

July 27th 2011
CNS 2011 Workshop
Basal Ganglia: Dynamics, Function and Learning

Organizers:

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Dr. Jeanette Hellgren Kotaleski	Royal Institute of Technology, Stockholm. Sweden [jeanette@nada.kth.se]
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Description:

The basal ganglia (BG) are involved in a wide range of motor and cognitive processes, and accordingly, their dysfunction can lead to several neurological diseases. Extensive experimental characterization at multiple scales of the BG in normal and pathological conditions have provided important insights about the BG. However, a coherent computational theory linking these observations to function has eluded the neuroscientists.

Bottom-up computational approaches have addressed the dynamical properties and interaction of the neural activity in the BG nuclei, while top-down approaches rather have described BG function inspired by machine learning algorithms.

In this workshop, we will discuss progress made in our understanding of the BG at multiple scales with the aim to bridge between bottom-up and top-down approaches. The main emphasis of the workshop will be to understand how the dynamics relate to function and dysfunction of BG. In addition the workshop will foster an interaction between experimentalists and theoreticians.

Tentative program

Speaker

Title

The basal ganglia - introduction: 0915 – 0945 (1 talk)

**Jeanette Hellgren Kotaleski/
Sten Grillner** Evolutionary perspectives of the basal ganglia

The Nobel Institute for
Neurophysiology, Karolinska
Institutet, Stockholm, Sweden

Cellular- and subcellular properties of basal ganglia neurons: 0945 – 1045 (2 talks) (chairing Jeanette Hellgren Kotaleski)

Carmen Canvier Using the dynamic clamp combined with computational
LSUHSC Neuroscience Center models to determine how the spiking rate is controlled in
of Excellence, New Orleans, SNC dopamine neurons
USA

Avrama Blackwell Modeling the role of temporal pattern and subcellular
George Mason University, location in synaptic plasticity
Fairfax, VA, USA

Basal ganglia microcircuits: 1100 – 1230 (3 talks) (chairing Arvind Kumar)

Charles Wilson A second type of tonically active neurons in the
University of Texas, San striatum.
Antonio, TX, USA

Dieter Jaeger Modeling synaptic integration in Globus Pallidus
Emory University, Atlanta, US neurons

Gilad Silberberg Intra-striatal connectivity: what we think we know, and
The Nobel Institute for what we don't
Neurophysiology, Stockholm,
Sweden

Basal ganglia network: 1400 – 1600 (4 talks) (chairing Dieter Jaeger)

Izhar Bar-Gad Decorrelation breakdown in the abnormal basal ganglia
Gonda Brain Research Center,
Bar-Ilan University, Israel

Arvind Kumar Origin of oscillations in the basal ganglia: Implication for
University of Freiburg, Germany deep brain stimulation

Kevin Gurney Cortico-striatal plasticity for action learning using spike
The University of Sheffield, timing dependent eligibility
Sheffield, UK

Abigail Morrison tba
University of Freiburg, Germany

Applications of BG models: 1615 – 1745 (3 Talks) (chairing Christian Hauptmann & Peter Tass)

Stephane van Gils From parkinsonian thalamic activity to restoring thalamic
Nonlinear Analysis relay using Deep Brain Stimulation: new insights from
Department of Mathematics computational modeling

University of Twente, The
Netherlands

Jean-Pascal Pfister

Computational Neuroscience
Lab, Physiology Department,
Univ of Bern, Switzerland

Theoretical conditions for long-lasting neuronal
desynchronization in oscillatory recurrent networks with
STDP

**Christian Hauptmann & Peter
Tass**

Institute for Neuroscience and
Medicine – Neuromodulation,
Research Center Jülich,
Germany

Restoration of segregated, physiological neuronal
connectivity by desynchronizing deep brain stimulation