

Conference

Saturday 20th June 2015

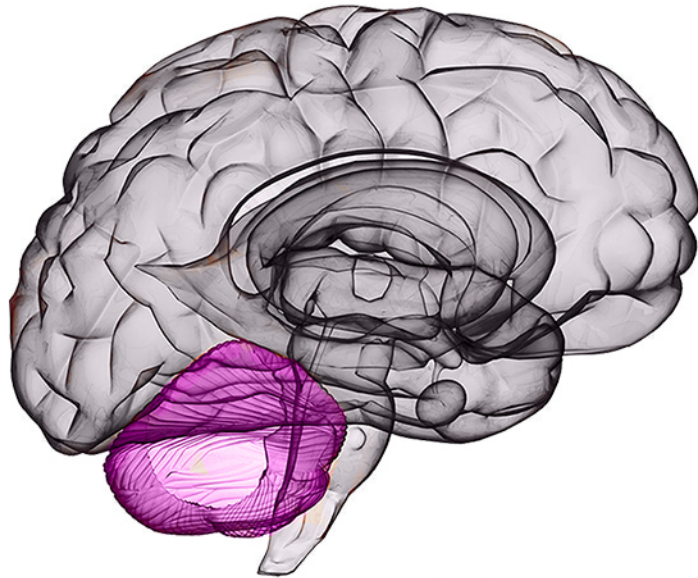
Cerebellum

What is its role in Neuro Rehabilitation?

Workshop

Sunday 21st June 2015

Executive Function



Cerebellum

What is its role in Neuro Rehabilitation?

The Cerebellum is most commonly known for its role upon regulating rate, rhythm, force and accuracy of movement. However its role is by no means limited to motor control and it is the aim of our conference to further expand our knowledge on the varying roles of the Cerebellum and how it integrates with the following:

- Visual system
- Cognition
- Sensory Processing
- Language Processing

With a deeper understanding of the Cerebellum, we in turn hope to facilitate discussion with the panel of guest speakers, of how this knowledge can be related to our current clinical practice.



20th June 2015 Conference
21st June 2015 Workshop

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Location: Birkdale Neuro Rehabilitation Centre, Fairbanks Court, Atlip Road, HA0 4GJ

Conference Agenda

<u>Time</u>	<u>Topic</u>	<u>Lecturer</u>
08.30 - 09.00	Registration and Tea/Coffee	
09.00 - 10.00	Physiology and Anatomy of the Cerebellum	Dr Erwin Van Wegen
10.00 - 11.00	Anatomy and Physiology of the Cerebellum and its Role in Visually Guided Movements	Dr Nadia Cerminara
Coffee Break		
11.30 - 12.30	Visual Processing and the Cerebellum	Dr Dee Birtles
12.30 - 13.00	Question Time	
Lunch Break		
14.00 - 15.00	Language Processing and the Relationship to Movement Disorders	Dr Alan Gray
Coffee Break		
15.15 - 16.15	Cerebellum and Cognition	Dr Deborah Budding
16.15 - 16.45	Question Time	

Erwin van Wegen PhD



Dr. van Wegen is senior researcher in motor control, learning and rehabilitation in movement disorders. His research over the years has focused on the coordination of locomotion and balance in relation to neurorehabilitation, specifically in Parkinson's Disease, Stroke, MS and the elderly. Dr. van Wegen is currently employed at the VU University Medical Center (dept. of Rehabilitation Medicine) and member of the MOVE research institute amsterdam. He is local coordinator in several national and international multicenter grant projects (EU, ZonMW, Hersenstichting). In addition, he is lecturer and coordinator of several Bachelor and Master courses in Medicine and Human Movement Sciences at the Vrije Universiteit Amsterdam. Dr. Van Wegen is also deputy-treasurer of the Dutch Society of Neurorehabilitation (www.dsnr.nl).

