

Hildelith Leyser

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Hildieleyser

Professional Summary

Neuroscience PhD candidate and neurotechnology researcher working across social cognition, brain-computer interfaces, wearable sensing, robotics, and multimodal AI systems. Experience spans primate social decision-making, awake neuroimaging, EEG and fNIRS integration, real-time behavioural tracking, robotic rehabilitation concepts, and translational neurotechnology. Current work combines academic neuroscience with industry research infrastructure for large-scale human and animal multimodal datasets.

Education

- 2023–2028 **PhD in Neuroscience**, *McGill University – Integrated Program in Neuroscience*, Montreal, Canada
Research across McGill and RIKEN on social decision-making, embodied cognition, neurotechnology, and computational models of behaviour. Methods include awake neuroimaging, behavioural modelling, pose estimation, inverse reinforcement learning, and multimodal physiology.
- 2022–2023 **MSc in Applied Neuroscience – Distinction**, *Royal Holloway, University of London*, London, UK
Dissertation using VR and eye-tracking for real-time behavioural analysis. Training in human neuroscience, experimental design, and machine learning applications for biological systems.
- 2018–2021 **BA in History**, *University of Oxford, Hertford College*, Oxford, UK
Research training in historical analysis, scientific argumentation, and the history of medicine and mental healing.

Advanced Training & Fellowships

- 2026 **Cambridge NeuroWorks What If Fellowship**, *ARIA-funded programme*, Cambridge, UK
Selected fellow developing speculative neurotechnology concepts around olfaction, hidden biological state, and adaptive wearable systems.
- 2025 **Neurohackademy**, *University of Washington eScience Institute*, Seattle, USA
Training in neuroimaging, open science, Python workflows, and reproducible data analysis.
- 2025 **Women in Science Japan Machine Learning Summer School**, Tokyo, Japan
Intensive training in machine learning, statistics, and scientific programming.
- 2024–2025 **RIKEN Brain Science Training Program**, Tokyo, Japan
Doctoral research training in primate cognition, neuroimaging, and experimental neuroscience.
- 2024 **International Center for Primate Brain Research Summer School**, Shanghai, China
Training in primate neuroscience, histology, immunohistochemistry, and comparative brain research.
- 2023 **RIKEN Center for Brain Science Learning and Imagination Summer Program**, Tokyo, Japan
Summer research placement in decision-making and cognitive neuroscience.
- 2022 **Rhode Island School of Design: Video Game Design & Interactive Systems**, Remote
Training in Unity, Unreal Engine, and interactive system design.
- 2022 **University of Amsterdam Methods and Statistics in Social Sciences – Grade A**, Remote
Training in statistics and quantitative social science methods.

Research & Development Experience

- 2026–Present **Head of Research**, *Netholabs Ltd*, London, UK
Lead human neuroscience research across multimodal capture, protocol design, device integration, and translational neurotechnology. Built research workflows combining EEG, fNIRS, eye tracking, motion capture, wearable IMUs, EMG, microphones, haptics, and LSL/XDF synchronisation. Coordinated human data collection, live demonstrations, data governance, and scientific direction across research, AI, and engineering teams.
- 2024–2025 **International Program Associate**, *RIKEN Center for Brain Science*, Tokyo, Japan
Designed and ran a 3D social foraging task in macaques to study exploration, exploitation, dominance, and social decision-making. Developed behavioural analysis pipelines for choice, value, rank, social context, and movement. Applied DeepLab-Cut, SLEAP, YOLO, and pose estimation workflows for real-time and offline behavioural tracking.
- 2023–Present **PhD Researcher**, *McGill University Social and Sensory Brain Mechanisms Lab*, Montreal, Canada
Research on social cognition, sensory processing, neuroimaging, and embodied decision-making. Current projects include primate behavioural modelling, awake fMRI paradigms, movement kinematics, and computational approaches to social reward valuation.
- 2026–Present **Neuroscience and EEG Analysis Consultant**, *NeuroZen*, Remote / India
Consulted on EEG study design, neural targeting, pilot interpretation, and sham-controlled validation planning for a non-invasive neurostimulation device. Produced protocol reviews, EEG quality-control guidance, power analysis, and study-design documents for adult relaxation and ADHD-related pilots.

