Basal Ganglia

Emo Todorov

Applied Mathematics
Computer Science and Engineering

University of Washington

Loops with cortex
Recurrent connections with cortex

Cortical targets

Specificity or recurrent connections
Imbalance of excitation and inhibition

Parkinson’s movements are mostly normal
Imbalance of excitation and inhibition

Broad suppression and local facilitation
Coding of reward by dopamine neurons

(Schultz)

A 'Primary' liquid and food rewards

B Conditioned reward predicting stimuli

C Aversive events

D Physically intense stimuli

E Stimuli with different reward values

Coding of relative reward magnitude

A

B

C

Animal A

Animal B

Median activation

0.0 0.1 0.2 0.3 0.4 0.5

Liquid volume (ml)

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5
Coding of reward uncertainty/risk

Learning effects on spatial coding