

Striatal ensembles continuously represent animals kinematics and limb movement dynamics during execution of a locomotor habit

Pavel Rueda-Orozco, David Robbe

► **To cite this version:**

Pavel Rueda-Orozco, David Robbe. Striatal ensembles continuously represent animals kinematics and limb movement dynamics during execution of a locomotor habit. the Twenty Second Annual Computational Neuroscience Meeting: CNS*2013, Jul 2013, paris, France. pp.P325. inserm-00842295

HAL Id: inserm-00842295

<https://www.hal.inserm.fr/inserm-00842295>

Submitted on 8 Jul 2013

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.

POSTER PRESENTATION

Open Access

Striatal ensembles continuously represent animals kinematics and limb movement dynamics during execution of a locomotor habit

Pavel E Rueda-Orozco*, David Robbe

From Twenty Second Annual Computational Neuroscience Meeting: CNS*2013
Paris, France. 13-18 July 2013

The sensorimotor striatum contributes to the normal execution of motor habits but the mechanisms underlying this function are largely unknown[1]. Motor habits are stereotyped sequences of movements learned through a long trial-and-error process, automatically triggered by a set of sensory cues and that tend to persist despite outcome degradation (e.g. reward omission). We found that rats running on a treadmill become proficient in a fixed time interval estimation task by developing a highly stereotyped locomotor routine. Consistently with the definition of habits, the routine was acquired slowly (at least 2 months of daily practice), and once learned, it persisted for several sessions when the rewarding outcome was omitted. We took advantage of this unexpected behavior and used tetrode arrays to record the spiking activity of dorsolateral striatal ensembles while rats perform the locomotor habit. We report sequential activations of striatal neurons during the entire execution of the task. Importantly, we found that the firing rate of a large fraction of neurons was either locked to the locomotor limb movements or correlated with the kinematics of the habit (running speed, acceleration, position and time). These results contrast with the long-standing view that striatum is mainly concerned with action selection[2]. Rather movements and task kinematics encoding suggest that the striatum continuously control the execution of habitual action. Additional experiments are currently being performed to further investigate this hypothesis.

Acknowledgements

This work was funded by a Marie Curie International Reintegration Grant (IRG 230976, to DR). D.R. was supported by a Ramon-Y-Cajal fellowship from the Spanish Ministerio de Ciencia e Innovación and the Avenir program from

INSERM. P.R.-O. was supported by a Marie Curie International Incoming Fellowship (IIF253873) and CONACyT, México.

Published: 8 July 2013

References

1. Redgrave P, Rodriguez M, Smith Y, Rodriguez-Oroz MC, Lehericy S, Bergman H, Agid Y, DeLong MR, Obeso JA: **Goal-directed and habitual control in the basal ganglia: implications for Parkinson's disease.** *Nat Rev Neurosci* 2010, **11**:760-772.
2. Calabresi P, Di Filippo M: **Neuroscience: Brain's traffic lights.** *Nature* 2010, **466**:449.

doi:10.1186/1471-2202-14-S1-P325

Cite this article as: Rueda-Orozco and Robbe: Striatal ensembles continuously represent animals kinematics and limb movement dynamics during execution of a locomotor habit. *BMC Neuroscience* 2013 **14**(Suppl 1):P325.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

 **BioMed Central**

* Correspondence: pavel.rueda@inserm.fr
INSERM, U901; Aix-Marseille University, UMR 901; INMED, France