

# Alexandra Maria Proca

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## EDUCATION

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<b>Imperial College London</b> <i>Doctor of Philosophy in Computational Neuroscience and Machine Learning; President's Scholar</i>	Oct. 2023 – Present London, UK
<b>University College London</b> <i>Master of Science in Machine Learning with Distinction; Dean's List Laureate</i>	Sept. 2020 – Dec. 2021 London, UK
<b>University of North Carolina at Chapel Hill</b> <i>Bachelor of Science in Computer Science, in Neuroscience with Honors, Minor in Music</i>	Aug. 2016 – May 2020 Chapel Hill, NC

## RESEARCH EXPERIENCE

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<b>Research Assistant</b> <i>ETH Zürich Department of Computer Science (Lab: Dr. João Sacramento)</i> <ul style="list-style-type: none"><li>Conducted research studying the use of hypernetworks for meta-learning</li></ul>	Jan. 2022 – Jan. 2023 Zürich, CH
<b>Master's Student</b> <i>UCL Department of Computer Science (Lab: Dr. Jun Wang)</i> <ul style="list-style-type: none"><li>Conducted research studying the partial information decomposition of multitask neural networks across varying task settings in supervised and reinforcement learning models</li></ul>	May 2021 – Dec. 2021 London, UK
<b>Research Intern</b> <i>MIT Brain and Cognitive Sciences (Lab: Dr. Tomaso Poggio)</i> <ul style="list-style-type: none"><li>Completed the Massachusetts Institute of Technology Summer Research Program for two summers</li><li>Conducted research adversarially reprogramming recurrent neural networks across task domains</li></ul>	June 2019 – Aug. 2020 Cambridge, MA
<b>Research Assistant</b> <i>UNC Department of Mathematics (Lab: Dr. Peter Mucha)</i> <ul style="list-style-type: none"><li>Conducted statistical research analyzing changes in neural morphology of infant fMRI data</li></ul>	May 2018 – May 2020 Chapel Hill, NC
<b>Research Assistant</b> <i>UNC Department of Psychology and Neuroscience (Lab: Dr. Sylvia Fitting)</i> <ul style="list-style-type: none"><li>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</li></ul>	Jan. 2017 – May 2020 Chapel Hill, NC
<b>Research Intern</b> <i>OSU Department of Computer Science (Lab: Dr. Radu Teodorescu)</i> <ul style="list-style-type: none"><li>Conducted research using Arduino accelerometers to create motion-detection gloves, designed to teach middle and high-school students basic programming skills</li></ul>	May 2015 – Aug. 2015 Columbus, OH

## HONORS AND AWARDS

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

## PUBLICATIONS AND THESES

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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. **International Conference on Learning Representations**, May 2024.
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

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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. Wolczyk, D. Zhao, S. Kobayashi, S. Schug, J. von Oswald, J. Sacramento. **Sinergia Meeting 2022**, Bern, Switzerland, July 2022.

## CONFERENCE AND WORKSHOP POSTER PRESENTATIONS

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1. *How context representations emerge during training: a linear network perspective.* **A.M. Proca\***, K. Sandbrink\*, J. Bauer\*, A. Hummos. **COSYNE 2024**, Lisbon, Portugal, February 2024.
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. **Gatsby Computational Neuroscience Unit Analytical Connectionism Summer School**, London, England, August 2023.
3. *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.
4. *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.
5. *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.

6. *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. Miso, 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.
7. *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. Miso, **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.
8. *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. Miso, **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.
9. *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. Miso, **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.
10. *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. Miso, **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.
11. *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. Miso, **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

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<b>Teaching Assistant</b>	Jan. 2019 – May 2019
<i>Introduction to Research in Network Data Science (Math 190)</i>	<i>Chapel Hill, USA</i>

## TRAINING AND WORKSHOPS

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<b>Gatsby Unit Analytical Connectionism Summer School</b>	August 2023 <i>London, UK</i>
<b>Mathematical Consciousness Science: Modelling Consciousness Workshop</b>	August 2022 <i>Dorfgastein, AUT</i>
<b>Sinergia Meeting 2022</b>	July 2022 <i>Bern, CH</i>
<b>UCL &amp; PSL Summer School on Consciousness and Metacognition</b>	June 2021 <i>London, UK</i>
<b>MIT Brains, Minds, and Machines Summer Course</b>	Aug. 2020 <i>Cambridge, USA</i>
<b>University of Nicosia Summer Pre-Med Program</b>	June 2017 – July 2017 <i>Nicosia, CY</i>

## LEADERSHIP AND SERVICE

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<b>Member</b> <i>Imperial College London Poetry Society</i>	Oct. 2023 – Present <i>London, UK</i>
<b>Executive Officer</b> <i>Qualiaheads Consciousness Science Journal Club</i>	Feb. 2022 – Present <i>Zürich, CH</i>
<b>Treasurer</b> <i>Psi Chi Psychology Honor Society</i>	March 2018 – May 2019 <i>Chapel Hill, USA</i>
<b>Executive Officer</b> <i>Carolina Neuroscience Club</i>	Jan. 2018 – May 2020 <i>Chapel Hill, USA</i>
<b>Piano Instructor</b> <i>Musical Empowerment</i>	Sept. 2017 – May 2020 <i>Chapel Hill, USA</i>
<b>Member</b> <i>Women in Computer Science</i>	Sept. 2017 – May 2020 <i>Chapel Hill, USA</i>
<b>Boston Qualifying Team</b> <i>UNC Marathon Team</i>	Sept. 2016 – May 2020 <i>Chapel Hill, USA</i>

## SKILLS

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

## LANGUAGES

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