

Arthur Prat-Carrabin

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- 2024 - **Harvard University**, Cambridge
Postdoctoral Fellow. Department of Psychology, Computational Cognitive Neuroscience Lab. PI: Samuel Gershman.
- 2018 - 2023 **Columbia University**, New York
Associate Research Scholar. Department of Economics, Cognition and Decision Lab. PI: Michael Woodford. (2018-2022: Postdoctoral Research Scholar; spring 2021: Fellow at the Italian Academy for Advanced Studies in America.)

EDUCATION

- 2013 - 2017 **École Normale Supérieure – Physics Department**, Paris
• PhD Student. Advisor: Rava Azeredo da Silveira.
• Thesis: “Bayesian models of human online inference”
- 2005 - 2009 **École Polytechnique**, Palaiseau (Paris)
• French leading “Grande École d’Ingénieur” (scientific school)
• Courses in mathematics, statistics, econometrics, economics, quantum statistical physics, and mechanics
- 2008 - 2009 **ENSAE**, Paris (*École Nationale de Statistique et d’Administration Économique*)
• National statistics school. Courses in statistics, economics, and finance.
- 2002 - 2005 **Lycée Henri IV**, “Classes Préparatoires,” Paris
• Three-year intensive courses in Mathematics, Physics, and Chemistry.

ACADEMIC VISITS & SUMMER SCHOOLS

- April-May 2024 **University of Zurich**, Department of Economics, Zurich, Switzerland
Academic guest, invited by Christian Ruff, Professor of Neuroeconomics and Decision Neuroscience
- July 2018 **Sloan Nomis Summer School on the Cognitive Foundations of Economic Behavior**, Vitznau, Switzerland
- 2013-2016 **Princeton Neuroscience Institute**, Princeton, NJ
Visiting Student Research Collaborator
(Three visits: Nov. 2013-Feb. 2014, Oct.-Dec. 2015, and Oct.-Nov. 2016)
- Aug. 2016 **Champalimaud Center for the Unknown**, Lisbon, Portugal
CAJAL Course in Computational Neuroscience

PUBLICATIONS & MANUSCRIPTS

- 2024 **Prat-Carrabin, A.**, Gershman, S. *Bayes vs. Weber: how to break a law of psychophysics*. (Under review at Nature Communications). <https://doi.org/10.1101/2024.08.08.607196>
- 2024 **Prat-Carrabin, A.**, Woodford, M. *Endogenous Precision of the Number Sense*. (Under review at eLife). <https://doi.org/10.1101/2024.03.14.585091>
- 2024 **Prat-Carrabin, A.**, Woodford, M. *Imprecise Probabilistic Inference from Sequential Data*. Psychological Review. <https://doi.org/10.1037/rev0000469>
- 2024 **Prat-Carrabin, A.**, Meyniel, F., Azeredo da Silveira, R. *Resource-rational account of sequential effects in human prediction*. eLife. <https://doi.org/10.7554/eLife.81256>
- 2022 **Prat-Carrabin, A.**, Woodford, M. *Efficient coding of numbers explains decisions bias and noise*. Nature Human Behaviour. <https://www.nature.com/articles/s41562-022-01352-4>
- 2021 **Prat-Carrabin, A.**, Woodford, M. *Bias and variance of the Bayesian-mean decoder*. In M. Ranzato et al., eds., Advances in Neural Information Processing Systems 34 (NeurIPS 2021). <https://proceedings.neurips.cc/paper/2021>
- 2021 **Prat-Carrabin, A.**, Wilson, R., Cohen, J.D., Azeredo da Silveira, R. *Human Inference in Changing Environments with Temporal Structure*. Psychological Review. <http://dx.doi.org/10.1037/rev0000276>
- 2021 **Prat-Carrabin, A.**, Meyniel, F., Tsodyks, M., Azeredo da Silveira, R. *Biases and Variability from Costly Bayesian Inference*. Entropy. 23(5):603. <https://doi.org/10.3390/e23050603>

GRANTS, AWARDS, & DISTINCTIONS

- 2024 **NYU SPiNES Finalist**
New York University – Seminars by Postdocs in Neuroscience: Extramural Series
- 2022 **Paper of the Year Award – Society for NeuroEconomics**
Prat-Carrabin, A., Woodford, M. *Efficient coding of numbers explains decisions bias and noise* (2022). Nature Human Behaviour.
- 2021 **Spotlight Presentation – 35th Conference on Neural Information Processing Systems (NeurIPS 2021)**
Prat-Carrabin, A., Woodford, M. *Bias and variance of the Bayesian-mean decoder*.
- Spring 2021 **Fellowship - The Italian Academy for Advanced Studies in America - Columbia University**. “Art, Humanities, and Neuroscience Fellowship” – Appointment as a Postdoctoral Research Scholar at the Italian Academy.
- 2020 **Poster Spotlight – Society for NeuroEconomics Annual Meeting**
Efficient encoding of numbers explains biased judgments.

