generated Given the primary importance of the topic for the latest developments it is essential to compare the different legal systems and strategies that they offer for dealing with these legal implications Therefore the book *International Neurolaw A Comparative Analysis* contains several country reports from around the world as well as those of international organizations such as UNESCO in order to show the different legal approaches to the topic and possible interactions

Medical Data Sharing, Harmonization and Analytics Vasileios Pezoulas, Themis Exarchos, Dimitrios I Fotiadis, 2020-01-05 *Medical Data Sharing Harmonization and Analytics* serves as the basis for understanding the rapidly evolving field of medical data harmonization combined with the latest cloud infrastructures for storing the harmonized shared data Chapters cover the latest research and applications on data sharing and protection in the medical domain cohort integration through the recent advancements in data harmonization cloud computing for storing and securing the patient data and data analytics for effectively processing the harmonized data Examines the unmet needs in chronic diseases as a part of medical data sharing Discusses ethical legal and privacy issues as part of data protection Combines data harmonization and big data analytics strategies in shared medical data along with relevant case studies in chronic diseases

Ultra-Low Field Nuclear Magnetic Resonance Robert Kraus Jr., Michelle Espy, Per Magnelind, Petr Volegov, 2014-02-26 This book is designed to introduce the reader to the field of NMR MRI at very low magnetic fields from milli Tesla to micro Tesla the ultra low field ULF regime The book is focused on applications to imaging the human brain and hardware methods primarily based upon pre polarization methods and SQUID based detection The goal of the text is to provide insight and tools for the reader to better understand what applications are best served by ULF NMR MRI approaches A discussion of the hardware challenges such as shielding operation of SQUID sensors in a dynamic field environment and pulsed magnetic field generation are presented One goal of the text is to provide the reader a framework of understanding the approaches to estimation and mitigation of low signal to noise and long imaging time which are the main challenges Special attention is paid to the combination of MEG and ULF MRI and the benefits and challenges presented by trying to accomplish both with the same hardware The book discusses the origin of unique relaxation contrast at ULF and special considerations for image artifacts and how to correct them i e concomitant gradients ghost artifacts A general discussion of MRI with special consideration to the challenges of imaging at ULF and unique opportunities in pulse sequences is presented The book also presents an overview of some of the primary applications of ULF NMR MRI being pursued

The Oxford Handbook of Transcranial Stimulation , 2024-07-30 Transcranial stimulation encompasses noninvasive methods that transmit physical fields such as magnetic electric ultrasound and light to the brain to modulate its

function The most widespread approach transcranial magnetic stimulation TMS has emerged as an important tool in several areas of neuroscience as well as in clinical applications in psychiatry and neurology Originally envisioned as a way to measure the responsiveness and conduction speed of neurons and synapses in the brain and spinal cord TMS has also become an important tool for changing the activity of brain neurons and the functions they subserve as well as an causal adjunct to brain imaging and mapping techniques Along with transcranial electrical stimulation techniques TMS has diffused far beyond the borders of clinical neurophysiology and into cognitive perceptual behavioural and therapeutic investigation and attracted a highly diverse group of users and would be users Another major success of TMS has been as a treatment in psychiatry where it is now in routine use worldwide The field of noninvasive neuromodulation has matured and diversified considerably in the past decade with an expansion in the number of tools available and our understanding of their mechanisms of action This second edition of The Oxford Handbook of Transcranial Stimulation brings together the latest developments and important advances in all areas of Transcranial stimulation The new volume captures the rapid progress made since the first edition and provides an authoritative and comprehensive review of the state of the art It also highlights challenges opportunities and future directions for this rapidly changing field The book focuses on the scientific and technical background required to understand transcranial stimulation techniques and a wide ranging survey of their burgeoning applications in neurophysiology neuroscience and therapy Each of its six sections deals with a major area and is edited by an international authority therein It will serve researchers clinicians students and others as the definitive text in this area for years to come

