

# Gecia Bravo-Hermsdorff

AI RESIDENT · GOOGLE RESEARCH NYC

(+1)404.630.8102 | [gecia@google.com](mailto:gecia@google.com) | [gecia.github.io](https://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, Statistical learning and nonparametric estimation, Complex analysis, Machine learning & pattern recognition, Natural algorithms, 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

- Three-year multidisciplinary program. Admitted via the “International Selection in Science” ([link](#))
- *Selected courses*: Computational neuroscience, Mathematics, Developmental biology, Modeling, Biophysics, Logics, Ecology and evolution, Cognitive science, Philosophy of science, Theoretical chemistry, Decision sciences, Statistics

BACHELOR OF SCIENCE ([link](#))

2009

## Publications

- **G Bravo-Hermsdorff\***, LM Gunderson\*, PA Maugis & CE Priebe. **A PRINCIPLED (AND PRACTICAL) TEST FOR NETWORK COMPARISON.** *arXiv*, 2021 ([link](#))
- LM Gunderson\* & **G Bravo-Hermsdorff\***. **INTRODUCING GRAPH CUMULANTS: WHAT IS THE VARIANCE OF YOUR SOCIAL NETWORK?** *arXiv*, 2020 ([link](#)) ([video](#)) ([code](#))
- **G Bravo-Hermsdorff**. **QUANTIFYING HUMAN PRIORS OVER ABSTRACT RELATIONAL STRUCTURES.** *Ph.D. dissertation, Princeton University*, 2020 ([link](#)) ([slides](#)) ([demos](#))
- **G Bravo-Hermsdorff\*** & LM Gunderson\*. **A UNIFYING FRAMEWORK FOR SPECTRUM-PRESERVING GRAPH SPARSIFICATION AND COARSENING.** *Neural Information Processing Systems (NeurIPS)*, 2019 ([link](#)) ([video](#)) ([demos](#)) ([code](#)) ([poster](#))
- **G Bravo-Hermsdorff**, V Felso, E Ray, LM Gunderson, ME Helander, J Maria & Y Niv. **GENDER AND COLLABORATION PATTERNS IN A TEMPORAL SCIENTIFIC AUTHORSHIP NETWORK.** *Applied Network Science*, 4(1), 2019 ([link](#)) ([dataset](#))
- **G Bravo-Hermsdorff** & Y Niv. **MODELING THE HEMODYNAMIC RESPONSE FUNCTION FOR PREDICTION ERRORS IN THE VENTRAL STRIATUM.** *bioRxiv, Cold Spring Harbor Laboratory*, 2019 ([link](#))
- **G Bravo-Hermsdorff**, TD Pereira & Y Niv. **QUANTIFYING HUMANS’ PRIORS OVER GRAPHICAL REPRESENTATIONS OF TASKS.** In *Unifying Themes in Complex Systems IX. ICCS, Springer Proceedings in Complexity*, 281–290, 2018 ([link](#))

\*denotes equal contribution

## Summer schools

MACHINE LEARNING SUMMER SCHOOL (MLSS) ([link](#)) ([video of my poster presentation](#))

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, US, June 2015

BRAINS, MINDS AND MACHINES SUMMER SCHOOL ([link](#))

Woods Hole, MA, US, August 2015

COMPUTATIONAL AND COGNITIVE NEUROSCIENCE SUMMER SCHOOL ([link](#))

Suzhou, China, August 2010

## Research positions

AI RESIDENT AT GOOGLE RESEARCH NYC ([link](#))

St. George, UT, US (remote), 2020 – now

PHD CANDIDATE AT THE NIV LAB ([link](#))

Princeton, NJ, US, 2014 – 2019

PHD RESEARCH ROTATION AT THE BOTVINICK LAB (*now at Google DeepMind*)

Princeton, NJ, US, 2013 – 2014

- Learning structure in task-sets. Started work leading to my PhD project. *Advisor*: Matthew Botvinick

RESEARCH SCHOLAR IN NEUROECONOMICS AT THE MONTAGUE LAB ([link](#))

VTCRI, Roanoke, VA, US, 2011–2013

- Worked in several projects modeling human behavior in games, such as the ultimatum game and gambles. *Advisors*: Terry Lohrenz and Read Montague

#### MASTER'S STUDENT AT THE COGNITIVE SCIENCE AND PSYCHOLINGUISTIC LAB ([link](#))

ENS Ulm, Paris, France, 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](#))

Caltech, CA, US, Spring, 2010

- Designed, performed, and analyzed behavioral experiments in humans for a project 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, France, 2009

- Worked on an experimental project studying the molecular mechanisms involved in the emergence of cellular territories during the morphogenesis of chicken embryo neural tubes. *Advisors:* Elizabeth Di Lullo and Alain Prochiantz

## Teaching

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#### BIOGRAPH 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
- **LECTURER:** Lectured for the probability module.
- **TEACHER ASSISTANT:** Held afternoon sessions for exercises in linear algebra, dynamical systems, probability, coding (Python), and signal processing

#### INTRODUCTION TO COGNITIVE NEUROSCIENCE (PRINCETON UNIVERSITY) ([link](#))

Spring 2015

- **TEACHER ASSISTANT:** Held weekly sessions discussing relevant journal publications, constructed and graded the exams

#### LAB COURSE FOR INTRODUCTION TO PSYCHOLOGY (PRINCETON UNIVERSITY) ([link](#))

Fall 2014

- **TEACHER ASSISTANT:** Held weekly lab sessions and lectured on topics such as statistical analysis, MRI, EGG, psychophysics, experimental design, computational modeling, and game theory

#### 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)

## Awards

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- **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
- **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; NIPS 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

## Talks

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- **GRAPH REDUCTION BY EDGE DELETION AND EDGE CONTRACTION.** *International Conference on Complex Systems (ICCS), 2018*
- **QUANTIFYING PEOPLE'S PRIORS OVER GRAPHICAL REPRESENTATIONS OF TASKS.** *International Conference on Complex Systems (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*

## Languages

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- **Human:** PORTUGUESE (*native*), ENGLISH & FRENCH (*fluent*), SPANISH (*conversant*)
- **Computer:** PYTHON & MATLAB (*fluent*), MATHEMATICA & R (*functional*), JAVASCRIPT & HTML (*conversant*)