

GIANCARLO KERG

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EDUCATION

- Université de Montréal, Mila** 09/2017 – 03/2023
Ph.D. in Computer Science (*GPA: 4.3/4.3, A+*)
Thesis: *Inductive Biases for Efficient Information Transfer in Artificial Networks*
Advisor: Prof. Yoshua Bengio OC FRS FRSC; co-advisor: Prof. Guillaume Lajoie
- Université Libre de Bruxelles** 09/2012 – 06/2013
M.Sc. in Pure Mathematics (*Grande Distinction*)
Thesis: *On Neretin's group of tree spheromorphisms*
Advisor: Prof. Pierre-Emmanuel Caprace
- University of Cambridge, Clare College** 10/2011 – 06/2012
M.A.St., Part III of the Mathematical Tripos (*Merit*)
Thesis: *Expansion in groups*
Advisor: Prof. Ben J. Green FRS
- Université Libre de Bruxelles** 09/2008 – 06/2011
B.Sc. in Mathematics (*Grande Distinction*); minor in Physics

MATHEMATICAL OLYMPIAD INVOLVEMENT

- International Mathematical Olympiad (IMO), Deputy Leader, Luxembourg** 2026
Author of **Problem 1 of the IMO 2026**.
The team achieved **Luxembourg's best result in its IMO participation history**.
Co-led the delegation, including coordination of marking, appeals, and team supervision.
- Benelux Mathematical Olympiad (BxMO), Deputy Leader, Luxembourg** 2026
The team achieved **Luxembourg's best result in its BxMO participation history**.
Member of the BxMO 2026 Problem Selection Committee.
Responsible for team preparation, coordination, and grading during the competition.
- Luxembourg Mathematics Olympiad Program, Coach & Trainer** 09/2022 – present
Regular training sessions for top-performing high-school students selected via the OMB competition, preparing them for the IMO, BxMO, and other international competitions.
Sole author of the 2026 Team Selection Tests (TSTs) for both the BxMO and IMO: problem design, marking schemes, grading, and selection of the national teams.
- International Mathematical Olympiad, Personal Student Mentor** 02/2010 – 07/2012
Privately mentored an IMO participant on a weekly basis for over two years; the student later earned bronze and silver medals at the IMO.

ACADEMIC AND TEACHING EXPERIENCE

- Athénée de Luxembourg, Mathematics Teacher** 06/2025 – 07/2026
Taught mathematics in grades 9, 11, 12, and 13, mostly within the International Baccalaureate (IB) programme. Led Grade 9 class 5IEC to **first place in the 2026 MaachMath Competition**.
- Cambridge Society of Luxembourg, Mock Interviewer** 11/2020 – present
Conduct mock admissions interviews in Mathematics and Computer Science for Luxembourgish applicants to the University of Cambridge and the University of Oxford.
Provide individual feedback on technical problem solving, mathematical reasoning, and interview technique.

Université de Montréal / Mila, <i>Doctoral Researcher</i> Co-reviewer for JMLR and NeurIPS. M.Sc. thesis co-advisor (Victor Geadah). Teaching Assistant for Introduction to Machine Learning (Fall 2018).	09/2017 – 03/2023
Humboldt University of Berlin, <i>Research Associate</i> Co-reviewer for JMLR and NeurIPS. M.Sc. thesis co-advisor (Alexander Adler). Co-lecturer for a Machine Learning course. Research on guarantees for learning with weakly dependent random variables and concentration of measure.	03/2015 – 06/2016
Ministry of Education, Luxembourg, <i>Mathematics Tutor</i> Tutored high-school students preparing for their second examination.	09/2009 & 09/2010

WORK EXPERIENCE

GCBK Consulting sarls, <i>Founder & Managing Director</i> Personal branding and marketing consulting using artificial intelligence.	03/2023 – present
QuantCo Deutschland GmbH, <i>Data Scientist (Intern)</i> Data-driven claims management, algorithmic pricing, and management consulting. https://www.quantco.com	02/2017 – 08/2017
Hammer Lab, New York City, <i>Machine Learning Researcher (Intern)</i> Improving state-of-the-art MHC binding affinity prediction using deep learning. Contributing to open-source software for designing personalized cancer vaccines.	06/2016 – 12/2016
SavingGlobal GmbH, Berlin, <i>Business Intelligence Analyst (Intern)</i> Fintech startup by McKinsey founder team with 10 million EUR funding. Development of data-driven and pragmatic customer segmentation to guide marketing campaigns. Process-improvement ideas based on customer segmentation, employee interviews, and data analysis.	08/2014 – 10/2014
Startup Institute, Berlin, <i>Technical Marketing Student</i> Full-time career-accelerating program founded by partner startups based in Berlin. First project: market research project at Delivery Hero. Second project: matching platform for startup newcomers in Berlin.	05/2014 – 07/2014

AWARDS AND DISTINCTIONS

MaachMath Competition First place, class 5IEC (Athénée de Luxembourg), as teacher of the winning team.	2026
UNIQUE PhD Excellence Scholarship Winter 2021 competition, prize 15,000 CAD.	2021
UNIQUE Best Oral Presentation Award Third Montreal Artificial Intelligence and Neuroscience (MAIN) Conference.	2019
International Mathematics Competition Second Prize.	2011
International Mathematical Olympiad Bronze Medal (2007), Honorable Mention (2006, 2008).	2006–2008
Olympiade Mathématique Belge First Prize (2008), Second Prize (2006), Third Prize (2007), Fourth Prize (2005).	2005–2008

On Neural Architecture Inductive Biases for Relational Tasks.

