

Book reviews

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The Frontal Lobes: Development, Function and Pathology. Edited by J. Risberg and J. Grafman. (Pp. 240; £35.00; ISBN 0521672252 pb.) Cambridge University Press, 2006.

The mysteries of the prefrontal cortex continue to fascinate new generations of psychiatrists, neurologists and cognitive neuroscientists, and this edited volume provides a welcome addition to the literature on this topic. It is more introductory (and much less expensive!) than Stuss & Knight's comprehensive *Principles of Frontal Lobe Function* (2002), and several chapters would be suitable for undergraduate teaching. It is similar in format to Roberts *et al.*'s *The Prefrontal Cortex: Executive and Cognitive Functions* (1998), and serves as a useful update to this decade-old volume. Across the eight chapters, the reader is introduced to the core themes of anatomical, pharmacological and computational organization of the prefrontal cortex (Barbas, Wang), the neurodevelopment of the region (Dennis), and the wealth of neurocognitive functions associated with the prefrontal cortex, including working memory, long-term memory, inhibition and decision-making (Grafman, Ragland). The functional and anatomical heterogeneity of the region is emphasized throughout. Barbas proposes a tripartite organization of the frontal lobes into lateral, medial and orbital subregions; with dysfunction of these subregions resulting in behavioural symptoms involving cognitive control, motivation and emotion, respectively.

Fittingly, the volume highlights are provided by the two editors. Grafman's chapter provides a succinct overview of the major current theories of frontal lobe function, including the working memory model, the supervisory attentional system, the somatic marker hypothesis, and the adaptive coding model. There is a candid and insightful comparison of their strengths and weaknesses, considered in terms of processing approaches that associate the prefrontal cortex with specific functions like inhibition or

working memory, compared to representational approaches that aim to establish the kinds of information that may be held in the prefrontal region.

The chapter by Risberg considers the evolutionary aspects of prefrontal cortex function, a perspective that has been generally overlooked in other edited volumes. Whilst it is controversial whether the entire frontal lobes are disproportionately larger in humans, there is strong evidence that frontal subregions like Brodmann Area 10 are larger than in our primate relatives. The possible adaptive strengths of these changes include tool-making, cooking, skilful hunting, teaching and socialization. However, these changes come at a cost: the large human brain is at increased risk for disease and injury, and psychiatric illnesses like schizophrenia may be inevitable side-effects of our evolutionary success.

The overall bias of the volume is towards human research, and neuropsychological deficits associated with frontal damage are particularly well-covered. Loring and Meador's chapter provides a historical overview of how our understanding of frontal lobe function has changed since Phineas Gage's seminal injury in 1848, and some subsequent influential case studies. They highlight how much of the research inspired by Gage has neglected to mention that initial descriptions focused on Gage's remarkable survival and cognitive *integrity* after such extensive brain damage. It was not until Harlow's 1968 report that Gage's personality change was noted, 7 years after Gage's death and 20 years after his accident.

Had Gage's accident occurred prior to adulthood – during the protracted period of prefrontal neurodevelopment – it is likely his social and neurocognitive abilities would have been more severely compromised. Dennis' chapter reviews the complex effects of childhood damage to the prefrontal region, for example, in childhood traumatic brain injury or phenylketonuria. The psychiatric implications of prefrontal dysfunction are profound, and many psychiatric disorders may be better characterized as a gradual process of abnormal prefrontal

neurodevelopment than an acute and localized prefrontal 'lesion'.

A chapter of chapters touch upon the putative role of prefrontal disruption in the aetiology of schizophrenia (Barbas, Wang, Risberg, Ragland), and the final chapter by Brun & Gustafson provides a clear picture of the distressing and insidious effects of frontal dementias on patients and their families. My only complaint is that other disorders are generally overlooked. I would have welcomed more discussion of the potential roles of the orbital and medial prefrontal subregions in depressive, anxious and addictive disorders, where cognitive neuroscience has provided a wealth of research findings in recent years.

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References

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Handbook of Psychophysiology (3rd edn). By J. T. Cacioppo, L. G. Tassinary and G. G. Berntson. (Pp. 908; \$175.00; ISBN 0521844711 hb.) Cambridge University Press. 2007.

The field of psychophysiology deals with the relation between psychological processes and the associated multi-faceted physiological responses. Recent technological advances – mainly those that allow non-invasive assessment of activity in the central nervous system – have drastically broadened the scope of this relatively young scientific discipline. In light of this expansion, any appropriate handbook must: (1) offer a comprehensive review of a truly daunting number of research areas and methods, (2) integrate such diversity into a coherent body of work, and (3) supply accessible material that includes theoretical background information as well as more practical insights in techniques and research approaches. The 3rd edition of the *Handbook of Psychophysiology*, edited by Cacioppo, Tassinary and Berntson, succeeds

commendably on the first and third count, and sufficiently on the second.

The textbook consists of 36 short chapters and is globally organized into two parts, each comprising three sections. The first part, titled 'Foundations of Psychophysiology', addresses a wide array of physiological systems and their measures. Section 1 describes techniques capable of assessing or altering activity in the central nervous system, with individual chapters focusing on topics such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG) and transcranial magnetic stimulation (TMS). Section 2 offers in-depth descriptions of the more traditional psychophysiological measures of the peripheral nervous system, such as those that probe cardiovascular, electrodermal and electromyographic responses. Moreover, attention is given to areas that, despite their unique contributions, are often overlooked in psychophysiological research (e.g. respiration, sexual response and gastrointestinal function). The last section of Part 1 deals with physiological responses on the cellular and humoral level, with chapters centring on topics like the endocrinology of stress and the innate and adaptive immune systems. All chapters in the first part of the book start out with succinct descriptions of the historical context in which the specific physiological system should be viewed, followed by detailed biological background information and, if applicable, the physical rationale behind the relevant techniques. For instance, the chapter on the cardiovascular system written by Berntson, Quigley and Lozano eases readers into measures like electrocardiography by giving a very clear review of the basic anatomy and physiology. However, this background information can easily be skipped by the advanced reader, since the rest of the chapter is accessible and can be read independently. After a basic grounding, chapters give specific examples of how the discussed system has bearing on psychophysiological research. For instance, the chapter on event-related potentials (ERPs) offers insights in both the parametric characteristics and theoretical implications of several prominent ERPs; just as the chapter on EEG does for oscillation rhythms. However, the strongest point of all these chapters is the way in which their uniform structure fluently paves the way for a description of issues pertaining to the pragmatics of these techniques. For instance, the excellent