Gecia **Bravo-Hermsdorff**

AI Resident · Google Research

(+1)404.630.8102 | gecia@google.com | gecia.github.io

Education

Princeton University — *Princeton, NJ, USA*

PhD in Quantitative & Computational Neuroscience *(link)* — *2020*

- *Dissertation*: "Quantifying human priors over abstract relational structures"
- *Selected courses (hyperlinked):* Random graphs and networks, Mathematical physics, Theory of deep learning, Complex analysis, Natural algorithms, Statistical learning and nonparametric estimation, Machine learning & pattern recognition, Interacting with data, Optimal learning, Abstract algebra, Computational complexity, Statistical optimization and reinforcement learning, High-dimensional probability, Stochastic processes on graphs

École Normale Supérieure (ENS Ulm) — *Paris, France*

Research Master in Cognitive Sciences and Neuroscience *(link)* — *2011*

- *Dissertation*: "Neural basis of self-contingency detection in 5-month-old babies"

Diplôme de l'ENS *(link)* — *2011*

- Admitted via the "International Selection in Science" *(link)*
- Three-year multidisciplinary program, coursework included: Computational neuroscience, Cognitive science, Decision theory, Biophysics, Logics, Mathematics, Modeling, Ecology and evolutionary biology, Philosophy of science, Theoretical chemistry, Statistics, Philosophy of Mind

Bachelor of Science *(link)* — *2009*

Publications

Statistical Anonymity: Quantifying Reidentification Risks Without Reidentifying Users *(link)*
G Bravo-Hermsdorff, R Busa-Fekete, LM Gunderson, A Munõs Medina & U Syed. *arXiv, 2022*

A Principled (and Practical) Test for Network Comparison. *(link)*
G Bravo-Hermsdorff*, LM Gunderson*, PA Maugis & CE Priebe. *arXiv, 2021*

Introducing Graph Cumulants: What is the Variance of your Social Network? *(link, video, code)*
LM Gunderson* & G Bravo-Hermsdorff*. *arXiv, 2020*

Quantifying Human Priors over Abstract Relational Structures. *(link, slides, demos)*
G Bravo-Hermsdorff. *Ph.D. dissertation, Princeton University, 2020*

A Unifying Framework for Spectrum-Preserving Graph Sparsification and Coarsening. *(link, video, demos, code, poster)*
G Bravo-Hermsdorff* & LM Gunderson*. *Neural Information Processing Systems (NeurIPS), 2019*

Gender and Collaboration Patterns in a Temporal Scientific Authorship Network. *(link, dataset)*
G Bravo-Hermsdorff, V Felso, E Ray, LM Gunderson, ME Helander, J Maria & Y Niv. *Applied Network Science, 4(1), 2019*

Modeling the Hemodynamic Response Function for Prediction Errors in the Ventral Striatum. *(link)*
G Bravo-Hermsdorff & Y Niv. *bioRxiv, Cold Spring Harbor Laboratory, 2019*

Quantifying Humans' Priors over Graphical Representations of Tasks. *(link)*
G Bravo-Hermsdorff, TD Pereira & Y Niv. *Unifying Themes in Complex Systems IX. ICCS, Springer Proceedings in Complexity, 281–290, 2018*

**denotes equal contribution*

Teaching

BioMath Bootcamp (Princeton University) *(link)* — *Summer 2016*

- Month-long training in mathematical and computational tools for incoming PhD students in neuroscience and biology, organized by Carlos Brody
- Lectured for the probability module, and held afternoon sessions for exercises in: linear algebra, ODEs, programming, probability, and signal processing

Introduction to cognitive neuroscience (Princeton University) *(link)* — *Spring 2015*

- Held weekly sessions discussing relevant journal publications, constructed and graded the exams

Lab course for introduction to psychology (Princeton University) *(link)* — *Fall 2014*

- Held weekly 3 hours lab sessions with introductory lectures and exercises in: statistical analysis, MRI, EGG, psychophysics, experimental design, programming, computational modeling, and game theory

Research positions

AI resident at Google research NYC *St. George, UT, USA (remote), 2020 – now*

- I have been working
- Developed a neural network layer that is equivariant to permutations of the elements *(link).*

PhD candidate at the Niv lab *(link)* *Princeton University, 2014 – 2019*

- Developed non-bullsh*t methods to quantify human priors over relational data.
  Disclaimer: This work included experiments with a minimal (but nonzero) amount of bullsh*t.

PhD research rotation at the Botvinick lab *(now at Google DeepMind)* *Princeton University, 2013 – 2014*

- Modelling structural learning in humans. Started working on ideas that lead to my PhD project. *Advisor*: Matthew Botvinick

Research scholar in neuroeconomics at the Montague lab *(link)* *Virginia Tech Carilion Research Institute (VTCRI), 2011–2013*

- Worked on computational modelling of behavioral data in economic experiments, such as, multi-armed bandit problems, repeated ultimate game, and gambling tasks. *Advisors*: Read Montague and Terry Lohrenz

Master's student at the Cognitive Science and Psycholinguistic lab *(link)* *ENS Ulm, Paris, 2011*

- Master's project studying the neural substrates of self-contingency detection in babies using functional near-infrared spectroscopy (fNIRS). Designed, coded and built the experimental apparatus, recorded and analyzed the data from 61 babies. *Advisor*: Emmanuel Dupoux