G.Kerg, S. Mittal, D. Rolnick, Y. Bengio, B. Richards, G. Lajoie.

Under review at *the Advances in Neural Information Processing Systems (NeurIPS)*, 2022.

Goal-driven optimization of single-neuron properties in artificial networks reveals regularization role of neural diversity and adaptation.

V. Geadah, S. Horoi, G.Kerg, G. Wolf, G. Lajoie.

Inductive Biases for Relational Tasks.

G.Kerg, S. Mittal, D. Rolnick, Y. Bengio, B. Richards, G. Lajoie.

Accepted at *the ICLR 2022 workshop on Objects, Structure and Causality*, 2022.

Top-down optimization recovers biological coding principles of single-neuron adaptation in RNNs.

V. Geadah, G.Kerg, S. Horoi, G. Wolf, G. Lajoie.

Accepted at *Computational and Systems Neuroscience (COSYNE)*, 2022.

Continuous-Time Meta-Learning with Forward Mode Differentiation.

T. Deleu, D. Kanaa, L. Feng, G.Kerg, Y. Bengio, G. Lajoie, P.-L. Bacon.

Accepted at *the Tenth International Conference on Learning Representations (ICLR)*, 2022.

Catastrophic Fisher Explosion: Early Phase Fisher Matrix Impacts Generalization.

S. Jastrzebski, D. Arpit, O. Astrand, G.Kerg, H. Wang, C. Xiong, R. Socher, K. Cho and K. Geras.

Accepted at *the Thirty-eighth International Conference on Machine Learning (ICML)*, 2021.

Network-level computational advantages of single-neuron adaptation.

V. Geadah, G. Lajoie, G.Kerg, Stefan Horoi, Guy Wolf.

Accepted at *Computational and Systems Neuroscience (COSYNE)*, 2021.

Untangling trade-offs between recurrence and self-attention in artificial neural networks.

G.Kerg*, B. Kanuparthi*, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.

Advances in Neural Information Processing Systems (NeurIPS), 2020.

<https://arxiv.org/abs/2006.09471>

Catastrophic Fisher Explosion: Early Phase Fisher Matrix Impacts Generalization.

S. Jastrzebski, D. Arpit, O. Astrand, G.Kerg, H. Wang, C. Xiong, R. Socher, K. Cho, K. Geras.

Accepted for a poster presentation at the *Proceedings of the NeurIPS 2020 Workshop on Optimization in Machine Learning (OPT)*, 2020.

Submitted to the *Ninth International Conference on Learning Representations (ICLR)*, 2021.

<https://openreview.net/forum?id=yT7-k6Q6gda>

Guarantees for stable signal and gradient propagation in self-attentive recurrent networks.

G.Kerg, B. Kanuparthi, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.

DeepMath 2020 (Conference on the Mathematical Theory of Deep Neural Networks), 2020.

Learning Long-term Dependencies Using Cognitive Inductive Biases in Self-attention RNNs.

G.Kerg*, B. Kanuparthi*, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.

Accepted for poster presentations at the *ICML 2020 Inductive biases, invariances and generalization in RL workshop, 2020* as well as *The Fourth Annual Montreal AI Symposium (MAIS), 2020*.

https://biases-invariances-generalization.github.io/program/big_31.html

Advantages of biologically-inspired adaptive neural activation in RNNs during learning.

V. Geadah, G.Kerg, Stefan Horoi, Guy Wolf, G. Lajoie.

<https://arxiv.org/abs/2006.12253>

Non-normal Recurrent Neural Network (nnRNN): learning long time dependencies while improving expressivity with transient dynamics.

G.Kerg*, K. Goyette*, M.P. Touzel, G. Gidel, E. Vorontsov, Y. Bengio and G. Lajoie.

Advances in Neural Information Processing Systems (NeurIPS), 2019.

<https://arxiv.org/abs/1905.12080>

h-detach: Modifying the LSTM gradient towards better optimization.

B. Kanuparthi*, D. Arpit*, G.Kerg, R. Ke, I. Mitliagkas and Y. Bengio.

Seventh International Conference on Learning Representations (ICLR), 2019.

<https://openreview.net/forum?id=ryf7ioRqFX>

<https://arxiv.org/abs/1810.03023>

Safe Screening for Support Vector Machines.

J. Zimmert, C. Schröder de Witt, G.Kerg, and M. Kloft.

Proceedings of the NIPS 2015 Workshop on Optimization in Machine Learning (OPT), 2015.

VOLUNTEER WORK

Well-being in Machine Learning (WBiML), Co-organizer at NeurIPS 2019

12/2019

OTHER

Languages English, German, French, Luxembourgish (Fluent/Native)
Italian, Polish (Basic)

Interests AI, Neuroscience, Psychology, Mathematics Education, Chess, Entrepreneurship