

MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2025-2026

(internship from January to June 2026)

Host laboratory: Lyon Neuroscience Research Center (CRNL)

Eduwell, 95 Boulevard Pinel, 69500 Bron, France

Host team: Brain, Behavior and Learning (BBL) lab

Eduwell, 95 Boulevard Pinel, 69500 Bron, France

<https://bbl-lab.fr/>

Internship supervisors: Jérôme Prado, Ph.D., Chargé de Recherche CNRS

Project title: Neural architecture of language and thought: Investigating hemispheric co-lateralization of linguistic and mathematical processing through development

Project summary: This project will investigate the relation between language and abstract cognition by examining whether neural substrates of arithmetic processing become co-lateralized with language processing over development. The student will leverage a comprehensive dataset containing fMRI measurements of both phonological processing and arithmetic operations (single-digit subtraction and multiplication) in children and adults. The student will analyze patterns of neural activation and hemispheric lateralization across these cognitive domains. Methodologically, the project will employ advanced neuroimaging analysis techniques, including lateralization indices, representational similarity analysis, and potentially connectivity analyses to characterize the spatial and functional relationships between networks for language and math processing. This research addresses a longstanding theoretical debate about whether language serves as a cognitive substrate for abstract mathematical thought.

3-5 recent publications:

1. Prado, J., & Knops, A. (2024). Spatial attention in mental arithmetic: A literature review and meta-analysis. *Psychonomic Bulletin and Review*, 31, 2036-2057.
2. Nakai, T., Girard, C., Longo, L., Chesnokova, H., & Prado, J. (2023). Cortical representations of numbers and non-symbolic quantities expand and segregate in children from 5 to 8 years of age. *PLOS Biology*, 21(1): e3001935.
3. Díaz-Barriga Yáñez, A., Longo, L., Chesnakova, H., Poletti, C., Thevenot, C., & Prado, J. (2023) Neural evidence for procedural automatization during cognitive development: Intraparietal response to changes in very-small addition problem-size increases with age, *Developmental Cognitive Neuroscience*, 64, 101310.
4. Girard, C., Bastelica, T., Léone, J., Epinat-Duclos, J., Longo, L., & Prado, J. (2022). Nurturing the mathematical brain: Home numeracy practices are associated with children's neural responses to Arabic numerals. *Psychological Science*, 33(2), 196-211.