Research internship at the Emotion and Social Cognition lab *(link)* *California Institute of Technology (Caltech), Spring 2010*

- Designed, performed, and analyzed behavioral experiments in humans for a study investigating whether values learned during a Pavlovian conditioning task could be expressed in an unrelated task without the subjects' conscious awareness. *Advisors*: Naotsugu Tsuchiya and Ralph Adolphs

Research internship at the Development and Neuropharmacology lab *(link)* *Collège de France, Paris, 2009*

- Studied the molecular mechanisms involved in the emergence of cellular territories during the morphogenesis of the neural tube. *Advisors*: Elizabeth Di Lullo and Alain Prochiantz

Undergraduate student at the Physiology of Cognition lab *(link)* *UFRJ, Brazil, 2007-2008*

- Studied the physiology of the visual system in monkeys (using intracranial recordings) and humans (using EEG). *Advisor*: Mário Fiorani

Research internship at the Institute of Neurobiology Alfred Fessard *(link)* *CNRS, Gif-sur-Yvette, France, Summer 2007*

- Studied the development of the neural crest by grafting quail and chick embryos *in ovo*. *Advisors*: Sophie Creuzet and Nicole Le Douarin

Awards

- **Google AI residency:** Competitive position for exploring research at Google *2020—2022*
- **Independent research grant:** Graduate student research funding ($5,000), Princeton Cognitive Science Department *2019*
- **Scholarship for Lake Como School of Advanced Studies in Complex Networks** *May, 2016*
- **Cognitive Science Graduate Fellowship** *2016—2017*
- **Scholarship for Brains, Minds and Machines summer school** *August, 2015*
- **Scholarship for SAMSI Bayesian Nonparametrics workshop** *July, 2015*
- **Princeton PhD Fellowship** *2013—2019*
- **École Normale Supérieure (ENS Ulm) "International Selection in Science"** *2008*
- **Scholarship for studying French literature in France, Lions Club** *Summer, 2006*
- **Brazilian CNPq "scientific initiation" scholarship** *2006—2008*
- **Entrance exam for the Biomedical Sciences program at the Universidade Federal do Rio de Janeiro (UFRJ):** Top Brazilian undergraduate program in biomedical sciences, completed two of four years before moving to France *2006—2008*
- **99th percentile at the Exame Nacional de Ensino Médio (ENEM):** Nationwide exam for Brazilian students after high school *2005*
- **Travel awards for presenting at conferences:**

  Neural Information Processing Systems (NeurIPS), *2019*; NeurIPS Women in Machine Learning, *2018*; International Conference on Complex Systems (ICCS), *2018*; Society for Industrial and Applied Mathematics (SIAM) Annual Meeting, *2018*; NIPS Women in Machine Learning, *2017*; Multidisciplinary Conference in Reinforcement Learning and Decision Making (RLDM), *2017*; International Conference on Mathematical Neuroscience (ICMNS), *2017*; Multidisciplinary Conference in Reinforcement Learning and Decision Making (RLDM), *2015*; Austin Memory & Learning Conference, *2015*

Languages

- **Human:** Portuguese *(native),* English & French *(fluent),* Spanish & Italian *(basic)*
- **Computer:** Python & MATLAB *(fluent),* Mathematica & R *(functional),* C++, Javascript & HTML *(basic)*

Summer schools

Machine Learning Summer School (MLSS) *(link, 9m21s video)* — *Tübingen (virtual event), Germany, Summer 2020*

Complex networks: theory, methods, and applications *(link)* — *Lake Como School, Italy, May 2016*

Bayesian nonparametrics: synergies in statistics, probability and math *(link)* — *SAMSI, NC, USA, June 2015*

Brains, minds and machines summer school *(link)* — *Woods Hole, MA, USA, August 2015*

Computational and cognitive neuroscience summer school *(link)* — *Suzhou, China, August 2010*

Voluntary work

Mentoring (Princeton University)

- Daniel J Wilson (intern during 2015, now a PhD student at the University of Toronto)
- Caitlyn Cap and Olamilekan Sule (interns during 2014 summer)

Reviewer

- *Journals:* Trends in Cognitive Sciences, Socio-Economic Planning Sciences
- *Conferences:* NeurIPS Women in Machine Learning (2017, 2018), WHMD 2021 NeurIPS workshop

Selected talks

- Statistical anonymity: quantifying re-identification risk without re-identifying users. *Chrome Anti-Fingerprinting Privacy Budget Meeting, 2021*
- Using graph cumulants to detect atypical patterns of information spread in social networks. *MML Eng Reviews Meeting (Google), 2021*
- Entropy estimation of high-dimensional sparse date. *Chrome Anti-Fingerprinting Privacy Budget Meeting, 2021*
- Graph reduction by edge deletion and edge contraction. *International Conference on Complex Systems (ICCS), 2018*
- Quantifying people's priors over graphical representations of tasks. *ICCS, 2018*
- Graph reduction by edge deletion and edge contraction. *SIAM workshop on network science (SIAMNS18), 2018*
- Characterizing people's priors over navigation task structure. *Princeton Cognitive Science Lunchtime Talk, 2017*
- Assessing decision-making deficits in patients with insula lesion using various neuroeconomic tasks. *Regional conference in neuroeconomics at the Duke center for interdisciplinary decision sciences, 2016*