four-dimensional sonography recordings, and the possibility to detect shear stress and plaque motion, have all increased the amount of in vivo information on vascular wall structure. US provides quantitative measures of early atherosclerotic changes and plaque progression or regression. Different trials are also evaluating the therapeutic effects of US when associated with thrombolytic agents.

There are many points of interest in this book, which should be considered one of the reference texts for all those who deal with stroke. It is to remark the clear, well illustrated, detailed, and practical exposition of various topics, authored by experts in different fields taking different approaches. This results in a rich, global, and varied perspective of the most important issues related to stroke.

The authors review exhaustively the physics and basic mechanisms of the US technique. The complex theoretical aspects of hemodynamics and arterial wall dynamics are conveniently illustrated with clear figures. Technical and practical applications of US in the diagnosis of cerebrovascular disorders are described, and the criteria for grading stenosis severity are also reviewed. Standards for carotid stenosis investigation and emphasis in the correlation between echo morphology and histological structures are well exposed and illustrated, also, with high quality pictures.

The authors devote a large part of the book to the developing fields of early atherosclerosis detection, such as quantitation of intima-media thickness and analysis of plaque motion. These new techniques would hopefully allow for better characterization of the echo morphology of the plaque, which would have practical repercussion in ascertaining the risk of stroke, and its management. The role of US in evaluating the effects of drugs in different trials such as statin trials is also summarized.

The chapter devoted to intracranial vessel examination is presented with striking images, but with less practical approach. Some aspects such as its role in diagnosis of cerebral death are somehow superficially described. Conversely, high intensity signals and cerebral vasoreactivity assessment are exhaustively analysed.

In summary, this book goes nicely over the main points underlying the present and immediate future development of cerebrovascular US, condensing all diverse and confluent views from many well known experts. We think that the book is of mandatory reading for those who would like to understand better the functional aspects of cerebrovascular blood circulation, and their abnormalities in patients with stroke.

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Detection of change: event-related potential and fMRI findings

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This book brings together a group of prominent cognitive neuroscientists who recap on an impressive amount of expertise on the neural mechanisms of change detection by means of fast brain activity recording techniques, such as electroencephalography (EEG), event-related potentials (ERP), and functional magnetic resonance imaging (fMRI). The scope of their review covers over 3 decades of experimental and clinical research in humans. Contributions from different experts have a common thread in the use of a well-known task paradigm of stimulus change detection, the so-called 'oddball paradigm'. In this paradigm the subject has to respond to one relatively infrequent target stimulus while ignoring all other nontarget events, which may be either frequent nontarget ('standards') or infrequent nontargets ('deviants'). The procedure involves the rapid sequential presentation of interspersed target and nontarget events, and can be implemented in any stimulus modality. This task and its variants have been extensively used in clinical neurophysiology and human psychophysiology to convey information about the brain mechanisms responsible for processing sensory change and stimulus novelty. In spite of its apparent simplicity, change detection provides an excellent benchmark to explore some fundamental issues in attention and memory research. These are but a few of the critical questions addressed in these pages: where and how does neural change detection occur? Are similar processes elicited across modalities? How do these events contribute to human perception, memory and attention?

The book consists of 10 chapters conveniently organized in 3 sections. The first section is devoted to mismatch negativity (MMN). It begins with a scholarly and well-written general overview (Kujala and Näätänen), which describes the technical parameters for MMN elicitation (i.e. frequency, intensity, spatial locus, duration, rise time of deviants), its clinical applications (i.e. speech-sound perception, Alzheimer's and Parkinson's disease, frontal lobe damage, closed-head injury), and an outline of some relevant theoretical issues (i.e. persistence of sound memories, neural loci for short- and long-term auditory memories). Chapter 2 presents an excellent research update of distraction paradigms—modified versions of the oddball paradigm (Alho, Escera and Schröger). These recent findings reveal a host of interactions between the MMN and other ERP indexes of stimulus onset detection (N1), attention switching (P3a), and reorienting of attention (RON) back to the relevant task. Chapter 3 presents new evidence about the elusive visual MMN, and also defines some plausible links between the auditory and visual MMN counterparts (Heslenfeld). In Chapter 4 there is a timely and thought-provoking critical review of the oddball paradigm

(Winkler). The main issue is whether the MMN, or indeed the P3a, might be regarded as an artefact of the 'unnatural' regularities in the oddball procedure. A series of studies demonstrate that these ERP features can be elicited in complex natural environments. This offers an alternative view of the MMN in terms of 'maintenance of acoustic regularities', and reveals important interactions between top–down and bottom–up mechanisms in MMN elicitation.

