Brain: The neuroconstructivist approach
Annette Karimiloff-Smith

in Neurodevelopmental Disorders Across the Lifespan: A neuroconstructivist approach
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This chapter examines how the Williams syndrome (WS) brain in particular and atypically developing brains in general differ from the typical brain in terms of structure, function, physiology, and biochemistry. It stresses the multidirectional interactions between genes, cognition, behaviour, and brain, raising such questions as whether, in WS, the parietal cortex starts out smaller or whether it becomes smaller over developmental time because of atypical processing in that region. It bemoans the fact that almost everything we know about the WS brain emanates from studies of adult brains and stresses the need to trace brain anatomy, brain biochemistry, and brain function across developmental time, that is, to study the developing brain across time from infancy to adulthood. The chapter also highlights the need for in-depth cross-syndrome comparisons at the cerebral level.

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

Cell Death
Stevens K. Rehen and Jerold J.M. Chun

in Brain Development: Normal Processes and the Effects of Alcohol and Nicotine

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The importance of cell death in the formation of the central nervous system has become well established over the past several decades. Understanding cell death in the developing brain is one of the most exciting areas of research in neuroscience. This chapter focuses on the mammalian fetal cerebral cortex as a paradigm of study.

Cerebral Plasticity
Leo M. Chalupa, Nicoletta Berardi, Matteo Caleo, Lucia Galli-Resta, and Tommaso Pizzorusso (eds)

Published in print: 2011 Published Online: August 2013
DOI: 10.7551/mitpress/9780262015233.001.0001

The notion that neurons in the living brain can change in response to experience—a phenomenon known as “plasticity”—has become a major conceptual issue in neuroscience research as well as a practical focus for the fields of neural rehabilitation and neurodegenerative disease. Early work dealt with the plasticity of the developing brain and demonstrated the critical role played by sensory experience in normal development. Two broader themes have emerged in recent studies: the plasticity of the
adult brain (one of the most rapidly developing areas of current research) and the search for the underlying mechanisms of plasticity—explanations for the cellular, molecular, and epigenetic factors controlling plasticity. Many scientists believe that achieving a fundamental understanding of what underlies neuronal plasticity could help us treat neurological disorders and even improve the learning capabilities of the human brain. This book offers contributions from leaders in the field that cover all three approaches to the study of cerebral plasticity. Chapters look at normal development and the influences of environmental manipulations; cerebral plasticity in adulthood; and underlying mechanisms of plasticity. Others deal with plastic changes in neurological conditions and with the enhancement of plasticity as a strategy for brain repair.

Reflection
Saskia K. Nagel
in The Faculties: A History
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This final Reflection looks at our natural desire to enhance our mental states, and improve upon them. Humans have tried many methods of enhancing mental states including psychoactive substances which act to achieve different perceptions, thoughts, and feelings. The most relevant way to enhance faculties in the modern world is through psychoactive drugs which can effect muscle strength, sleep, sexuality, cognitive capacities, and affective states. It is still unclear, however, what is enhanced by the sorts of interventions we use now. The physiological and psychological short- and long-term effects of psychotropics on the developing human brain have not yet been systematically investigated in humans.