Factors effecting reward based decision making : a computational study

Abstract : Basal Ganglia (BG) are known to be responsible for action selection, decision making and reward based learning in a changing environment. We present a biologically plausible decision making model of BG and attempt to examine if action selection is affected under the influence of certain external factors with respect to stimulus representation. The model is inspired and replicated from *Guthrie et al, 2013.* When presented with two differently rewarding stimuli at the same time, the model learns to select a stimulus associated with a higher reward. We analyzed the model by presenting the lesser rewarding stimulus with more visual salience than that of the higher rewarding one. In another attempt, lesser rewarding stimulus is presented first and higher rewarding one later, after a delay. Early results show that, the model despite having learned to select a higher rewarding stimulus always, could make a bad decision choosing the lesser rewarding one if these changes in the representation are beyond certain limits. We also studied the possibility that BG learns to associate the reward not just to the cognitive aspect of the stimuli, but also to the motor action that fetched the reward. Such a learning is observed to reduce the performance, making more bad decisions.