Pierre Hieu Guilleminot

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EDUCATION

2019 - 2023 **PhD in Neurotechnology - Computational Cognitive Neuroscience**
Imperial College London, UK - Centre for Neurotechnology,
Thesis: *Neural Mechanisms of Audio Tactile Speech Integration*
Skills: *EEG Signal Processing, Spiking Neural Network, Statistics, Computational Modelling*

2018 - 2019 **MRes in Neurotechnology** (*Distinction*)
Imperial College London, UK - Centre for Neurotechnology,
Thesis: *Engineering Tactile Signals for Hearing Aids*
Skills: *Speech Processing, Speech recognition, Biostatistics, Deep Learning, Cognitive Neuroscience*

2015 - 2018 **Msc in Bioengineering** (*Distinction*)
Grenoble INP - Phelma, France - Department of Bioengineering
Thesis: *A Robotic Supernumerary Thumb for Complex Musical Tasks*
Skills: *Signal Processing, Robotics, Software Engineering*

2015 - 2016 **BEng in Engineering** (*Distinction*)
Grenoble INP - Phelma, France - Department of Physics and Signal Processing
Main Courses: *Maths, Signal Processing, Physics*

2012 - 2015 **Preparatory Classes for Grande Ecoles**
Lycee Condorcet Paris, France
Major: *Maths, Physics*
Minor: *Computer Science*

RESEARCH EXPERIENCE

2024 - now **Postdoctoral Researcher - Computational Cognitive Neuroscience**
Institute of System Neuroscience - Dynamics of Cognitive and Auditory Processes Team
Duties: *Computational Modelling. Information Theory. Reservoir Networks. Machine Learning. Electrophysiology.*

2022 - 2023 **Data Scientist (part-time) - Neural Data Processing**
INBRAIN Neuroelectronics - INNERVIA Bioelectronics - Data Intelligence
Duties: *Neural Interface Characterization. Neural Data Analysis. Computational Modelling. Machine Learning.*

2022 - 2022 **Research Scientist Intern - Neural Interface**
INBRAIN Neuroelectronics - INNERVIA Bioelectronics - Data Intelligence
Duties: *Neural Interface Characterization. Software Engineering on a Neural Interfacing System. Neural Data Analysis. Computational Modelling.*

2017 - 2018 **Research Intern**
Imperial College London - Brain And Behaviour Lab
Duties: *Design and Control of a Robotic Supernumerary Finger. Experimental Setup and Analysis of finger usage for Complex Musical Tasks.*

SKILLS & AREAS OF EXPERTISE

Quantitative background: Broad training in engineering and applied mathematics with focus on bio-signal processing, information theory, computational modeling and machine learning. Experience in developing and applying custom machine learning (scikit-learn), topological data analysis (giotto-tda) and deep learning (pytorch, lightning) frameworks.

Programming and computational background: Strong programming skills in Python. Demonstrable experience in high-performance computing and general software engineering.

Speech and Language processing: Speech processing with particular focus on offline/online feature extraction using signal processing and deep learning. Modeling of language using various computational models (HMM, word2vec embeddings, RNN, LLM) in an information theoretic framework (surprisal, Renyi entropy).

Neuroscience tools: Electrophysiological data (M/s/EEG) analysis and modeling. Nerve recording analysis and modeling. Machine learning, deep learning and spiking neural networks for biologically-constrained models (brian2). Information theoretic measures for neuroscience (Gaussian Copula Mutual Information, Partial Information Decomposition, Feature-specific Information Transfer, Transfer of Entropy).