- 2026 **Neuroscience Public Communication Consultant**, *Voltage TV*, London, UK
Provided neuroscience consulting for public communication work on adolescent brain development. Supported scientific framing, accuracy, and translation of complex neuroscience for broad audiences.
- 2025 **Hugging Face Le Robot Hackathon Winner**, *Team Electrify-141*, Global Competition
Led work on the Circuit Robot project using the SO-ARM101 robotic arm for electrical circuit assembly. Built an open-hardware robotic manipulation platform with documented physical trials, real-time computer vision, component recognition, manipulation control, and safety considerations for electrical environments.
- 2026 **Project Motherboard Hackathon Winner**, *Auracle*, London, UK
Created Auracle, a wearable olfactory sensing and filtration concept for air pollution and respiratory health. The system used a closed-loop wearable design, a companion app, real-time exposure scoring, and AI-based volatile organic compound classification.
- 2024 **Neural Synchrony Platform Developer**, *NatHACKS Canada*, Edmonton, Canada
Developed a dual-EEG hyperscanning platform using custom sensor hardware, real-time Python signal processing, and synchrony measures for human interaction and neurofeedback.
- 2023–2024 **Exoskeleton Development Project Lead**, *McGill Biomechanics Society*, Montreal, Canada
Led an interdisciplinary team developing an EMG-based exoskeleton concept for Parkinson's disease. Designed control logic for tremor-related motor support, integrated mechanical and electronic systems, and coordinated technical development across student teams.
- 2024 **VR Robotics Developer**, *NeuroHack McGill XR/VR Hackathon*, Montreal, Canada
Industry prize winner for a gamified VR environment for behavioural and robotic assessment. Built an underwater virtual task with biofeedback concepts and adaptive interaction design.

Selected Projects

Macaque Social Foraging	3D two-armed bandit task measuring exploration, exploitation, reward valuation, dominance, and social context in six macaques across solo, dyadic, and triadic conditions.
Behaviour Foundation Models	Industry research infrastructure for multimodal human and animal datasets using synchronized physiology, movement, gaze, audio, and behavioural data.
Real-Time Neurofeedback	Python package and dashboard work for real-time neurofeedback using EEG and multimodal physiological data.
BCI SSVEP Speller	Brain-computer interface project focused on SSVEP spelling and assistive communication for Parkinson's-related applications.
Auracle	Olfactory sensing and filtration wearable for air pollution, VOC classification, exposure scoring, and respiratory health.
Canary Labs Concepts	Research direction on olfaction, volatile organic compounds, hidden physiological state, and early detection of neurodegenerative or inflammatory processes.

Technical Skills

Programming	Python; MATLAB; R; JavaScript; React; Git; Jupyter; scientific computing workflows.
Machine Learning	PyTorch; scikit-learn; TensorFlow; deep learning; inverse reinforcement learning; behavioural modelling; Bayesian hierarchical modelling; explainability methods.
Neurotechnology	EEG; fNIRS; EMG; eye tracking; LSL/XDF; neurofeedback; BCI design; wearable sensors; haptics.
Computer Vision	DeepLabCut; SLEAP; YOLO; OpenCV; 2D and 3D pose estimation; multi-camera tracking; movement analysis.
Robotics & Hardware	SO-ARM101 robotic arm; Unitree G1 exposure; EMG-controlled systems; 3D printing; prototyping; sensor integration.
Simulation & Design	Unity 3D; Unreal Engine; Blender; SketchUp; ANSYS HFSS; VR task design.
Data Analysis	Time-series analysis; HRV; signal processing; Bayesian models; mixed models; neuroimaging workflows; dashboard development.

Publications & Selected Presentations

Publications and Manuscripts

- In preparation Leyser, H. et al. Social context reshapes exploration and reward valuation in a 3D macaque foraging task.
- In preparation Leyser, H. et al. Invisible Orchestras: sensory and metabolic negotiation as the basis of social alignment.
- In revision Leyser, H.F. & Cooper, K. How do we differentiate between humans and robots? A multisensory perspective.
- 2023 Essay: Why Mirror Neurons are the most important finding in psychology. Postgraduate student essay competition winner.

