

MASTER 2 Fundamental and Clinical Neurosciences
Internship proposal 2025-2026
(internship from January to June 2026)

Host laboratory: Stem Cell and Brain Research Institute (INSERM U1208), 18 avenue du Doyen Lépine, 69500 Bron

Host team : Neurobiology of Executive Functions, <https://sbri.fr/teams/neurobiology-of-executive-functions/>

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Internship co-supervisors : Fadila Hadj-Bouziane, DR2, fadila.hadj-bouziane@inserm.fr

Project title: The prefrontal operculum – precuneus network in the human brain: a neural substrate to regulate inner representation?

Project summary :

In the primate cortical organization, we have recently identified only two features that are distinct between non-human and human primates. The first one is the only new structure in the entire brain: it is located adjacent and medial to the classical Broca's area and is called the PreFrontal extent of the frontal Operculum (PFOp) (Amiez et al. 2023a, 2023b). The second one displays main structural changes between non-human and human primates: it is located dorsal to the posterior cingulate cortex in the postero-medial cortex and is called the precuneus. On one hand, recent knowledge obtained in the lab converge toward a specific role of PFOp in the cognitive control of inner speech (i.e. the little voice in our head), a function known at being critical for communication (preparing interactions with others), for executive and cognitive functions (planning and reasoning, memorizing informations, maintaining attention), and for autonoteic functions (self-representation over time) (e.g. Morin et al. 2011). On the other hand, current hypotheses strongly support a role of the precuneus in self-referencing processing, i.e. the processing of bodily-self and narrative-self (Lyu et al. 2023). Thus, these 2 processes appear highly interdependent and we hypothesize that 1) the PFOp-precuneus network might be critical for perceiving, understanding, and controlling our inner representations over time with the precuneus having a role of gating information on self-representation and PFOp in controlling them, and 2) the connectivity within this network and with the rest of the brain should reflect this function.

The goal of this internship will be to identify the fine-grained, direct or indirect, functional connectivity profile between PFOp and the precuneus in healthy adults, as well as the connectivity between this network and the rest of the brain. This aim will be achieved by analyzing resting-state functional magnetic resonance imaging data and the use of clustering algorithms already obtained and developed in the lab.

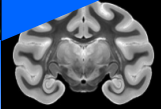
3-5 recent publications :

Amiez C, Verstraete C, sallet J, Hadj-Bouziane F, Ben Hamed S, Meguerditchian A, Procyk E, Wilson CRE, Petrides M, Sherwood C, Hopkins WD. The unique anatomy of the prefrontal operculum in the human brain and its relevance to the emergence of speech. *Communication Biology*, 2023a.

Amiez C, Sallet, J, Giacometti C, Verstraete C, Gaudaux C, Morel-Latour V, Meguerditchian A, Hadj-Bouziane F, Ben Hamed S, Hopkins WD, Procyk E, Wilson CRE, Petrides M. A revised perspective on the evolution of the lateral frontal cortex in primates. *Science Advances*, 2023b.

Morin, A., Uttl, B., & Hamper, B. Self-reported frequency, content, and functions of inner speech. *Procedia-Social and Behavioral Journal*, 30, 1714-1718, 2011.

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



Lyu, D., et al., Causal evidence for the processing of bodily self in the anterior precuneus. *Neuron* 111(16): p. 2502-2512 e4, 2023.