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# Computational modeling of cocaine addiction using reinforcement learning framework

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**Abstract**

***Objective:*** under two assumptions, first, phasic activity of dopaminergic neurons in ventral tegmental area (VTA) qualitatively corresponds to error signal employed in value learning process and second, drug consumption leads to increase of dopamine in VTA, we propose a neurocomputational model for drug addiction. ***Method:*** temporal difference reinforcement learning (TDRL) framework was used. Drug induces changes was modeled by adding an uncompensatable parameter to the error signal term in TDRL. Also, the level against which rewards are compared was introduced into TDRL using an additional term. ***Results:*** simulations show that the behavior of the model is satisfactorily compatible with the animal models of drug self-administration, especially compulsive drug seeking. Some other aspects of addition such as down-regulation of reward system are also addressed by the model. ***Conclusion:*** many decision-making deficits of drug addiction can be explained based on the two mentioned assumptions using computational modeling approach. Also, the model presents explicit behavioral predictions which can be tested both on human and animals.