

EDUCATION**McGill University**

2021-2025

B.A. Honours Psychology and Major Philosophy (expected in April 2025)

- CGPA: 3.99/4.00
- Selected courses: Behavioral Neuroscience; Statistics for Experimental Design; Cognition and the Brain; Memory
- Dow-Hickson Scholarship, 2024; Elsie Stephen Reford Scholarship, 2023; Dean's Honour List, 2022-2024

INDEPENDENT THESIS**Fourth-Year Honours Thesis Supervised by Dr. Sylvain Williams***Navigation and Memory in Mice with Hippocampal-Entorhinal Circuit-Specific Tauopathy.* (expected by Mar 2025)

- Modelled the progression of pathological tau in pre-clinical Alzheimer's Disease in the mice entorhinal cortex
- Examined the relationship between tau propagation and animals' navigation and episodic memory performance

Third-Year Honours Thesis Supervised by Dr. Robert Zatorre*Influence of Musicianship on Auditory Working Memory and Stream Segregation.*

- Examined the enhancements of auditory working memory and stream segregation through musical training
- Provided insights into experience-dependent plasticity in the auditory domain

PUBLICATION

Liu, M., Arseneau-Bruneau, I., Farrés Franch, M., Latorre, M.-E., Samuels, J., Issa, E., Payumo, A., Rahman, N., Loureiro, N., Leung, T.C.M., Nave, K.M., von Handorf, K.M., Hoddinott, J.D., Coffey, E.B.J., Grahn, J., & Zatorre, R.J. (2024). Auditory working memory mediates the relationship between musicianship and auditory stream segregation. *bioRxiv*. <https://doi.org/10.1101/2024.10.24.619127>

RESEARCH EXPERIENCES**Montreal Neurological Institute**

2024-present

Research Volunteer with Dr. Jean-Francois Poulin

- Involved in project: A novel genetically encoded tool to link neuronal bioenergetic demand with Parkinson's disease
- Contributed to experiment investigating the selective vulnerability hypothesis of dopamine neuron populations in Parkinson's disease, with a specific focus on axonal arbours and ATP Nucleosidase
- Analyzed data for Calb1+ and Calb1-nigral dopaminergic neurons and their distinct roles in mice motor function
- Assisted experiments examining the effects of induced early-life neuronal excitation on mouse social behaviour

Douglas Research Center

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2023-present

Research Assistant with Dr. Sylvain Williams

- Conducted diverse behavioural and electrophysiology experiments focusing on:
 - (1) theta-rhythm replay in the hippocampus during REM sleep and its influence on memory
 - (2) entorhinal tau protein (aTau) accumulation and the development of Alzheimer's disease
 - (3) spatial modulation of OLM interneurons in the hippocampus
- Operated procedures including REM sleep recording, optogenetics, star maze, Morris water maze, etc.

Montreal Neurological Institute

2022-present

Research Assistant with Dr. Robert Zatorre

- Collected and analyzed data (behavioural, EEG, fMRI) for the Open Multimodal Music and Auditory Brain Archive (OMMABA) project; tasks capture perceptual to higher-order cognitive auditory processes
- Organized and conducted EEG experiments that facilitate the establishment of tactile frequency following response
- Collected behavioural and frequency following response data for an auditory-motor integration project
- Assisted TMS experiments exploring the effects of sensory-motor area perturbation on groove perception
- Involved in task development and EEG protocol for an auditory pitch imagery project

Montreal Neurological Institute

2023-2024

Research Assistant with Dr. Sylvain Baillet

- Examined neural mechanisms in the sensory-motor cortex responsible for phoneme discrimination
- Assisted with task development (audio stimuli, sensory perturbation tool) and MEG protocol

Research Center – University of Montreal Center Hospital (CHUM)

2023

Summer Intern with Dr. Christine Vande Velde

- Performed in vivo rodent experimental procedures in amyotrophic lateral sclerosis (ALS) research
- Examined stress granule dynamics in the CNS of mutant RNA-binding protein TDP-43 ALS mice; co-authored publication to be expected

Lady Davis Institute at the Jewish General Hospital; Montreal Children's Hospital

