CORENTIN PUFFAY

Post-doctoral researcher at KU Leuven - EPFL graduate

@ corentin.puffay@kuleuven.be +33658898342 Vaartkom 5C 01.04, 3000 Leuven, Belgium
linkedin.com/in/corentin-puffay-389863151 github.com/puffayc

SUMMARY

I am a researcher fascinated by neuroscience and deep learning. At EPFL, I developed a strong engineering foundation through coursework in programming, machine learning, and neuroscience. My Ph.D. at KU Leuven focuses on relating continuous speech to brain signals (EEG) using novel deep learning architectures ranging from convolutional networks to transformers. I also leverage the use of recent large language models to extract meaningful language representations to predict brain responses from invasive (electrocorticography) and noninvasive recording modalities. The goal is to model speech processing in the brain and develop novel EEG-based diagnostic tools and hearing prostheses, as well as to understand the mechanisms underlying language processing in the brain.

EDUCATION

Postdoctoral researcher in Neuroscience & AI - ExpORL/PSI groups

Katholieke Universiteit Leuven (KU Leuven)

June 2025 – Now Leuven, Belgium

- Modeling language processing in the brain with LLMs
- Neuroimaging techniques
- Brain Foundation Models

PhD in Biomedical Sciences and Engineering Science: Electrical Engineering - ExpORL/PSI groups

Katholieke Universiteit Leuven (KU Leuven)

Feb. 2021 – June 2025 Leuven, Belgium

- Machine and Deep learning
- Auditory system modeling, language modeling
- Speech representation & EEG decoding/encoding

MSc in Bioengineering

Swiss Federal Institute Of Technology (EPFL)

Feb. 2018 – Mar. 2020 Lausanne, Switzerland

- Specialization in Neuroprosthetics
- Average grade 5.1/6

BSc in Life Science Engineering

Swiss Federal Institute Of Technology (EPFL)

Sep. 2013 – Dec. 2017 Lausanne, Switzerland

PROFESSIONAL EXPERIENCE

Visiting researcher - Neural Acoustic Processing Laboratory (Prof. Nima Mesgarani)

Columbia University

June 2024-October 2024 New-York City (NY), United States

SKILLS

Python | Tensorflow | Matlab | HuggingFace | LLMs | C++ | R | LaTeX

LANGUAGES

French — Mother tongue

English — Fluent

Dutch — Intermediate

Spanish — Intermediate

German — Basic

TEACHING

Teaching Assistant

Swiss Federal Institute of Technology (EPFL)

Sep. 2014– Jan. 2016 Lausanne, Switzerland

- Management of exercise sessions with student groups for General Chemistry.

DISTINCTIONS

1st prize - French Physics Olympiads

Lycée Jean Monnet

2011 – 2012 Annemasse, France

- Investigation of spatio-temporal correlates of speech understanding in intracranial brain responses (electrocorticography) using language features extracted with recent large language models (LLMs).

Master Thesis - Brown Neuromotion Laboratory

Brown University

Sep. 2019 – Mar. 2020 | Providence (RI), United States

- "The effects of spinal cord epidural electrical stimulation (EES) on the ascending proprioceptive neural circuits." The project involved machine learning techniques to investigate phenomenon underlying EES effects on neuronal data recorded in the somatosensory cortex of a Rhesus monkey.

Semester Project - Prof. Courtine Laboratory

Center for Neuroprosthetics, EPFL

Feb. 2019 – Jun. 2019 | Lausanne, Switzerland

- Using finite element models analysis, I contributed to the development of stimulation paradigms for large and diversified patient cohorts for restoration of locomotion with EES based on dorsal root activation.

Semester Project - Prof. Ijspeert Laboratory

Biorobotics Laboratory, EPFL

Sep. 2018 – Jan. 2019 | Lausanne, Switzerland

- Development of a neck model on Simulink in order to better understand mechanisms underlying posture control and balance. Started with vertebra and joints modelling, the addition of muscles based on the Hill model. Model response to perturbation compared against experimental data.

Industry Internship

Onward Medical

Sep. 2017 – Feb. 2018 | Eindhoven, the Netherlands

- Sensitivity Study on an implantable medical device using Finite Element Model analyses. Establishment of an uncertainty budget.
- Realisation of a collaborative geophysics project, presented to a jury of physicists in Paris.

EXTRA-CURRICULAR

- Handball, Running, Guitar Playing, Literature

SOCIAL INITIATIVES

Participation to Hackahealth 2019, a two-days event during which designers and engineers help people with disabilities in designing artefacts that can solve their specific—often neglected—daily challenges.

REFEREES

- Prof. Tom Francart - KU Leuven (tom.francart@kuleuven.be)
- Prof. Hugo Van hamme - KU Leuven (hugo.vanhamme@esat.kuleuven.be)

ACADEMIC GRANTS

- **PhD fellowship strategic basic research (October 2022)** - Fonds voor wetenschappelijk Onderzoek - Vlaanderen (**FWO**)
  Project: Diagnostics of the auditory system using deep-learning-based analysis of EEG signals.
- **Travel grant for long stay abroad (June 2024, Columbia University)** - Fonds voor wetenschappelijk Onderzoek - Vlaanderen (**FWO**)
  Project: Modeling language processing in intracranial recordings using large language models.

PUBLICATIONS

- **C. Puffay**, J. Van Canneyt, J. Vanthornhout, H. Van hamme, T. Francart, (2022). Relating the fundamental frequency of speech using a dilated convolutional network, *Proc. Interspeech 2022 10.21437/Interspeech.2022-315*
- **C. Puffay**, B. Accou, L. Bollens, M.J. Monesi, J. Vanthornhout, H. Van hamme, T. Francart, (2023). Relating EEG to continuous speech using deep neural networks: a review, *Journal of Neural Engineering, IOP publishing*
- **C. Puffay**, J. Vanthornhout, M. Gillis, B. Accou H. Van hamme, T. Francart, (2023). Robust neural tracking of linguistic speech representations using a convolutional neural network. *Journal of Neural Engineering, IOP publishing*

- L. Bollens, **C. Puffay**, B. Accou, J. Vanthornhout, H. Van Hamme, T. Francart, (2024). Auditory EEG decoding challenge for ICASSP 2024. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2024*.
- P. De Clercq, **C. Puffay**, J. Kries, H. Van Hamme, M. Vandermosten, T. Francart, J. Vanthornhout, (2024). Detecting Post-Stroke Aphasia Via Brain Responses to Speech in a Deep Learning Framework. *IEEE Engineering in Medicine and Biology Conference (EMBC 2024)*
- **C. Puffay**, J. Vanthornhout, M. Gillis, P. De Clercq, B. Accou, H. Van hamme, T. Francart. Classifying coherent versus nonsense speech perception from EEG using linguistic speech features.
Scientific Reports 14, 18922 (2024).
- **C. Puffay**, G. Mischler, V. Choudhari, J. Vanthornhout, S. Bickel, A. D. Mehta, C. Schevon, G. M. McKhann, H. Van hamme, T. Francart, N. Mesgarani Large Language Models Reveal the Neural Tracking of Linguistic Context in Attended and Unattended Multi-Talker Speech.
bioRxiv 2025.04.24.648897 (2025).
- He, L., Nie, E., Dindar, S. S., Firoozi, A., Florea, A., Nguyen, V., **Puffay, C.**, Shimizu, R., Ye, H., Brennan, J., Schmid, H., Schütze, H., and Mesgarani, N. (2025). XCOMPS: A multilingual benchmark of conceptual minimal pairs.
arXiv preprint arXiv:2502.19737, https://doi.org/10.48550/ARXIV.2502.19737