The role of glutamate receptor-dependent signaling in the dopamine system in reinforcement learning

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Learning to predict rewards is crucial for adaptive decision-making. This learning process involves midbrain dopamine (DA) neurons, which encode reward prediction errors (RPEs). The RPE signal is used for updating the action values stored by striatal neurons and thus provide a neural substrate for reinforcement learning processes that underlie action selection. Activity and plasticity in the DA system depends on glutamatergic (Glu) inputs. Impairments in Glu-dependent signaling may lead to aberrant reinforcement learning and maladaptive decision-making.

Here, by using genetically modified mouse lines with selective inactivation of NMDA or mGluR5 receptors in dopaminergic and D1 receptor-expressing neurons we investigate the specific role of Glu-DA interaction in reward-based learning.

Performance in the Two-Armed Bandit task

This project is supported by the grant PRELUDIUM 2014/15/N/NZ4/00761 from the Polish National Science Centre.

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