
Two essays from the forthcoming The Neurosciences: Fourth Study Program are selected for prior publication. Mountcastle's paper entitled "An organising principle for cerebral function: the unit module and the distributed system" is an important condensation of his well-known studies on cortical function. In ontogenetic development, migration of neurones along the surfaces of radially orientated glial cells causes a columnar organisation of cortical cells, microcolumns, assembled into columns which have strikingly similar morphology and processing functions in all areas, the functional differences depending on specific input and output connections. The details are interesting—for example, that only those columns in which stimulation produced movement of the fingers contained neurones with cutaneous receptor fields. The columnar organisation exhibits partially shifted overlap, local sign being sharpened by surround inhibition. General regulatory systems engage the cortex in all its layers and do not have columnar modules. The latter form distributed systems and one or more columns may be involved separately or synchronously in different distributed systems. As Mountcastle points out, the complex function controlled or executed by the system is not localised in any one of its parts, yet the parts are not equipotential in Lashley's sense. Distributed systems are re-entrant and cycle phasically, allowing continual updating of the perceptual image of self and its world, matching the neural replication of the external continuum with a readout of internally stored information (unlocalised). Thus for Mountcastle, unlike Eccles, conscious awareness does not require external influences incompatible with thermodynamic laws.

Edelman will be less well known to British readers as his neurobiological theories arise from immunobiology which leads him to a selectionist—as contrasted with instructionist—theory of neuronal organisation, the detectable signals being limited by genetic constraints modified by early development, independently of the structure of outside signals. There is then a hierarchy of "recognition" and "recognition of recognisers" but unlike earlier formulations this is not regarded as an infinite sequence. Groups of cells have primary and secondary repertoires, altered by selection and commitment during experience, important modifiers being repetition of input, including re-entrant inputs, and association. Versatility is provided by making selection by cell groups "degenerate", a term used to mean that, under given threshold conditions, there must be more than one way of satisfactorily recognising a given input signal, a more flexible safety factor than "redundancy". There is a most interesting discussion of how re-entrant signalling between inputs and recognisers in a phasic model can signal temporal order, an important feature missing from earlier models but essential for speech and other higher functions including, according to Edelman, conscious awareness. It is, of course, a model but the author lists some predictions and consequences, including six conditions which, if they held, would falsify the theory.

In his thoughtful introduction Francis O. Schmitt indicates how well the Edelman model fits with the experimental findings and conclusions of Mountcastle. Unquestionably this book will help to make cerebral function intelligible, a valuable template for interpreting new observations.

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This volume is divided into seven sections dealing with nerve pathology, axonal transport, the neuropathies of chronic renal failure and diabetes, compression neuropathies, the metabolic, genetic, and inflammatory neuropathies, and ends with a miscellaneous section containing eight papers on a variety of observations on peripheral neuropathy. It is always difficult in a book of this size containing so many individual contributions from many different authors to single out any one author or group of authors for special comment. How-

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