

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. Using a biologically plausible model, we have been investigating some external and internal factors related to the stimulus representation that might affect the decision making and action selection. We used a computational model of the cerebral structure BG, inspired and replicated from *Guthrie et al, 2013* and a two-armed bandit task described in *Pasquereau et al. 2007*. The task is a probabilistic learning task where stimuli are 4 different shapes associated with different reward probabilities upon selection. At a time, two of the shapes are presented in two distinct positions and the model is expected to make an action to select one of the presented shapes. Upon repeated trials and presented reward after each selection, the model learns the best rewarding cue and is expected to choose the best rewarding cue always thereafter.

One of the questions we attempt to address is to what extent the physical properties of the stimulus like its visual salience, affect the decision to overcome the impact of reward associated to the stimuli. Early results show that there can be an influence of some external and internal factors leading the model to take a bad decision when the worst choice (less rewarding) is presented before the best choice (more rewarding) or the worst choice is more salient than the best one or even if the model learns the reward probabilities associated not to the cue shapes, but to the position where the stimulus is shown.