Memory Development and Frontal Lobe Insult
Gerri Hanten and Harvey S. Levin
in Origins and Development of Recollection: Perspectives from Psychology and Neuroscience
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This chapter addresses the effect of traumatic brain injury (TBI) on memory skills in children. To provide a framework for the discussion of the neurobehavioral consequences of TBI in children, it first offers a brief overview of memory development and some findings regarding the relation between neural structure and memory performance in children. The multicomponent nature of memory interacts with injury variables, including the severity of impaired consciousness and associated multifocal and diffuse brain insult, together with focal lesions in the frontotemporal region, to contribute to persistent memory deficit after severe TBI in children. Prefrontal dysfunction during working memory performance is also demonstrated, suggesting that active maintenance of representations is especially altered in children with TBI, implicating compromised strategy use. Early age at the time of severe TBI is related to persistent impairment of declarative memory possibly due to diffuse axonal injury and a disruption of the neural network mediating development of this ability.

Brain and Spinal Cord Injury
Lorene M. Nelson, Caroline M. Tanner, Stephen K. Van Den Eeden, and Valerie M. McGuire
in Neuroepidemiology: From principles to practice
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Up to 50% of all trauma deaths in the United States involve significant injury to the brain or spinal cord. This chapter highlights the public health significance of traumatic brain and spinal cord injury and examines methodological issues in studies of the epidemiology of these injuries. It addresses methodological challenges in epidemiologic and clinical studies of brain and spinal cord injury, including difficulties in case ascertainment, differing approaches to brain injury classification, and measurement issues in brain injury severity and outcome scales. The chapter summarizes scientific literature addressing demographic and lifestyle risk factors for brain injury including age, sex, and alcohol consumption. External causes of traumatic brain and spinal cord injury are also discussed, including transportation-related injuries and increasingly recognized sports-related brain injuries.

Is more aggressive treatment of pediatric traumatic brain injury worth it?

J. Mick Tilford and Ali I. Raja

in Economic Evaluation in Child Health

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Traumatic brain injury (TBI) is a major health problem worldwide and is often referred to as the ‘silent epidemic’. The uncertainty faced by clinicians in treating children with severe brain injuries is controversial with important clinical and social implications. This chapter weighs the costs and consequences of aggressive treatment of pediatric TBI. It is organized into three sections. First, the physiology and treatment of TBI in children is described. Second, a cost-effectiveness analysis evaluating technology improvement in the treatment of pediatric TBI is presented. This analysis incorporates quality-adjusted life years (QALYs) using published data on preference-weighted health outcomes for children with TBI. Finally, the implications and clinical policy relevance of the analysis are discussed and additional research that could inform clinical policy is outlined.
Inflammatory responses to traumatic brain injury: an overview for the new millennium

Maria-Cristina Morganti-Kossmann, Mario Rancan, Philip F. Stahel, and Thomas Kossmann

in Immune and Inflammatory Responses in the Nervous System

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This chapter presents an overview of the major developments in the study of inflammatory responses to traumatic brain injury (TBI), reviewing the controversial role of inflammatory responses after TBI resulting from clinical and experimental studies. It analyses the interaction of immune-competent cells of the central nervous system with the systemic immune system and discusses the controversy of the protective versus the deleterious consequences of immunoactivation.

Executive Functions after Frontal Lobe Injury: A Developmental Perspective

Vicki Anderson, Harvey S. Levin, and Rani Jacobs

in Principles of Frontal Lobe Function

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This chapter contrasts normal cerebral and cognitive development with that of children who have sustained frontal pathology. It focuses specifically on the domain of executive function, with the assumption that frontal regions are essential to the development and implementation of efficient executive skills. It discusses two studies from that illustrate the impact of frontal lobe pathology during childhood and the problems of assessing these skills accurately with current methodologies. The first study describes an ongoing program of research that examines the range of executive deficits exhibited by children who have sustained traumatic brain injury involving the frontal regions. The second study investigates the impact of focal frontal lesions during childhood, with an emphasis on approaches to the measurement of executive function.
Cognitive and behavioural disorders following traumatic brain injury