Functional Neuroradiology Scott H. Faro, Feroze B. Mohamed, 2023-05-23 This new edition fully updates and expands Faro and Mohamed's Functional Neuroradiology a gold standard comprehensive introduction to the state of the art functional imaging in neuroradiology including the physical principles and clinical applications of Diffusion Perfusion Permeability MR spectroscopy Positron Emission Tomography BOLD fMRI and Diffusion Tensor Imaging With chapters written by internationally distinguished neuroradiologists neurologists psychiatrists cognitive neuroscientists and physicists Functional Neuroradiology is divided into 12 major sections including Diffusion and Perfusion Imaging Magnetic Resonance Spectroscopy and Chemical Exchange Saturation Transfer Imaging Multi Modality Functional Neuroradiology BOLD Functional MRI Diffusion Tensor Imaging Presurgical Brain Tumor Mapping Emerging neuroimaging techniques Functional Spine and Hydrocephalus imaging and Neuroanatomical Gray and White matter Brain Atlases This second edition is fully updated throughout and includes more than 15 new chapters on topics such as Brain tumor Radiogenomics CNS Tumor Surveillance and Functional MR Perfusion Imaging CNS Machine Learning Focused Ultrasound therapy TBI Sports Related Injury and CNS Lymphatic system By offering readers a complete overview of functional imaging modalities and techniques currently used in patient diagnosis and management as well as emerging technology Functional Neuroradiology is a vital information source for physicians and cognitive neuroscientists involved in daily practice and research

Neuroscience in

the 21st Century Donald W. Pfaff, Nora D. Volkow, John L. Rubenstein, 2022-10-17 Edited and authored by a wealth of international experts in neuroscience and related disciplines this key new resource aims to offer medical students and graduate researchers around the world a comprehensive introduction and overview of modern neuroscience Neuroscience research is certain to prove a vital element in combating mental illness in its various incarnations a strategic battleground in the future of medicine as the prevalence of mental disorders is becoming better understood each year Hundreds of millions of people worldwide are affected by mental behavioral neurological and substance use disorders The World Health Organization estimated in 2002 that 154 million people globally suffer from depression and 25 million people from schizophrenia 91 million people are affected by alcohol use disorders and 15 million by drug use disorders A more recent WHO report shows that 50 million people suffer from epilepsy and 24 million from Alzheimer's and other dementias Because neuroscience takes the etiology of disease the complex interplay between biological psychological and sociocultural factors as its object of inquiry it is increasingly valuable in understanding an array of medical conditions A recent report by the United States Surgeon General cites several such diseases schizophrenia bipolar disorder early onset depression autism attention deficit hyperactivity disorder anorexia nervosa and panic disorder among many others Not only is this volume a boon to those wishing to understand the future of neuroscience it also aims to encourage the initiation of neuroscience programs in developing countries featuring as it does an appendix full of advice on how to develop such programs With broad coverage of both basic science and clinical issues comprising around 150 chapters from a diversity of international authors and including complementary video components Neuroscience in the 21st Century in its third edition serves as a comprehensive resource to students and researchers alike

Introduction to Biomedical Imaging Andrew Webb, 2022-10-19 Introduction to Biomedical Imaging A state of the art exploration of the foundations and latest developments in biomedical imaging technology In the newly revised second edition of Introduction to Biomedical Imaging distinguished researcher Dr Andrew Webb delivers a comprehensive description of the fundamentals and applications of the most important current medical imaging techniques X ray and computed tomography nuclear medicine ultrasound magnetic resonance imaging and various optical based methods Each chapter explains the physical principles instrument design data acquisition image reconstruction and clinical applications of its respective modality This latest edition incorporates descriptions of recent developments in photon counting CT total body PET superresolution based ultrasound phased array MRI technology optical coherence tomography and iterative and model based image reconstruction techniques The final chapter discusses the increasing role of artificial intelligence deep learning in biomedical imaging The text also includes a thorough introduction to general image characteristics including discussions of signal to noise and contrast to noise Perfect for graduate and senior undergraduate students of biomedical engineering Introduction to Biomedical Imaging 2nd Edition will also earn a place in the libraries of medical imaging professionals with an interest in medical imaging techniques

What Radiology Residents Need to Know: Neuroradiology Behroze A. Vachha, Gul Moonis, Max Wintermark, Tarik F. Massoud, 2024-11-01 This book is an introduction to neuroradiology specifically designed for the needs of first year residents. Currently available textbooks while excellent reference books provide far too much material than is needed for radiology residents particularly those on first year rotations. This book covers information important both from a practical standpoint and for later board preparation in a short and simple format. The book is divided into three main sections: Brain, Spine, and Head and Neck. Using an easy to read bulleted format, this book covers all the necessary material for a first year resident and high yield often tested topics, making it additionally a useful study guide for board preparation later in residency. In addition, it provides valuable tips on how to approach and interpret CT and MRIs of the brain, spine, and head and neck. Additional included coverage makes it useful in later rotations of more specialized areas like the eyes and temporal bone structures. Key topics include neuroimaging, structural and functional anatomy, neurodegenerative disorders, and facial and skull base fracture imaging. Like other books in this series, a critical component of What Radiology Residents Need to Know: Neuroradiology will be the additional images found online only. These images amount to twice the number in the print and e-book versions to fully illustrate points made in the text. This is an ideal guide for first year radiology residency learning neuroradiology.

