Speaker: Catalina Vich
Authors: C. Vich, M. Clapp, T.Verstynen, J.Rubin

Title: Identification of different control ensembles involved in information processing within the cortico-basal ganglia-thalamic circuit.

Abstract: Mammals have been shown to exhibit a high level of flexibility in selecting an action in situations of uncertainty about action-reward contingencies. That is, they are able to adapt their behavior according to situations where a desirable result is produced (exploitation) and situations of risk, which are less certain but that might produce a better result (exploration). The cortico-basal ganglia-thalamo (CBGT) circuit is believed to be strongly implicated in the ability of mammals to flexibly adapt decision policies through dopaminergic plasticity mechanisms. However, the specific role of the different components of the CBGT in controlling the information during decisions is still unclear. On the other hand, it has been shown that drift diffusion models (DDM) are able to reproducebehavioral data obtained experimentally from mammals (i.e. the probability of action selection and the required time to make a decision). Hence, the output of the CBGT circuit can be mapped to a drift diffusion model (DDM) through adjustments in the drift rate, ν, the boundary height, a, the delay in onset of evidence accumulation (t), and the starting bias (z), to provide a representation of a decision policy.

In this work we determine how different neuronal weight configurations affect the dynamics of the CBGT networks and the corresponding mapping to the DDM. Applying a Canonical Correlation Analysis (CCA), we reveal that these mappings highlight both the importance of three core sets of CBGT subnetworks involved in the action selection process and how they play a role in adapting decision policies in uncertainty situations.