Alexandra Maria Proca

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Education

Imperial College London — Oct. 2023 – Present
Doctor of Philosophy in Computational Neuroscience and Machine Learning; President's Scholar — *London, UK*

University College London — Sept. 2020 – Dec. 2021
Master of Science in Machine Learning with Distinction; Dean's List Laureate — *London, UK*

University of North Carolina at Chapel Hill — Aug. 2016 – May 2020
Bachelor of Science in Computer Science, in Neuroscience with Honors, Minor in Music — *Chapel Hill, NC*

Research Experience

Research Assistant — Jan. 2022 – Jan. 2023
ETH Zürich Department of Computer Science (Lab: Dr. João Sacramento) — *Zürich, CH*
- Conducted research studying the use of hypernetworks for meta-learning

Master's Student — May 2021 – Dec. 2021
UCL Department of Computer Science (Lab: Dr. Jun Wang) — *London, UK*
- Conducted research studying the partial information decomposition of multitask neural networks across varying task settings in supervised and reinforcement learning models

Research Intern — June 2019 – Aug. 2020
MIT Brain and Cognitive Sciences (Lab: Dr. Tomaso Poggio) — *Cambridge, MA*
- Completed the Massachusetts Institute of Technology Summer Research Program for two summers
- Conducted research adversarially reprogramming recurrent neural networks across task domains

Research Assistant — May 2018 – May 2020
UNC Department of Mathematics (Lab: Dr. Peter Mucha) — *Chapel Hill, NC*
- Conducted statistical research analyzing changes in neural morphology of infant fMRI data

Research Assistant — Jan. 2017 – May 2020
UNC Department of Psychology and Neuroscience (Lab: Dr. Sylvia Fitting) — *Chapel Hill, NC*
- Conducted behavioral research in animal models, studying HIV-1 Tat's effects on operant conditioning tasks and how endocannabinoids can be used to protect against assessed behavioral deficits

Research Intern — May 2015 – Aug. 2015
OSU Department of Computer Science (Lab: Dr. Radu Teodorescu) — *Columbus, OH*
- Conducted research using Arduino accelerometers to create motion-detection gloves, designed to teach middle and high-school students basic programming skills

Honors and Awards

Imperial College London President's PhD Scholarship (Full PhD Tuition & Stipend) — January 2023
UCL Dean's List Laureate: Awarded to Top 5% of Graduating Class — March 2022
UCL Friends and Alumni Association Scholarship ($20,000) — May 2020
Honors Carolina Laureate — May 2020
Graduated with Honors in Neuroscience from UNC — May 2020
David Bray Peele Memorial Research Award ($220) — Oct. 2019
Carolina Research Scholar — Jan 2019
Lindquist Undergraduate Research Award ($350) — Nov. 2018
Office of Undergraduate Research Travel Award ($300) — Nov. 2018
Psi Chi Psychology Honor Society — March 2018
Honor's Carolina Membership — Sept. 2017
Sigma Alpha Lambda Honor Society — May 2017
The National Society of Collegiate Scholars — May 2017
UNC Dean's List — Dec. 2016 – May 2017

Publications and Theses

1. *Discovering modular solutions that generalize compositionally.* S. Schug*, S. Kobayashi*, Y. Akram, M. Wolczyk, **A.M. Proca**, J. Von Oswald, A. Steger, R. Pascanu, J. Sacramento. **ArXiv**, December 2023.

2. *Synergistic information supports modality integration and flexible learning in neural networks solving multiple tasks.* **A.M. Proca**, F.E. Rosas, A.I. Luppi, D. Bor, M. Crosby*, P.A.M. Mediano*. **ArXiv**, October 2022. https://arxiv.org/abs/2210.02996

3. *Jack of All Trades, or Master of One: Information Decomposition Reveals Distinct Features of Generalizable vs. Specialized Neural Representations.* **A.M. Proca**. Masters Thesis, University College London, London, UK, December 2021. (Supervisors: M. Crosby, P.A.M. Mediano; Advisor: J. Wang)

4. *Establishing a Contextual Fear Conditioning Paradigm for the Tat Transgenic Mouse Model.* **A.M. Proca**. Bachelors Honors Thesis, University of North Carolina at Chapel Hill, NC, USA, May 2020. (Supervisor: I.R. Jacobs, Advisor: S. Fitting) https://doi.org/10.17615/expe-sc24

5. *Inhibitory control deficits in Tat transgenic mice using the Go/No-Go task.* I.R. Jacobs, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, K. Mackie, A.H. Lichtman, B. Ignatowska-Jankoswka, S. Fitting. **Journal of Neuroimmune Pharmacology**. 13, S38-S38 (2018).

Conference and Workshop Talks

1. *Informational synergy as a link between biological and artificial brains.* P. Mediano, A. Luppi, **A.M. Proca**, F. Rosas, M. Crosby, D. Bor. **Conference on Complex Systems 2022**, Palma de Mallorca, Spain, October 2022.

2. *Linking generalizable intelligence to consciousness via information synergy.* **A.M. Proca**. **Association for Mathematical Consciousness Science: Modelling Consciousness Workshop**, Dorfgastein, Austria, August 2022.

3. *Fast deep learning with a simple model of the prefrontal cortex.* **A.M. Proca**, M. Wołczyk, D. Zhao, S. Kobayashi, S. Schug, J. von Oswald, J. Sacramento. **Sinergia Meeting 2022**, Bern, Switzerland, July 2022.