Conference Presentations

- 2026 British Neuroscience Association AI Symposium – presentation on neurotechnology and social cognition.
- 2025 Co-Creation International Conference, Tokyo – InterAction: Neural Mechanisms of Social Behaviour.
- 2024 International Center for Primate Brain Research Summer School, Shanghai – Sociability, Hierarchy, and Reward: A novel decision making framework.
- 2024 47th Japanese Neuroscience Society Meeting, Fukuoka – Embodied Decision-Making: A Social Foraging Paradigm Using a 3D Two-Armed Bandit Task.
- 2024 QBIN Scientific Day, Montreal – Integrating Movement and Decision Making: an Embodied Cross Species Approach.
- 2024 British Neuroscience Association, Online – Embodied Foraging: Explore versus Exploit Social Decision Making.
- 2024 COSYNE, Lisbon – Unveiling Movement Patterns as Cognitive Nodes.
- 2024 Canadian Biomedical Engineering Conference – Parkinsync Design McGill Biomechanics Society.

Invited Talks and Teaching

- 2024 Zatorre Lab Journal Club, Montreal – Rhythm and syncopation: movement as social communication.
- 2024 Integrate and Fire Seminar Series, McGill – Untangling Sex and Gender in Neuroscience. Host and chair.
- 2024 Non-Human Primates Journal Club, McGill – Behavioural acquisition and deep learning of explore/exploit paradigms.
- 2025–Present Python programming tutor for neuroscience, machine learning, data analysis, and creative BCI projects.

Awards & Recognition

- 2026 Cambridge NeuroWorks What If Fellowship – ARIA-funded programme.
- 2026 Project Motherboard Hackathon Winner – Auracle olfactory sensing and filtration wearable.
- 2025 UCSF-CBS Young Investigator Exchange Travel Award – Asilomar Retreat and UCSF Visit.
- 2025 Japanese Neural Network Society Travel Grant – JNNS Winter Workshop.
- 2025 Hugging Face Le Robot Worldwide Hackathon Winner – Circuit Robot Project.
- 2024–2025 RIKEN International Program Fellowship – Doctoral research fellowship.
- 2024–2025 Graduate Mobility Award – McGill University international research.
- 2024 Neurosphere natHACKS Award – Canada's NeuroTech Hackathon.
- 2024 Quebec Bioimaging Travel Award – Summer research funding.
- 2024 Industry Partner Prize – Silicio Labs VR environment development.
- 2024 International Center for Primate Brain Research Award – Full internship funding.
- 2024 COSYNE New Attendee Travel Grant – International conference.
- 2023–2024 McGill University IPN Recruitment Award.
- 2023–2027 McGill University International Fee Waiver.
- 2023 Women in Memory Research Award – Ruhr University workshop.
- 2023 Postgraduate Student Essay Competition Winner – Published essay.

Leadership & Service

- 2026–Present Head of Research, Netholabs – coordination across research, engineering, AI, and data teams.
- 2024–Present COSYNE Diversity and Inclusion Committee Member – selected from a competitive international pool.
- 2023–2024 Senior Project Advisor, McGill Biomechanics Society – exoskeleton development and student technical leadership.
- 2023–2024 Vice President, McGill Care Through Tech – technology access and health innovation initiatives.
- 2024–Present Team leader and technical contributor across neurotechnology, robotics, and AI hackathons.

International Collaboration Experience

- United Kingdom Netholabs research leadership; Cambridge NeuroWorks fellowship; Royal Holloway MSc; Oxford BA; public neuroscience consulting.
- Japan RIKEN Center for Brain Science doctoral research; primate social cognition; neuroimaging; machine learning training.
- Canada McGill PhD research; neurotechnology hackathons; biomechanics and BCI projects.
- China International Center for Primate Brain Research training in primate neuroscience and histological methods.
- United States Neurohackademy training; UCSF-CBS Young Investigator Exchange.

Languages & Communication

Languages English native; French professional; Spanish professional; German conversational; Japanese basic.

Communication Scientific writing, grant writing, technical reports, public neuroscience, interdisciplinary teaching, and international collaboration.