

SEMINAR

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Cerebellar upper limb tremor and gait ataxia: a behavioural, neural and rehabilitation perspective

- a. Proprioceptive and visuomotor control in persons with intention tremor in persons with MS
- b. Coupling steps to music and metronomes in persons with cerebellar impairments: behaviour, neural entrainment and gait

Peter Feys

Intention tremor is a very disabling problem, and related to dysfunction of the cerebellum or related neural circuitry in the brain stem. During my PhD, 2 decades ago, intention tremor was behaviourally investigated by experiments manipulating visual feedback given on arm position (and measuring eye-hand movement coordination) or disturbing proprioceptive inputs via cooling of the limb or the application of muscle vibration inducing movement illusions. The tremor component, but not the spatial ataxia, was reduced or even not always visible, when visual feedback was taken away or the limb proprioception was changed. Besides, it was revealed that the spatial overshoot typically seen with intention tremor, was reduced when the saccadic amplitudes were more accurate or smaller. The fixation on a target leads to better visual focus and better homing in of the hand on a target. We also investigate the upper limb during haptic robots tasks where the proximal arm control in addition to the hand control could be measured during a virtual haptic peg insertion test, offering new insights.

Lousin Moumdjian

Coupling walking to rhythms has become a topic of recent interest in the field of neurological rehabilitation. In Parkinson's Disease and Multiple Sclerosis, coupling steps to beats in music and ticks in metronomes have shown to promote a therapeutic advantage of altering walking pattern. The question however arises if these strategies are applicable in persons with cerebellar impairments presenting with ataxia. Given the function of the cerebellum in timing control, this question becomes crucial and of significant relevance, as effective rehabilitation strategies to improve gait ataxia are lacking.

The purpose of this study is to investigate if persons with cerebellar impairments (PwCI) would be able to synchronise their walking to auditory stimuli provided at different tempi compared to healthy controls (HC). In addition, we investigate the changes of the gait pattern as a result of coupling. As well, we recorded brain signals by using the EEG and developed a novel outcomes to quantify neural entrainment termed the 'stability index' and 'Event related frequency adjustments – ERFA' (work in progress).

Selected References related to the seminar

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