Conference and Workshop Poster Presentations

1. *Synergistic information supports modality integration and flexible learning in neural networks solving multiple tasks.* **A.M. Proca**, F.E. Rosas, A.I. Luppi, D. Bor, M. Crosby, P.A.M. Mediano. **Gatsby Computational Neuroscience Unit Analytical Connectionism Summer School**, London, England, August 2023.

2. *Synergistic information supports modality integration and flexible learning in neural networks solving multiple tasks.* **A.M. Proca**, F.E. Rosas, A.I. Luppi, D. Bor, M. Crosby, P.A.M. Mediano. **Conference on Cognitive Computational Neuroscience**, Oxford, England, August 2023.

3. *Jack of All Trades, or Master of One: Distinct Features Between Generalizable and Specialized Artificial Neural Representations.* **A.M. Proca**, M. Crosby, P. Mediano. **25th Annual Meeting of the Association for the Scientific Study of Consciousness**, Amsterdam, Netherlands, July 2022.

4. *A Picture is Worth 784 Characters: Adversarially Reprogramming a Neural Network.* **A.M. Proca**, A. Banburski, T. Poggio. **34th Annual MIT Summer Research Programs Poster Session**, Cambridge, MA, USA, August 2019.

5. *Time-Dependent Inhibitory Control Deficits in Female Tat transgenic mice in the Go/No-Go Task.* **A.M. Proca**, I.R. Jacobs, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, C.B. Russell, C. Manjarres, A. Lichtman, B. Ignatowska-Jankowska, S. Fitting. **48th Annual Meeting of the Society for Neuroscience**, San Diego, CA, USA, November 2018.

6. *Cannabinoid receptor type 1 upregulation of the infralimbic cortex of female Tat transgenic mice following ten months of Tat expression and testing for inhibitory control deficits using the Go/No-Go task.* I.R. Jacobs, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, K. Mackie, A. Lichtman, B. Ignatowska-Jankowska, S. Fitting. **48th Annual Meeting of the Society for Neuroscience**, San Diego, CA, USA, November 2018.

7. *Time-dependent effects of Tat on Go/No-Go performance.* I.R. Jacobs, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, S. Fitting. **35th Annual Meeting of the South Eastern Association for Behavior Analysis**, Chattanooga, TN, USA, October 2018.

8. *Inhibitory control deficits in HIV-1 Tat transgenic mice are sex dependent and alter CB1R expression.* A.B. Ferguson, I.R. Jacobs, D.J. Hermes, A.G. Antonucci, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, K. Mackie, A.H. Lichtman, B.M. Ignatowska-Jankowska, S. Fitting. **35th Annual Meeting of the South Eastern Association for Behavior Analysis**, Chattanooga, TN, USA. October 2018.

9. *HIV-1 Tat transgenic mice show inhibitory control deficits in the Go/No-Go task.* S. Fitting, I.R. Jacobs, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, C. Xu, K. Mackie, A.H. Lichtman, B. Ignatowska-Jankowska. **11th Annual Meeting of the Federation of European Neuroscience Societies**, Berlin, Germany, July 2018.

10. *Changes of the endocannabinoid system in HIV-1 Tat transgenic mice.* I.R. Jacobs, C. Xu, D.J. Hermes, A.G. Antonucci, A.B. Ferguson, K.L. Leggette, N.R. Miseo, **A.M. Proca**, C.B. Russell, C. Manjarres, C. Xu, M.J. Niphakis, B.F. Cravatt, K. Mackie, A.H. Lichtman, B. Ignatowska-Jankowska, S. Fitting. **International Cannabinoid Research Society**, Leiden, Netherlands, June 2018.

Teaching

Teaching Assistant — Jan. 2019 – May 2019
Introduction to Research in Network Data Science (Math 190) — *Chapel Hill, USA*

Training and Workshops

Gatsby Unit Analytical Connectionism Summer School — August 2023
London, UK

Mathematical Consciousness Science: Modelling Consciousness Workshop — August 2022
Dorfgastein, AUT

Sinergia Meeting 2022 — July 2022
Bern, CH

UCL & PSL Summer School on Consciousness and Metacognition — June 2021
London, UK

MIT Brains, Minds, and Machines Summer Course — Aug. 2020
Cambridge, USA

University of Nicosia Summer Pre-Med Program — June 2017 – July 2017
Nicosia, CY

Leadership and Service

Member — Oct. 2023 – Present
Imperial College London Poetry Society — *London, UK*

Executive Officer — Feb. 2022 – Present
Qualiaheads Consciousness Science Journal Club — *Zürich, CH*

Treasurer — March 2018 – May 2019
Psi Chi Psychology Honor Society — *Chapel Hill, USA*

Executive Officer Jan. 2018 – May 2020
Carolina Neuroscience Club *Chapel Hill, USA*

Piano Instructor Sept. 2017 – May 2020
Musical Empowerment *Chapel Hill, USA*

Member Sept. 2017 – May 2020
Women in Computer Science *Chapel Hill, USA*

Boston Qualifying Team Sept. 2016 – May 2020
UNC Marathon Team *Chapel Hill, USA*

Skills

Python, Pytorch, JAX, Java, Latex, C/C++, JavaScript, HTML/CSS, Unreal/Blueprint

Languages

English: Native Proficiency
Romanian: Limited Working Proficiency
French: Elementary Proficiency
Spanish: Elementary Proficiency