

## Book Reviews

**SPEHLMANN'S EVOKED POTENTIAL PRIMER VISUAL, AUDITORY AND SOMATOSENSORY EVOKED POTENTIALS IN CLINICAL DIAGNOSIS.** 1994. Edited by Karl E. Misulis. Published by Butterworth-Heinemann. 243 pages.

As pointed out by the author in the preface, this book is a sequel to a previous text by Rainer Spehlmann entitled "Evoked Potential Primer". The book follows the proper format and builds upon Dr. Spehlmann's text. The emphasis is clearly on evoked potential methodology and utility as these apply to current clinical practice. As such it will be of interest to both beginning and experienced practitioners in the field.

Strengths of the book include a comprehensive discussion of technical aspects of stimulation and recording parameters. Discussion of methods of activating particular components of the auditory, visual or somatosensory inputs are particularly thorough. Clinical correlations with central lesions are presented in phenomenological fashion and are comprehensive.

The text correctly identifies the current practice of using evoked potentials primarily for monitoring brain function in the operating room setting. This reviewer believes that the tendency to avoid neurophysiologic examination of peripheral (including proximal nerves and dermatomes) and central structures in neurologic syndromes has been overdone, driven largely by financial pressures from insurance carriers and not based on vigorous cost-benefit comparison with imaging methods. A discussion of the differences and complementary aspects of neurophysiologic and imaging (MRI and PET scanning) data would have been helpful to counter balance this deficiency in modern practice.

A specific deficiency in the text is an inadequate discussion of source localization problems and methods to address these. This area is one in which knowledge is expanding at a very rapid rate. One would anticipate that developments in analysis of surface recorded voltage and magnetic fields will define an important part of the future of clinical neurophysiology. This deficiency, although important, does not detract from the overall quality and usefulness of this text, which I would rate as very high.

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**NEURAL ACTIVITY AND GROWTH OF THE BRAIN.** 1994. By Dale Purves. Published by Cambridge University Press. 108 pages.

This little book, available in both hardcover and softcover editions, is a series of four lectures delivered in June, 1992 in Pisa, Italy, by Professor Dale Purves, a distinguished developmental neurobiologist who has devoted his career to studying postnatal brain growth, correlations with synaptic development and functional inputs that modify them. One might regard this book as a series of essays and includes a list of references, though the latter is far from a complete bibliography.

The principal hypothesis defended by the author is that postnatal brain growth is modulated by the differential metabolic and electrical activity of its component parts, the "glow and grow" theory, to explain the fourfold increase in cerebral volume after birth in both the human and the rat, this increase being mainly in the neuropil. Functional activity modulates this neuropil growth to stabilize or to help select useful connections. Professor Purves asserts that the brain is constructed by the gradual accretion of circuitry rather than

by the selection of circuitry from initial excess. It is this latter point upon which I and many developmental neurobiologists do not share his view. He does acknowledge that there is a physiological deletion of transient excess axonal collaterals and synapses, but he depreciates the importance of this "pruning" in the fetal and postnatal brain and regards it as a minor detail. The contrary view is that pruning is the major developmental process that converts diffuse, generalized projections into selective, precise connections to subserve specific functions. Dr. Purves introduces this "contrary view of brain development" by the statement "Every good argument needs a foil". His selection of references also deletes numerous important papers that provide strong scientific support for the role of selective deletion in the development of specificity of brain function.

A second hypothesis defended in this book is that experience permanently alters neuronal circuitry, thereby storing information which becomes expressed as memory, learning and behaviour. This hypothesis was first proposed by the psychologist Donald Hebb in 1849 and was subsequently advanced by many other psychologists and, regrettably, by many pseudoscientists with sociological views of "enhanced" or "impoverished" human environments, which in turn damaged its credibility and impaired objective research in the scientific community.

The first lecture is on "brain maps" in which the author presents evidence from his work and that of other investigators in which he shows that regional brain growth is in relation to the functional importance of various parts more than in relation to the actual anatomical size of a particular part of the body represented, i.e., the vibrissae of the rat and the hands and face of the human having a disproportionately large area of sensory and motor cortex regulating them, the now classical "humunculus" of neuroanatomical texts. Lecture 2, "modules", explores the vertical columnar organization of cortical units, introduced with the history of the developmental work from the morphological studies of Golgi (1874) and Lorente de Nó (1922), to the electrophysiological studies of Mountcastle (1950s) to the discovery of ocular dominance columns by Hubel and Wiesel (1960s through 1980s) and somatosensory dominance columns by Woolsey (1950s through 1970s) to Purves' own work (1980s) on the histochemical demonstration of such dominance columns as "barrels" in the cortex. Though his own experimental work is solid, he then depreciates it in my mind by making a ridiculous analogy between cortical barrel organization and the alternating stripes of zebras and patches of giraffes in the fur of these animals. While this analogy is appealing in its simplicity, the well established embryological origin of gene expression in dermatomal segments that cause such distinctive fur patterns have nothing to do with the ontogenesis of the brain.

Lecture 3, "trophic interactions" addresses the synaptic organization of the developing brain and classical patterns of convergence and divergence. The work of Hubel and Wiesel in the organization of the visual system is greatly admired by Purves and is heavily cited. The influence of trophic factors in the growth of neurites, terminal axonal sprouting and synaptogenesis also are emphasized and, in my view, appropriately so. Lecture 4, "activity", is a functional integration of the neuroanatomical and neurophysiological aspects of developing discussed in earlier chapters. Purves discusses his own histochemical demonstration of oxidative enzymatic activity and also the microvasculature of barrels within the cerebral