Reprogramming the Cerebral Cortex
Stephen Lomber and Jos Eggermont (eds)

The brain has a remarkable ability to adapt in the event of damage — in many cases shifting responsibility for specific cognitive functions to other non-damaged brain regions. This ‘plasticity’ can be crucial in aiding recovery from stroke, trauma, and peripheral damage such as eye or ear damage. Over the past thirty years our view of cortical plasticity has evolved greatly. Early studies suggested that changes to cortical function due to peripheral lesions could only occur during development and that these plastic changes were specific to a particular temporal window or ‘critical period’. Over time, it has been demonstrated that cortical modifications as a consequence of either peripheral or central lesions can induce adaptive, or beneficial, changes in cortical function in an effort to preserve or enhance function. More recently, studies have identified that many of these adaptive changes, once thought only possible in the developing brain, are also possible in the mature or developed brain. At present, many laboratories are defining the beneficial capabilities of cerebral cortex plasticity, upon which many proactive and therapeutic strategies may be developed in order to maximise the ‘reprogramming’ capabilities of the cerebrum. This book describes these exciting studies and examines adaptive cortical plasticity in a variety of systems (visual, auditory, somatomotor, cross-modal, language, and cognition).

Peripheral nerve regeneration
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in Brain Damage, Brain Repair
Mammals have retained the ability to regenerate axons in the peripheral nervous system (PNS) and, if properly treated, can regain much of the function that is lost after peripheral nerve damage. Not only do the axons regenerate in the periphery, but they restore functional motor connections with muscles, and functional sensory connections with the skin. Nevertheless, peripheral nerve repair is seldom perfect, due both to problems of axon guidance and to other factors that can limit regeneration. There are, therefore, several problems that need to be solved before a regenerated peripheral nerve can completely restore normal function.