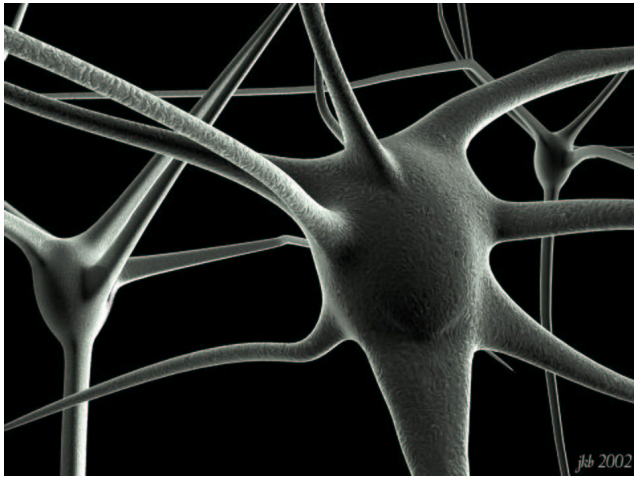
Seminar Projects (6SWS) - Overview

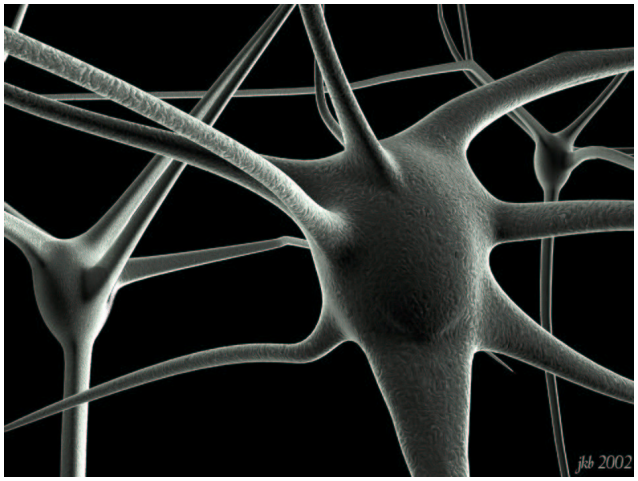
1. Apply variants of STDP on the scaling of the synaptic "utilization" parameter.
2. Working memory based on fast Hebbian learning with spiking neurons.
3. Combining reinforcement- and Hebbian learning.

Apply STDP on the synaptic utilization parameter



Experimental studies show that STDP does not change the absolute strength of a synapse, but rather a dynamic "utilization" parameter.

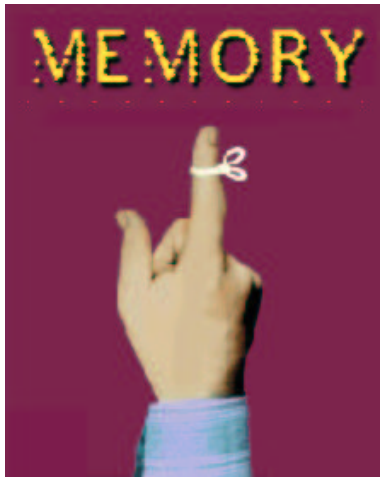
Apply STDP on the synaptic utilization parameter



This project aims at expanding simulations for standard STDP to this dynamic parmeter.

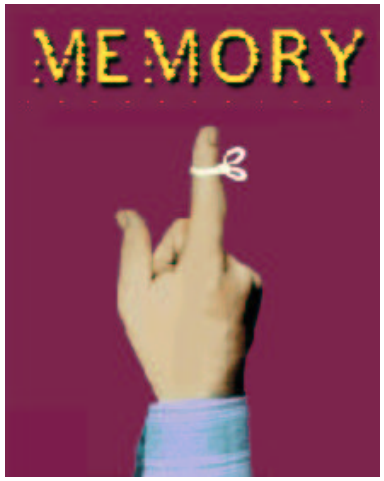
The student will perform simulations under Matlab together with the csim-tool developed at the institute.

Working memory based on fast Hebbian learning



A recent model by Sandberg et. al. shows that stable working memory can be based on fast Hebbian learning (simple form of local learning).

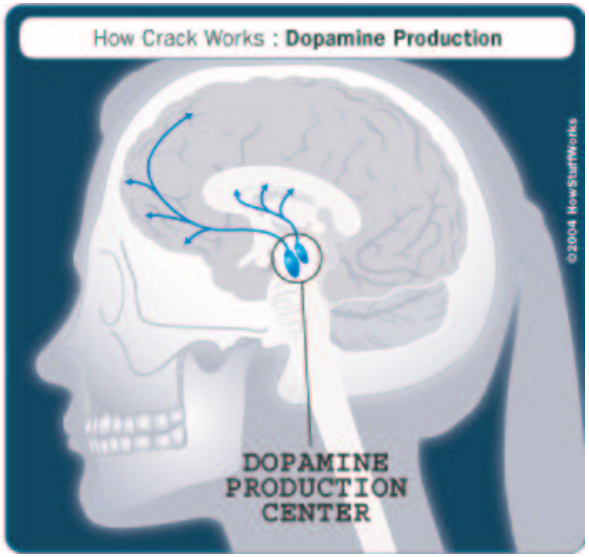
Working memory based on fast Hebbian learning



The aim of this project is to expand the model to networks of spiking neurons and explore the capabilities in simulations.

The student will perform simulations under Matlab together with the csim-tool developed at this institute.

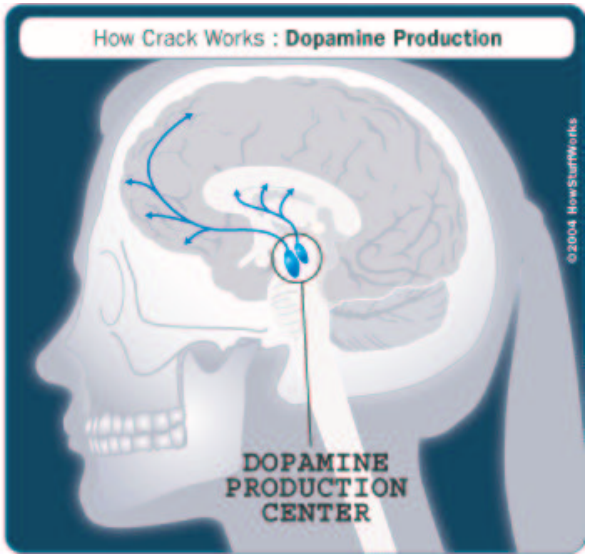
Combining reinforcement and Hebbian learning



The diffuse modulatory system is believed to deliver reinforcement signals over broad regions of the brain.

Novel theoretical studies combine rewards-based and Hebbian learning in neural network models.

Combining reinforcement and Hebbian learning



The aim of this project is the implementation and test of these models as well as an implementation for spiking neurons.

The student will perform simulations under Matlab together with the csim-tool developed at this institute.

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