



A system-level computational model of decision-making and learning in the lateral and medial sub-regions of Orbitofrontal Cortex

Bhargav Teja Nallapu, Frédéric Alexandre

► To cite this version:

Bhargav Teja Nallapu, Frédéric Alexandre. A system-level computational model of decision-making and learning in the lateral and medial sub-regions of Orbitofrontal Cortex. OFC 2019 : Fourth Quadrennial Meeting on OFC Function, Nov 2019, Paris, France. hal-02417618

HAL Id: hal-02417618

<https://inria.hal.science/hal-02417618>

Submitted on 18 Dec 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

A system-level computational model of decision-making and learning in the lateral and medial sub-regions of Orbitofrontal Cortex

Bhargav Teja Nallapu, Frederic Alexandre

bhargav.teja-nallapu@inria.fr

INRIA, Institute of Neurodegenerative Diseases, LaBRI Bordeaux

Abstract

Orbitofrontal Cortex

Flexible and adaptive animal behavior through value-based decision making and learning

Pavlovian valuation with basolateral amygdala (BLA)

Instrumental valuation with Anterior Cingulate Cortex (ACC) and Ventral Striatum (VS)

Closed-loop dynamics with the Basal Ganglia (BG) and the Thalamus - Limbic (CtxBG) Loops

Lateral

Medial

Projections from Sensory areas and Amygdala

Projections from visceral areas like Lateral Hypothalamus

External features [1]

Internal motivation[1]

Outcome Identity[2]

Outcome Value[3]

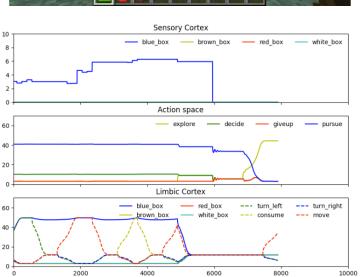
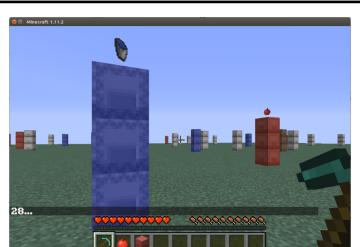
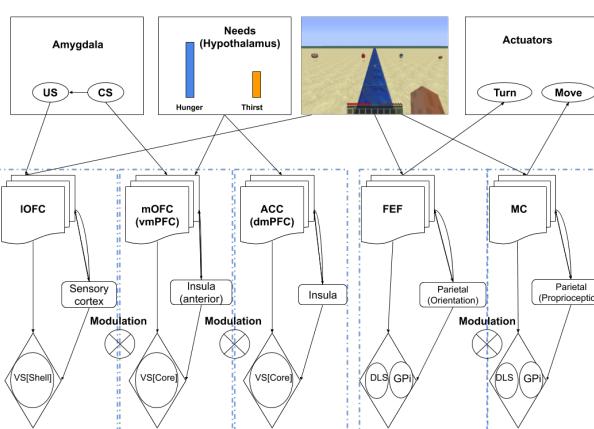
After feedback[1]

Before feedback[1]

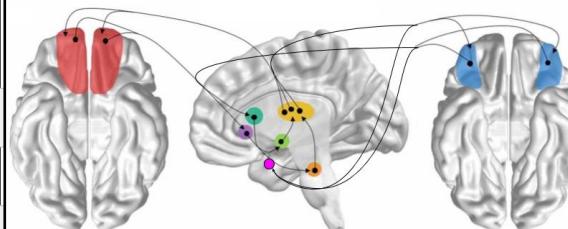
Credit Assignment[3]

Value Comparison[4]

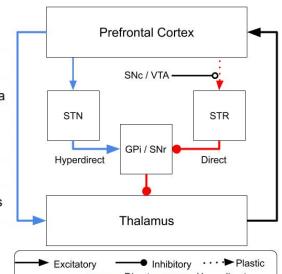
Limbic and sensori-motor loop interactions (Krack et al., 2010)



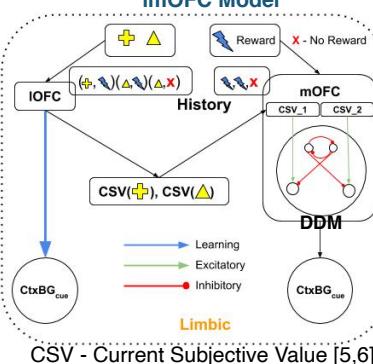
Medial and Lateral Thalamo-BG closed-loop connectivity (Fettes et al., 2017)



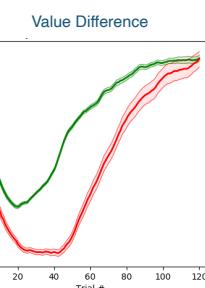
CtxBG (Boraud et al., 2018)



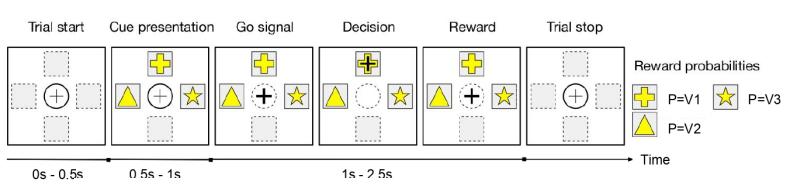
ImOFC Model



ImOFC Model CtxBG Model



3-Arm Bandit Task



Hypotheses : Medial vs Lateral OFC

Value prediction vs State prediction

Task beginning vs Task ending

Model-Free vs Model-Based

References

- [1] Bouret et al., 2010
- [2] Walton et al., 2010
- [3] Noonan et al., 2010
- [4] Hunt et al., 2012
- [5] Bissonette et al., 2013, [6] Grossberg 2018

Inria
inventeurs du monde numérique

IMN
BORDEAUX NEUROCAMPUS

LaBRI