The second section is devoted to the 'oddball' P300 potential, and consists of a concise summary of historical hallmarks plus an integrative model (Polich). According to this model, the P3a and P3b are distinct ERP components resulting from the interaction between 'frontal lobe attentional control over the contents of working memory and the subsequent long-term storage operations'. Chapters 6 and 7 offer an updated review of the functional anatomy of the P3a and P3b components from lesion studies (Hartikainen and Knight), and an example of combined ERP and fMRI methods for exploring P300 brain potentials (Opitz), respectively. This last chapter also describes some technical difficulties in combining fMRI and ERP signal analyses, such as the anatomical, physiological, and statistical restrictions for electrical source modelling. Like most other chapters, those in this section will certainly serve as an up-to-date reference for researchers involved with the oddball P300 paradigm in experimental or clinical work. The clarity and simplicity of descriptions of crucial facts, theories, and functional anatomy make this useful as a primer textbook for graduate students. The golden thread of the oddball paradigm facilitates theoretical integration across the first two sections of this book, and also encourages the reader to think over some unexplained paradoxes in the conventional model of the oddball P300. The first paradox is that the P3a be regarded as an index of involuntary attention, even though it partly reflects activation from 'anterior attentional network' structures (i.e. cingulate, prefrontal cortex) that have been held responsible for the executive control of attention. Another paradox is that the target-related P3b be regarded as an index of voluntary attention, even though it is largely preserved after extensive prefrontal damage, and mostly reflects activation from the 'posterior attentional network'. Such paradoxes merit some consideration, and will definitely foster future research and theoretical integration with alternative models of change detection.

The third section will be of most interest to those concerned with developing new methods of electromagnetic signal analysis. Although not directly connected with the main topic of the book, these chapters present alternative ways for exploring fast spatio-temporal brain dynamics through a combination of EEG analyses in the frequency and temporal domains. Chapter 8 provides a nice introduction to high-resolution EEG technology, and introduces event-related potential covariances (ERPC), a measure of the coordinated activation in neuronal populations that may reveal functional interactions across distant cortical regions in the sub-second time scale (Gevins, Smith and McEvoy). This technology captures the essentially fast brain dynamics underlying mental operations. In Chapter 9, the reader can find several examples of how event-related desynchronization (ERD), a measure of spectral power time-locked to stimulus events, can be used to explore successful encoding and retrieval of episodic information (Klimesch). Under the assumption that different EEG frequencies convey information about different neural processes, Chapter 10 describes how oscillatory gamma (30–80 Hz) activity discloses attention-binding phenomena (Herrmann). This last chapter reviews relevant literature concerning the relation of gamma activity to human visual perception and attention, and provides illustrative examples of how gamma band analysis can be used to study the interactions between top–down and bottom–up attentional processes. Some useful technical tips are also provided for recording and analysing gamma activity, as well as for avoiding the contamination of unwanted artefacts.

Each chapter is complemented by an up-to-date and well-selected list of references. Perhaps there is some redundancy across chapters in the description of task paradigms, the definition of ERP measures, and their putative neural substrates. However, this will help the novice reader to flow smoothly from one chapter to the next. And it will also be of great value to the specialist, who can put side by side slightly different interpretations of the same component processes. A few concepts and speculative proposals in different parts of the book would perhaps benefit from some revision in future editions. For instance, take the concept of habituation. It is argued that the P3a reflects frontal function since it 'rapidly habituates'. For many neuroscientists, habituation denotes a simple form of nonassociative learning often studied in the sea snail *Aplysia*. Hence, it is probably inaccurate to use the same term to refer to the reported reductions in P3a amplitude after repetitive stimulation. This terminology is reminiscent of the early models of the 'orienting reflex', and surely needs an update in line with current models of higher brain functions.

A related problem derives from the definition of stimulus context in terms of 'the relative perceptual distinctiveness among stimuli'. Such a definition emphasizes the physical properties of stimulation, rather than the temporal and functional relationships among task events. Indeed, recent studies using task-cueing and other task switching paradigms have begun to unveil that context-updating is best construed in terms of task-change detection rather than stimulus-change detection processes. Within this new interpretative framework, it would be possible to elicit a change in the internal representations of stimulus–response mappings (or task sets), in the absence of any actual change in the physical parameters of stimulation. From current models of task switching, one could re-interpret any brain

responses to nontarget deviants in terms of a switch in attention to a secondary task. In fact, recent ERP findings have suggested a role of the P3a response in the executive control of task set switching, a proposal that should be kept in mind when confronting the two P300 paradoxes mentioned above. From this new perspective, the concept of 'stimulus change' would be subsumed within the wider concept of 'task change'. Indeed, the latest findings in this promising area of research hint at the existence of a common brain 'change detection' mechanism involved in the processing of both stimulus and task novelty.

These stimulating proposals would require to go 'beyond the oddball paradigm', as Winkler lucidly proposes in his title. Typically, oddball tasks define just one single task-set (i.e. 'press a button to named targets'), so that switching the attention away from this main task is involuntarily or exogenously mediated. In consequence, oddball-like tasks lay the emphasis on stimulus change detection at the expense of alternative accounts such as task switch detection. This interpretative bias may partly explain some of the P300 paradoxes mentioned above. Authors in the present volume realize that 'the observed effects of sound change on visual task performance did not truly reflect involuntary attention, as the subjects were covertly attending to the sounds' (p. 31). Indeed, human beings switch tasks constantly. The target in one task (i.e. reply to the mobile tune), may be the distractor for the next task (i.e. brake on the red light!), and vice versa. The solution to these disparities in the interpretation of ERP results should require a revision of how voluntary and involuntary attention modes are operationally defined in the oddball paradigm. A next step forward towards this direction would probably call for a comparison of results from stimulus- and task-related change detection paradigms.

In summary, this book is great reading. Not only does it recapture decades of knowledge on the brain mechanisms of change detection, but also stimulates future research efforts, and opens up new avenues of inquiry. Many neurophysiologists and other cognitive neuroscientists will enjoy it and, surely will feel interested in contributing to research on this fascinating area of human behaviour.

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