Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project – Year 2023-2024

Laboratory/Institute: Grenoble Institut Neurosciences - GIN **Director:** E. Barbier
Team: Brain Behavior and Neuromodulation **Head of the team:** J. Bastin
Name and status of the scientist in charge of the project: Clément Dondé **HDR: yes** ☐ **no** ☐
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Laboratory/Institute: LPNC **Director:** M. Mermillod
Team: Vision & Emotion **Head of the team:** N. Faivre
Name and status of the scientist in charge of the project: Nathan Faivre **HDR: yes** ☐ **no** ☐
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Program of the Master's degree in Biology:

☐ Microbiology, Infectious Diseases and Immunology ☐ Structural Biology of Pathogens
☐ Physiology, Epigenetics, Differentiation, Cancer X Neurosciences and Neurobiology

Title of the project: Perceptual decision-making contribution to early auditory deficits in schizophrenia

Objectives (up to 3 lines):
Objective 1: To explore if specific impairments in binary decision-making processes account for early auditory disturbance in schizophrenia. Objective 2: To determine the relationship between decision-making, early auditory deficits and clinical symptoms.

Abstract (up to 10 lines):
Early auditory processing (EAP) dysfunctions (often referred as "bottom-up") are an integral and important part of the cognitive pathophysiology of schizophrenia. Critical substrates for EAP are localized to the auditory cortex regions. EAP can be explored using behavioral assessment of the ability to discriminate simple sensory stimuli e.g., frequency of tone pairs using two-choices tone-matching task. However, it remains unclear if impaired tone-matching performance is solely related to early sensory dysfunction or if the ability to flexibly translate early levels of processing into behavioral responses, which substrates are related to activity of further extra-auditory regions, contributes to EAP disturbance. Here, we will use an innovative computational drift-diffusion approach to account for perceptual decision-making and uncover the underlying cognitive processes of tone-matching deficits in schizophrenia and its clinical manifestations.

Methods (up to 3 lines):
The student will investigate a ready-to-use dataset including tone-matching behavioral performance of 25 subjects with schizophrenia and 25 healthy volunteers. She/he will learn and apply a computational drift-diffusion model to the data.

Up to 3 relevant publications of the team:
- **Dondé C**, Kantrowitz JT, Medalia A, Saperstein A, Balla A, Sehatpour P, Martinez A, O'Connel MN, Javitt DC. Early auditory processing dysfunction in schizophrenia: mechanisms and implications. Neurosci Biobehav Rev 2023
- Rouy, M., Pereira, M., Saliou, P., Sanchez, R., el Mardi, W., Sebban, H., Baque, E., Porte, P., Dezier, C., de Gardelle, V., Mamassian, P., Moulin, **C., Donde**, C.*, Roux, P.*, and **Faivre, N**.*. (2023). medRxiv, doi: 10.1101/2023.03.28.23287851
- **Faivre, N.*,** Roger, M.*, Pereira, M., de Gardelle, V., Vergnaud, JC., Passerieux, C., and Roux, P. (2020). Confidence in perceptual decision-making is preserved in schizophrenia. (2020). Journal of Psychiatry and Neuroscience, doi: 10.1503/jpn.200022

Requested domains of expertise (up to 5 keywords):
schizophrenia; early auditory processing; decision-making; neurocognition; computation