What Determines Social Behavior? Investigating the Role of Emotions, Self-Centered Motives, and Social Norms Corrado Corradi-Dell'Acqua, Leonie Koban, Susanne Leiberg, Patrik Vuilleumier, Ernst Fehr, 2016-09-28 Human behavior and decision making is subject to social and motivational influences such as emotions, norms, and self-regarding preferences. The identification of the neural and psychological mechanisms underlying these factors is a central issue in psychology, behavioral economics, and social neuroscience with important clinical, social, and even political implications. However, despite a continuously growing interest from the scientific community, the processes underlying these factors as well as their ontogenetic and phylogenetic development have so far remained elusive. In this Research Topic, we collect articles that provide challenging insights and stimulate a fruitful controversy on the question of what determines social behavior. Indeed, over the last decades, research has shown that introducing a social context to otherwise abstract tasks has diverse effects on social behavior. On the one hand, it may induce individuals to act irrationally, for instance, to refuse money, but on the other hand, it improves individuals' reasoning in that formerly difficult abstract problems can be easily solved. These lines of research led to distinct, although not necessarily mutually exclusive, models for socially driven behavioral changes. For instance, a popular theoretical framework interprets human behavior as a result of a conflict between cognition and emotion, with the cognitive system promoting self-interested choices and the emotional system triggered by the social context operating against them. Other theories favor social norms and deontic heuristics in biasing human reasoning and encouraging choices that are sometimes in conflict with one's interest. Few studies attempted to disentangle between these as well as other models. As a consequence, although insightful results arise from specific domains, tasks, a

comprehensive theoretical framework is still missing Furthermore studies employing neuroimaging techniques have begun to shed some light on the neural substrates involved in social behavior implicating consistently although not exclusively portions of the limbic system the insular and the prefrontal cortex In this context a challenge for present research lies not only in further mapping the brain structures implicated in social behavior or in describing in detail the functional interaction between these structures but in showing how the implicated networks relate to different theoretical models This is Research Topic hosted by members of the Swiss National Center of Competence in Research Affective Sciences Emotions in Individual Behaviour and Social Processes We collected contributions from the international community which extended the current knowledge about the psychological and neural structures underlying social behavior and decision making In particular we encouraged submissions from investigators arising from different domains psychology behavioral economics affective sciences etc implementing different techniques behavior electrophysiology neuroimaging brain stimulations on different populations neurotypical adults children brain damaged or psychiatric patients etc Animal studies are also included as the data reported are of high comparative value Finally we also welcomed submissions of meta analytical articles mini reviews and perspective papers which offer provocative and insightful interpretations of the recent literature in the field

Functional Magnetic Resonance Imaging Rakesh Sharma, 2012-05-09 Functional Magnetic Resonance Imaging Advanced Neuroimaging Applications is a concise book on applied methods of fMRI used in assessment of cognitive functions in brain and neuropsychological evaluation using motor sensory activities language orthographic disabilities in children The book will serve the purpose of applied neuropsychological evaluation methods in neuropsychological research projects as well as relatively experienced psychologists and neuroscientists Chapters are arranged in the order of basic concepts of fMRI and physiological basis of fMRI after event related stimulus in first two chapters followed by new concepts of fMRI applied in constraint induced movement therapy reliability analysis refractory SMA epilepsy consciousness states rule guided behavioral analysis orthographic frequency neighbor analysis for phonological activation and quantitative multimodal spectroscopic fMRI to evaluate different neuropsychological states *Handbook on Optimizing Patient Care in Psychiatry* Amresh Shrivastava, Avinash De Sousa, Nilesh Shah, 2022-11-21 This handbook examines current mental health research challenges in patient care and advances in clinical psychiatry with the aim of improving approaches toward the screening of at risk individuals facilitating access to care and supervising rehabilitation Combining evidence based research with clinical case studies international experts provide detailed holistic insights into our understanding of mental disorders through biological social interpersonal and economical lenses Models of intervention prevention and treatment are provided along with methods for continued care and patient advocacy Finally experts analyze the future of psychiatric research and mental health care Readers will gain greater understanding of the finer nuances of handling psychiatric cases and a holistic perspective of optimizing patient care within this field This innovative book contributes to the development of community

management of various psychiatric disorders and will be of interest to case managers mental health workers doctors nurses and many more

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