MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2023-2024

(internship from January to June 2024)

Host laboratory: CRNL

Host team : IMPACT

**Internship supervisors : Claudio BROZZOLI, CRCN, claudio.brozzoli@inserm.fr**

Project title : The syntax of tool use

Project summary :

Language leverages the sensorimotor circuits handling perception and action to process linguistic sounds (phonemes) and word meaning (semantics). Recently, we revealed that planning to use a mechanical tool and understanding sentences with a complex syntax (i.e., object-relatives) activate the same brain structures within the Basal Ganglia (BG) prompting similar patterns of neural activations. We further unveiled cross-domain learning transfer: training to use a tool improves syntactic comprehension of complex structures in language; reciprocally, training to process sentences with complex syntactic structures improves tool use. The overarching aim of this project is to identify the critical sensorimotor and linguistic ingredients for the reciprocal boosting between tool use and language. By combining innovative behavioral, kinematic and neuroimaging methods, we will test hypotheses on the sensorimotor characteristics of the tool and the syntactic structures in language that allow for reciprocal benefits.

Please send your proposal to marion.richard@univ-lyon1.fr for publication on the Master of Neuroscience website.
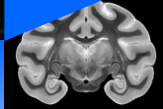
3-5 recent publications :

Mediavilla T, Özalay Ö, Estévez-Silva HM, Frias B, Orädd G, Sultan FR, Brozzoli C, Garzón B, Lövdén M, Marcellino DJ. Learning-related contraction of gray matter in rodent sensorimotor cortex is associated with adaptive myelination. Elife. 2022 Nov 9;11:e77432. doi: 10.7554/eLife.77432. PMID: 36350292; PMCID: PMC9678357.

Thibault S., Py R., Gervasi M., Salemme R, Koun E, Lövdén M., Boulenger V., Roy A.C., Brozzoli C. (2021). Tool use and language share syntactic processes and neural patterns in the basal ganglia. Science, 374(6569):eabe0874.

Brozzoli C, Roy AC, Lidborg LH, Lövdén M. Language as a Tool: Motor Proficiency Using a Tool Predicts Individual Linguistic Abilities. Front Psychol. 2019 Jul 16;10:1639. doi: 10.3389/fpsyg.2019.01639. 8.

Wenger E, Brozzoli C, Lindenberger U, Lövdén M. Expansion and Renormalization of Human Brain Structure During Skill Acquisition. Trends Cogn Sci. 2017 Dec;21(12):930-939. doi: 10.1016/j.tics.2017.09.008. Review. PubMed PMID: 29149999; PubMed Central PMCID: PMC5697733.

Please send your proposal to marion.richard@univ-lyon1.fr for publication on the Master of Neuroscience website.