2022-2023

Research Volunteer with Dr. Ashley Wazana and Dr. Brain Greenfield

- Volunteered for the DREAM BIG research program and collaborators; research focuses on the prediction and modelling of complex development psychopathology (prenatal, genetics, early environment, etc.)
- Organized harmonization of the datasets for the OUI CARE Project, which evaluates hospital treatment programs for elementary children experiencing severe internalizing and externalizing difficulties
- Performed literature reviews on prenatal stress and its relationship with anxiety development

Mount Sinai Hospital – Toronto

2019

Hospital CO-OP

- Operated equipment such as MRI and CT in the fracture imaging department
- Part of the Ontario Specialist High Skill Major (SHSM) program

SELECTED CONFERENCE PRESENTATIONS

Arseneau-Bruneau, I., Farrés Franch, M., Latorre, M.-E., Samuels, J., Core, L., Li, A., Chen, E., Issa, E., Rahman, N., Payoma, A., Kolde, S., **Liu, M.**, Bermudez, P., Llanos, F., Coffey, E. B. J., & Zatorre, R. J. *Listening While Playing the Organ: How Auditory-Motor Integration May Influence the Frequency-Following Response*. Poster submitted to the NeuroMusic Conference VIII 2024, Helsinki, Finland; the Center for Research on the Brain, Language and Music Scientific Day 2024, Montreal; and Neuropsychology Day 2024, Montreal.

Bolduc, C., Sung, G., Campeau, C., **Liu, M.**, Sharpe, M., Oram, C., Bach, H., Martin, S., & Poulin, JF. *Expression of an ATP Nucleosidase in Midbrain Dopaminergic Neurons to Study the Mechanisms of Selective Vulnerability in Parkinson's Disease*. Poster presentation delivered at The 16th Annual Integrated Program in Neuroscience (IPN) Retreat, Montreal, September 27, 2024.

Liu, M., Farrés-Franch, M., Arseneau-Bruneau, I., Latorre, ME., & Zatorre, R.J. *Influence of Musicianship on Auditory Working Memory and Stream Segregation*. Poster presentation delivered at the McGill Psychology Departmental Poster Session, Montreal, April 12, 2024.

Samels, J., Arseneau-Bruneau, I., Farrés Franch, M., Core, L., Latorre, ME., Li, A., Issa, E., Payoma, A., **Liu, M.**, Bermudez, P., Llanos, F., Coffey, E.B.J., & Zatorre, R.J. *Transfer Learning Effect on the Timing of Keypress in Music Training*. Poster presentation delivered at the McGill Psychology Departmental Poster Session, Montreal, April 12, 2024.

Arseneau-Bruneau, I., Farrés Franch, M., Core, L., Li, A., Issa, E., Payoma, A., **Liu, M.**, Bermudez, P., Llanos, F., Coffey, E.B.J., & Zatorre, R.J. *Influences of Sensory-Motor and Predictive Mechanisms on the Frequency Following Response*. Poster presentation delivered at the Organization for Human Brain Mapping (OHBM) 2023 Conference, Montreal, July 23, 2023; Association for Research in Otolaryngology 47th Annual Midwinter Meeting, Anaheim, United States, February 3, 2024.

VOLUNTEER

Event Organizer – The Neuro

2022-present

Supported the planning and coordination of symposiums and conferences, including the 25th Annual Neuropsychology Day and Brenda Milner Lecture, McConnell Brain Imaging Center Scientific Day, Wilder Penfield Lecture, etc.

SKILLS AND TECHNIQUES

Animal Research: brain and spinal cord dissection, organ embedding, vibratome/cryostat sectioning, immunohistochemistry, microscopy imaging, PCR, cell passage, injection, blood collection, surgery etc.

Electrophysiology: mini scope, calcium imaging, open ephys shuttle drive, implant preparation, micro soldering

Human Research: EEG (full-cap active, full-cap passive, FFR), fMRI protocol, MEG protocol, TMS

Data Analysis: Knowledge in Python, R, SPSS, MATLAB, JASP SLEAP, QuPath, ImageJ, etc.

Languages: English (academic), French (academic), Chinese (Mandarin; native), German (conversational)