Abstract - Physiology and Anatomy of the Cerebellum

The cerebellum is involved in coordination of movement as well as standing balance and postural stability but also plays a role in planning, initiating and long-term memory of movements (i.e. motor learning). This lecture will address some basic physiology and anatomy of the cerebellum and discuss its role in rehabilitation, especially in the context of a research program on the application of non-invasive transcranial direct current stimulation (tDCS) combined with exercise training in stroke rehabilitation. Findings from recent studies on motor cortex tDCS in stroke patients and cerebellar tDCS in healthy subjects show promise for the possible role of non-invasive cerebellar tDCS in improving (the prognosis of) lower limb function and standing balance control after stroke. An intervention study, combining Virtual Reality Postural Feedback Therapy with cerebellar tDCS to improve control of standing balance is explained that tests the added value and applicability of such an early applied intervention in clinical stroke care.

Dr Nadia Cerminara

Dr Nadia Cerminara is a research fellow at the University of Bristol, UK. She obtained her Ph.D. in neurophysiology from Monash University, Australia in 2002. Using an in vivo systems level approach, a key aim of her work is to determine the information processing that occurs in cerebellar circuits during the performance of both new and well-rehearsed movements.

Abstract - Anatomy and Physiology of the Cerebellum and its Role in Visually Guided Movements

An investigation into how vision guides movement inevitably leads to the cerebellum because this is where visual information is directed and is thought to provide the main pathway that links the visual to the motor centres. In particular, the cerebellar hemispheres receive inputs from extrastriate visual areas and neurons in this region of the cerebellum are particularly responsive to moving visual targets and to visual events. Lateral cerebellar injury also results in characteristic defects of visuomotor control. Therefore both the anatomy and pathology suggest a critical role for the lateral cerebellum in the visual guidance of movement. Exactly how the cerebellum controls limb movements in visually guided reaching is still vigorously debated. However, much routine behaviour is thought to depend on the cerebellum operating in a way that involves prediction.

Predictive behaviour can be achieved through what are known as internal models or 'motor memories'. Internal models are proposed as a way for the central nervous system to maintain accurate movements and optimise performance in the presence of long feedback delays in sensorimotor loops. My talk will provide evidence that activity of cerebellar neurones may reflect the operation of an internal model of a visual target which could be used in a predictive capacity in the interception of a moving object.

Dr Deirdre Birtles



Dee Birtles is a Research Fellow at the Institute for Research in Child Development, University of East London. She previously held research posts at University College London in the Department of Anatomy, studying the role of the cerebellum in visually guided behaviour and in the Visual Development Unit where she combined interests in developmental visual neuroscience and visuomotor control with longitudinal studies of children with developmental disorders including children with Down syndrome, Williams syndrome and children born very preterm. Her current research activity at UEL includes a long-term follow-up of a cohort of children with Down syndrome studying perceptual-motor behaviour from infancy to adolescence and the development of bimanual coordination in young children and children with brain injury.

Abstract - Visual Processing and the Cerebellum

Evidence from clinical, experimental and neuroimaging studies over the past few decades suggests that the cerebellum plays an important role in visual processes. Anatomical studies have revealed connections between the cerebellum and cortical areas associated with motion processing in the dorsal visual stream, while deficits in detecting and discriminating moving visual signals have been reported in patients with cerebellar lesions and several developmental disorders. A role for the cerebellum has also been proposed for biological motion processing and self-motion perception, visual processing abilities critical for a wide range of everyday activities. A better understanding of the involvement of the cerebellum in perceptual processes will help in the identification and treatment of visual deficits which at present tend to be overlooked. Findings will be presented on the specific anomalies of motion processing found in several developmental disorders including Down syndrome, Developmental Coordination Disorder and children born preterm including a possible role for abnormal cerebellar function and connectivity in these deficits.

Dr Alan Gray



Dr Alan Gray undertook his undergraduate in psychology at the University before completing his clinical psychology doctorate at the University of Sheffield. He is currently employed by Headwise Ltd and Berkshire Healthcare NHS Trust where he offers clinical neuropsychology services to children and adults with a diverse range of neuropathologies. He is an honorary lecturer at the University of Sheffield and the University of Birmingham and acts as an external examiner at Lancaster University. His research interests centre on movement disorders, caregiver burden, basal ganglia pathologies, and functional neurosurgery techniques. He has published in peer-reviewed journals and has been invited to present at international conferences on his research into deep brain stimulation.

