Summary of *A tutorial on the free-energy framework for modelling perception and learning* by Rafal Bogacz

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Complex system in neuroscience, 12 December 2023

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Summary of *A tutorial on the free-energy framework for modelling perception and learning* by Rafal Bogacz
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2023-12-09
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2. Weight stimuli by their noise, learn features using their covariance, implement attentional modulation changing the variance of attended features.

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Summary of *A tutorial on the free-energy framework for modelling perception and learning* by Rafal Bogacz
2023-12-09
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- Free energy minimization.

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1. Prior predictions are compared to stimuli and the model parameters are updated considering prediction errors, features corresponding to receptive fields in the the primary sensory cortex are learned.
2. Weight stimuli by their noise, learn features using their covariance, implement attentional modulation changing the variance of attended features.
3. Synaptic strenght is changed proportionally to activities of pre-synaptic and post-synaptic neurons.
4. Minimization of free energy can be seen as the base of many theories of perception.

Working hypotheses

- Local computation.

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1. The state of a neuron is determined only by the synaptic weight and the state of its input neurons.

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3. The state of a neuron is the result of the application of a monotonic function to the linear combination of states and synaptic weights of input neurons.

Exact solution of the inference problem

Approximated solution of the inference problem

Neural implementation

Learning model parameters

Learning relation between variable and stimulus

Free energy framework

Free energy framework

Multiple variables model

Learning parameters

Learning parameters

Hierarchical structure implementation

Recover local plasticity

Recover local plasticity

Conclusion

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2023-12-09
Summary of *A tutorial on the free-energy framework for modelling perception and learning* by Rafal Bogacz
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