Anna Mazzucchi

in Cognitive Neurology: A clinical textbook

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Traumatic brain injury (TBI) could be defined as an insult to the brain caused by an external force producing altered states of consciousness that result in impaired cognitive or physical functions. TBI, especially if severe, can produce structural and functional modifications of the brain, which in turn can result in a highly variable and complex interaction of symptoms depending on the motor, sensory, cognitive, emotional, behavioural, and autonomic spheres. The brain during traumatic collision is prone to insults due to a complex combination of acceleration and deceleration and translation and rotation forces causing contusions, diffuse axonal injuries (DAI), and haemorrhages. Moreover, damages to neurons may occur as a consequence of biochemical modifications as a consequence of a drop in the levels of oxygen and glucose, and, finally, because of blood hypotension or increased intracranial pressure. This complex combination of and interaction among insults tends to produce a heterogeneous association of diffused and focalized damages that affect every possible area of the brain: cortical, subcortical, and midbrain. In addition, mild TBI can produce cerebral damage whose severity is directly correlated with the length of loss of consciousness and of post-traumatic amnesia.

Effect of orbitofrontal lesions on mood and aggression

Pamela Blake and Jordan Grafman

in The Orbitofrontal Cortex

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This chapter reviews the effects of lesions in the orbitofrontal cortex (OFC) on mood states and aggressive behavior. Particular attention is paid to studies of patients with traumatic brain injury, although data from patients with stroke or degenerative disorders are also presented. Lesions of the OFC have been observed to cause disinhibited, impulsive states that result in an increase in impulsive aggression. Problems with reduced empathy and social processing may further contribute to the
clinical picture. OFC lesions are not as closely associated with depression as are dorsolateral lesions. The current literature on the effects of OFC lesions in the development of anxiety appear contradictory, with some studies showing increased and others showed decreased anxiety symptoms. Methodological issues that hinder interpretation of the effects OFC lesions on personality and mood are discussed.

The Effects of Focal and Diffuse Brain Injury on Behavior
Brian Levine

in Mind and the Frontal Lobes: Cognition, Behavior, and Brain Imaging
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Standardized neuropsychological tests are often ineloquent to the real-life deficits endured by patients with damage to the frontal lobes. The Strategy Application Test was designed to mimic real life situations in which the most adaptive response is neither dictated by the examiner nor transparent in the test materials. While patients with frontal lesions are impaired on this test, so are patients with diffuse injury. Diffuse injury causes deficits on “frontal” or executive function tasks by disrupting integrated brain function. Traumatic brain injury, multiple sclerosis, ischemic white matter disease, unsuccessful aging, dementia, and psychiatric conditions that cause diffuse injury account for a large proportion of functional disability due to brain disease. Structural and functional neuroimaging research on traumatic brain injury demonstrates the widespread neuropathology of diffuse injury, the effects of which can be revealed through analysis of activation patterns and functional connectivity, providing adjunctive information to behavioral testing and supporting patients’ claims of increased mental effort on cognitive tasks, even when their performance appears normal.

Brain injury and social exclusion
Michael Oddy, Sara da Silva Ramos, and Deborah Fortescue

in Social Determinants of Health: An Interdisciplinary Approach to Social Inequality and Wellbeing
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This chapter examines the link between brain injury and social exclusion. Evidence suggests that people belonging to socially peripheral and disadvantaged groups are more likely to have suffered an acquired brain injury (ABI), particularly a traumatic brain injury (TBI). However, it is not clear whether this association is due to common risk factors for social exclusion and for brain injury, or whether each increases the risk of the other. The chapter first considers screening for brain injury, with particular emphasis on the Brain Injury Screening Index (BISI), before discussing a number of potential risk factors for brain injury such as homelessness and offending. It then describes a low-cost, low-intensity intervention known as the Linkworker system developed by The Disabilities Trust Foundation (TDTF) and concludes that self-reports of brain injury are an important source of evidence that TBI is prevalent in socially marginalised groups such as offenders and homeless people.