Abstract - Language Processing and the Relationship to Movement

For over two centuries our understanding of the role of the cerebellum in human behaviour has centred on its links to motor functioning. In contrast, it has been the temporal lobe and posterior sections of the frontal lobe that have been held to be the seat of language in the human brain. My presentation will seek to challenge this orthodoxy by arguing that there is increasing evidence to suggest that the cerebellum plays a vital role in language processing. Through exploring the evidence emanating from functional imaging studies and research with clinical populations, I will review the cerebellum's contribution to reading, aphasia, verbal fluency, writing, verbal working memory, speech motor planning, and agrammatism. The cerebellum's contribution to language processing will be contrasted with other movement disorders of basal ganglia aetiology. Based on this emerging evidence I will present a revised overview of the functional organisation of the cerebellum and the neuroanatomical correlates of language processing. Finally, I will discuss how this should shape our approach to supporting patients with cerebellar pathology.

Dr Deborah Budding



Dr. Deborah Budding is a board certified neuropsychologist who works with children, adolescents, and adults in the Los Angeles area. She has a background in literature and magazine publishing prior to earning her Ph.D. in psychology. She is co-author of “Subcortical Structures and Cognition: Implications for Neuropsychological Assessment,” which was published in 2008, as well as peer-reviewed articles related to subcortical contributions to cognitive and emotional function, including a Consensus paper on cerebellar contributions to both movement and cognition published in 2013. She has strong interests in neuroscience, art, and video games, not necessarily in that order. Dr. Budding is a supervising faculty member at Harbor-UCLA's neuropsychology training program and is increasingly involved in research involving transcranial direct current stimulation (tDCS). She has particular interest in the cerebellum's contributions to non-motor function, in brain-behavior relationships in neurodevelopmental disorders, and in finding ways to amplify the voices of women and people of color in science education.

Abstract - Language Processing and the Relationship to Movement

The cerebellum has historically been known for its influence on sensory-motor mapping. Increasingly, research shows important non-motor functions of the cerebellum that are essential to coordinating not only sensory-motor functions, but affective and cognitive functions as well. The rate, rhythm and force of sensory-motor activities develop in parallel with these qualitative aspects of thinking and feeling. This research will be translated into a practical understanding of how “automatic/habitual” behaviors and “controlled/deliberate” behaviors can be used for understanding individual differences and treatment approaches across multiple areas of function.

Participants will be able to:

- Identify key characteristics of cerebellar functions in the development of a vertically organized brain
- Develop a “big picture” understanding of how overlapping brain functions become a template for interdisciplinary practice
- Define the role of “automatic” versus “deliberate” behaviors and their application to the clinical setting

Workshop

By Dr Deborah Budding
Executive Function
Sunday 21st June 2015

08.30 - 09.00 Registration and Tea/ Coffee

09.00 - 12.00 Interactive workshop during which attendees will have the opportunity to discuss individual cases. Please see below for a description of what this workshop will entail

10.30 - 10.45 Break for Tea/Coffee

Dr Deborah Budding

"Whether working with acquired injuries or neurodevelopmental disorders, clinicians face a variety of challenges in helping their patients improve day to day self-help skills. How can clinicians effectively measure areas of strength and deficit that will translate into real-world areas of competence? "Executive Function" is a term frequently used, but what skills comprise Executive Functions, really? How can we better consider the interplay of "top down" or more consciously driven functions, with "bottom up" or more automatic/ nonconscious aspects of habit formation? How do we measure them more effectively given there is not one "test" of these things?



This seminar will break "Executive Function" down into more tangible subcomponent areas and present updated ways to conceptualize these areas of function and interpret obtained test data. Dr. Budding will present an over-view of this approach (as was initially described in *Subcortical Structures and Cognition*, Springer 2008), and will illustrate with case data. Attendees are encouraged to bring clinical material to share and consider together from this perspective."