Alexander Lanine

Curriculum Vitae

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Professional Summary

Aspiring researcher in computational neuroscience and computational cognitive science, with a strong foundation in mathematics, data analysis, and computational modeling. Proficient in neural data analysis, machine learning methods, and probabilistic modeling, supported by a proven track record of academic excellence and extensive research experience. Actively seeking PhD positions at the intersection of neuroscience, AI, and cognition.

Education

Present — **Master of Science in Cognitive Science**, *École Normale Supérieure - Ulm*, France, Specializing in Mathematical and Computational Modeling
M1 Level: 19.00/20.00

May 2023 — **Bachelor of Science, Honours Mathematics with Distinction (summa cum laude)**, *University of Victoria*, Canada
Overall GPA: 3.88/4; Mathematics GPA: 4.00/4

Work Experience

Feb 2024 – Present — **Research Intern**, *Group for Neural Theory, École Normale Supérieure*
Investigating latent feedforward patterns in recurrent neural networks.

Sept 2023 – June 2024 — **Research Intern**, *Institut Jean Nicod, École Normale Supérieure*
Investigated non-classical probability theories to model uncertainty semantics and probabilistic judgments. Developed applications for decision science to capture behavior related to illusory inferences.

Present & Sept 2020 – April 2022 — **Mathematics and Statistics Tutor**, *Self-Employed & Math and Stats Assistance Centre, University of Victoria*
Provided tutoring in Pre-Calculus, Calculus, Statistics, Linear Algebra, Combinatorics, Logic, and Physics. Currently specializing in Mathematics for Machine Learning in private practice. At UVic, assisted undergraduate students in first- and second-year math and stats courses through drop-in sessions and exam review sessions for groups of up to 250 students. Promoted to Head Tutor (Fall 2021), with responsibilities including training new tutors and analyzing centre data to improve student support.

May 2023 – Aug 2023 — **Undergraduate Researcher (NSERC Funded)**, *Department of Mathematics and Statistics, University of Victoria*
Researched generalizations of continuous logic for applications to functional analysis.

May 2021 – Aug 2021 — **Undergraduate Researcher (NSERC Funded)**, Department of Mathematics and Statistics, University of Victoria
Conducted simulations of Rayleigh-Bénard convection on Compute Canada supercomputers. Analyzed scaling laws using Python and computational fluid dynamics methods.

Academic Awards

2023 **France Excellence Scholarship**, *Awarded by Campus France and Canadian Embassy to France*, Full-tuition scholarship awarded to top Canadian students pursuing graduate studies in France.

2021, 2023 **NSERC Undergraduate Research Award**, *Awarded by Natural Sciences and Engineering Research Council of Canada*, Competitive Canadian Research Grant. Awarded twice.

2021 **Corbett Scholar**, *University of Washington*, Competitive exchange scholarship program aimed at promoting cultural and academic exchange between Canada and the United States in the Pacific Northwest (conducted virtually due to COVID-19).

2020 **Fulbright's Killam Fellowship**, *Fulbright Canada*, Prestigious exchange program award (deferred due to COVID-19).

2019-2023 **Additional Awards**, *Leeder Family Memorial Award in Mathematics, J.B. Wood Book Prize, Jamie Casseles Undergraduate Research Award, Melva J. Hanson Scholarship, etc.*

Selected Projects

FORCE Replicated results from computational experiments described in Sussillo and Abbott (2009). Implemented the FORCE learning algorithm from scratch in Python.

VKF Power Law Extended Robotics project on the Volatile Kalman Filter (Piray and Daw, 2020). Discovered a novel power law relating learning rate updates and temporal dynamics of prediction error magnitudes.

Finnegan's-GPT Built a transformer model from scratch following Andrej Karpathy's tutorials. Trained a small GPT on James Joyce's collected works, with humorous results.

Technical Skills

Programming Python, PyTorch, C, R, Bash/Z Shell, SQL

Data Science NumPy, pandas, scikit-learn, Matplotlib, SciPy

AI and ML Neural network modeling, dimensionality reduction, reinforcement learning

Languages English (native), French (limited working proficiency)

Other High-performance computing, parallel computing (MPI), LaTeX

Extracurricular and Leadership Activities

July 2024 - Present **AI and Cognitive Science Group Organizer**
Facilitated biweekly discussions on AI and cognitive modeling. Led a collaborative project to build a GPT model from scratch, engaging peers in hands-on learning. Presented research papers on mechanistic interpretability.

Summer 2023 **Journal Club Leader in Philosophy of Mathematics**
Organized a journal club with advanced undergraduate and graduate students at the University of Victoria. Arranged one talk by a faculty member.

2019-2021 **Philosophy of Mind and Language Reading Group**
Organized a small interdisciplinary reading group focused on reading major works in the science and philosophy of mind and language.