Aetiologies and anatomy of confabulation
Armin Schnider

in The Confabulating Mind: How the Brain Creates Reality
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What diseases cause confabulations and which are the brain areas whose damage is responsible? This chapter reviews the causes, both historic and present, of confabulations and deduces the anatomo-clinical relationships for the four forms of confabulation in the following disorders: alcoholic Korsakoff syndrome, traumatic brain injury, rupture of an anterior communicating artery aneurysm, posterior circulation stroke, herpes and limbic encephalitis, hypoxic brain damage, degenerative dementia, tumours, schizophrenia, and syphilis. Overall, clinically relevant confabulation is rare. Some aetiologies have become more important over time, others have virtually disappeared. While confabulations seem to be more frequent after anterior brain damage, only one form has a distinct anatomical basis.

Cognitive rehabilitation outcomes for traumatic brain injury
Nancy Carney and Hugo du Coudray

in The Effectiveness of Rehabilitation for Cognitive Deficits
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In 1998, the Evidence-Based Practice Center (EPC) of Oregon Health and Science University (OHSU) conducted a systematic review of the scientific literature about the effectiveness of cognitive rehabilitation for the treatment of traumatic brain injury (TBI) in adults. The review was part of a larger report, funded by the Agency for Healthcare Research and Quality (AHRQ), in which the evidence for the effectiveness of rehabilitation interventions for TBI at various phases of recovery was summarized. This chapter summarizes the process and findings about cognitive rehabilitation from that report, as well as the findings from an update conducted to review the literature from 1998 to 2002.

Task Switching and Executive Dysfunction
Abhijit Das and Glenn R. Wylie

in Task Switching and Cognitive Control

This chapter reviews the current scientific literature on task switching and executive dysfunction in stroke, Parkinson's disease (PD), Huntington's disease (HD), traumatic brain injury (TBI), and schizophrenia. It shows that different disease conditions, with their varying pathophysiological mechanisms, differently affect task switching.

Concussion, neuroethics, and sport: Policies of the past do not suffice for the future
Brad Partridge and Wayne Hall

in Neuroethics: Anticipating the future

Concussion management policies have become a major priority worldwide for sports that involve frequent collisions between participants because repeated head trauma has been associated with long-term cognitive impairments, mental health problems, and some forms of neurological degeneration. A number of concussion management policies have been developed by professional bodies and subsequently adopted by various sporting leagues. These have offered little guidance on how to navigate ethical issues in identifying and managing concussion. This chapter discusses ethical issues that arise in the diagnosis of concussion,
debates about the longer-term consequences of repeated concussion injuries, and the design and implementation of policies that aim to prevent and manage concussion injuries in sporting matches.

The history of confabulation
Armin Schnider

in The Confabulating Mind: How the Brain Creates Reality
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The interest in confabulations has a long history. Starting with Korsakoff’s early reports of pseudo-reminiscences in alcoholic and malnourished patients and Kraepelin’s description of fantastic confabulations in psychosis and syphilis, this chapter examines a rich literature which documented in fine detail the various presentations and causes of confabulations. Korsakoff syndrome was recognized as the combination of amnesia, disorientation, and confabulation. Authors soon distinguished between different forms of confabulation. From the beginning, they speculated about the mechanisms and indeed anticipated most of the currently proposed models. The chapter finishes with a table comparing old and new terminology of the proposed mechanisms.

Acoustic Territories
J. Martin Daughtry

in Listening to War: Sound, Music, Trauma, and Survival in Wartime Iraq
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This chapter discusses the spatial impact of belliphonic sounds, and the extent to which open and enclosed spaces can shape and be shaped by the sounds that pass through them. Sounds territorialize space, and belliphonic sounds territorialize space violently. In wartime Iraq, acoustic territories ranged in size from the vast outdoor spaces where the sounds of explosions resonated to the delicate fluid-filled enclosures within the body that vibrated in concert with belliphonic sounds. These territories, particularly the fleshy ones inside the body, proved to be highly vulnerable to the sonic forces that invaded them in Iraq, as sensory excess was amplified in wartime, a fact that makes human resilience in the face of belliphonic violence all the more remarkable.