PUBLICATIONS & PREPRINT

P Guilleminot, C Graef, E Butters, T Reichenbach (2023). Audiotactile stimulation can improve syllable discrimination through multisensory integration in the theta frequency band. *JOCN*

E Varano, **P Guilleminot**, T Reichenbach (2022). AVbook, a high-frame-rate corpus of narrative audio-visual speech for investigating multimodal speech perception. *JASA*

P Guilleminot*, M Kegler*, E Varano* (2021). sPyEEG: Package for modelling EEG responses to speech. (Zenodo)

P Guilleminot, T Reichenbach (2021). Enhancement of speech-in-noise comprehension through vibro-tactile stimulation at the syllabic rate. *PNAS*

A Shafti, S Haar, R Mio, **P Guilleminot**, AA Faisal (2021). Playing the piano with a robotic third thumb: Assessing constraints of human augmentation. *Scientific Reports*

J Cunningham, A Hapsari, **P Guilleminot**, A Shafti, AA Faisal (2018) The Supernumerary Robotic 3rdThumb for Skilled Music Tasks. *Biorob 2020*

CONFERENCE TALKS

TEMPOMEGA 2025 - Encoding and Decoding of Continuous Neural Data

WoCoMo 2025 - Sequential Processing of Predictive Strength and Dispersion during Speech Comprehension

CCN 2025 - Decomposition of uncertainty into dispersion and strength during speech processing

MENTORING & RESEARCH SUPERVISION

Laure Deyna
PhD Student - Cognitive Neuroscience (2023-now)
Project: *Computational models of multi-scale Temporal Predictions in Speech Processing. Interaction between dorsal and ventral pathway.*

Clement Sauvage
PhD Student - Cognitive Neuroscience (2023-now)
Project: *Spectral Spatio-Temporal Decomposition of Entropy and Surprisal in the Electrophysiological response to Natural Speech.*

Cosima Graef
Msc Student - Bioengineering (2021-2022)
Project: *Characterizing the brain responses to multisensory stimuli by relating EEG and behavioural data.*

Arianne de St-Victor
Msc Student - Bioengineering (2020-2021)
Project: *Sensory substitution of hearing by touch using data from a robotic hand. Model of rigid contact body sounds.*

Emilia Butters
Msc Student - Translational Neuroscience (2019-2020)
Project: *Exploring the roles of neural oscillations in syllables parsing. Stochastic modelling of behavioural responses to speech.*

TEACHING

Modern Methods for Brain Imaging
ILCB Summer School (2025)
Description: *Deep dive into the latest methods used to study brain function through imaging techniques.*

Brain-Machine Interfaces
Imperial College London, UK - Department of Bioengineering (2018-2022)
Teaching Award 2021
Description: *Supervise students during a machine learning competition. Teach neural data analysis and visualisation methods.*

Reinforcement Learning
Imperial College London, UK - Department of Computing (2021-2022)
Description: *Supervise students during practicals covering basic reinforcement learning (Bellman Equation, Markov Modelling) and deep reinforcement learning*

Probability and Statistics
Imperial College London, UK - Department of Bioengineering (2018-2022)
Description: *Teach the bases of probability and statistics*

Modelling in Biology
Imperial College London, UK - Department of Bioengineering (2019-2020)
Description: *Stochastic processes, differential equations and their applications to biology.*

Maths II
Imperial College London, UK - Department of Bioengineering (2019-2020)
Description: *Linear algebra and differential equations*

VOLUNTEERING & PUBLIC ENGAGEMENT

Highschool Observation Internship
Institut de Neuroscience des Systèmes, 2024-2025
Description: Promote Neuroscience and Research to highschoolers.

Voyage en labo inconnu
Institut de Neuroscience des Systèmes, 2024
Description: Promote Neuroscience to highschoolers.

Science Communication Workshops
Imperial College London 2019-2021
Description: Presenting neuroscience research to a general public.

Bioeng Summer School Imperial College London
Imperial College London, 2021
Description: Promote neuroscience to highschool students.

Girls who ML - Lecture Series Winter 2021
Description: Volunteered to demonstrate workshops on machine learning and its application to different fields.

Co-organizer of the CDT Neurotechnology stand
Imperial Science Festival 2019
Description: Presenting neuroscience research to a general public.

LANGUAGES

English: Professional proficiency (IELTS C2 Level)
German: Elementary knowledge (A2)
French: Native speaker
Spanish: Elementary knowledge (A2)

HOBBIES

Art: Drawing
Musical Training: Violin, Bass guitar
Game Theory: Automating solutions to various games
TTRPG: Pathfinder 2e, D&D 5e