- 2016 **Competitive Travel Grant - Hebrew University ELSC Annual Retreat**
Edmond & Lily Safra Center for Brain Science, Hebrew University of Jerusalem.
- 2013 **Fondation Pierre-Gilles de Gennes PhD Fellowship**
- 2007 **“Outstanding Leadership” Mention - Ecole Polytechnique**
“Exceptional student in campus and leadership activities”

TALKS

- 2024-10 *forthcoming* *Learning Memory & Decision Lab* (PI: Matt Nassar), Brown University. Title TBD.
- 2024-10 *forthcoming* *Human and Machine Cognition Lab* (PI: Charely Wu), University of Tübingen. Title TBD.
- 2024-09 “The Number Sense under Limited Resources”, *Cognition, Brain, and Behavior Research Seminar*, Harvard University.
- 2024-05 “Flexible neural coding of numerosity”, *Ruff Lab*, Zurich Center for Neuroeconomics, University of Zurich, Switzerland. With G. de Hollander.
- 2023-09 “Endogenous Imprecision of the Number Sense”, Seminar Series of the *Air Force Center of Excellence in the Neuroscience of Decision-Making*, Department of Biomedical Engineering, Columbia University, New York.
- 2022-09 “Imprecise Probabilistic Inference from Sequential Data”, *Shenhav Lab*, Department of Cognitive, Linguistic & Psychological Sciences, Brown University, Providence.
- 2022-09 “Constrained representations of numerical magnitudes”, *Zuckerman Institute Postdoctoral Seminars*, Columbia University, New York.
- 2022-01 “Bias and variance with efficient coding and Bayesian-mean decoding”, *Laboratory for Computational Vision* (PI: Eero Simoncelli), Center for Computational Neuroscience, Flatiron Institute, New York.
- 2021-12 *Spotlight presentation* – “Bias and variance of the Bayesian-mean decoder,” *35th Conference on Neural Information Processing Systems (NeurIPS 2021)*. Online.
- 2021-08 “Imprecise Probabilistic Inference from Sequential Data”, *Horga lab*, Department of Psychiatry, Columbia University, New York.
- 2021-02 “Encoding-decoding of numbers explains biased judgments”, *Computational Perception and Cognition Lab* (PI: Alan Stocker), UPenn, Philadelphia.
- 2021-02 “Encoding-decoding of numbers explains biased judgments”, *Italian Academy Seminar*, Columbia University, New York.
- 2020-10 “Efficient encoding of numbers explains biased judgments”, Interactive Talk, *Neuromatch 3.0* (online conference).
- 2020-02 “Efficient encoding of numbers explains biased judgments”, *Cognition and Decision Making Joint Lab Meeting*, Columbia University, New York.

- 2019-02 “Encoding-decoding of numbers explains biased judgments”, *2019 Sloan-Nomis Workshop on the Cognitive Foundations of Economic Behavior*, NYU, New York.
- 2017-11 “Models of human online inference in the presence of temporal structure”, *Flowers Lab* (PI: Pierre-Yves Oudeyer), INRIA (Institut National de Recherche en Informatique et en Automatique), Bordeaux, France.
- 2017-01 “Modulation of inference by the temporal statistics of stimuli”, *2017 ELSC Annual Retreat in Ein Gedi*, Hebrew University of Jerusalem, Israel.
- 2016-08 “Robustness and variability of efficient spiking networks”, with Lueckmann, J.-M. & Gíbor L., *Chamalimaud Center for the Unknown*, Lisbon, Portugal.
- 2016-03 “Inference in presence of temporal structure in the signal”, *Laboratoire de Physique Statistique* (LPS), École Normale Supérieure, Paris.
- 2015-07 “Inference of change points with temporal structure”, *Institut des Systèmes Intelligents et de Robotique* (ISIR), Université Pierre et Marie Curie, Paris.
- 2014-04 “Inference of change-point stimulus with temporal structure”, *Laboratoire de Neurosciences Cognitives* (LNC), École Normale Supérieure, Paris.
- 2014-02 “Inference of change-point stimulus with temporal structure”, *Princeton Neuroscience Institute* (PNI), Princeton, NJ.

POSTERS

- 2023-10 **Prat-Carrabin, A.**, Woodford, M. A Bayesian noisy-memory account of recency effects in averaging tasks. *Society for NeuroEconomics Meeting*. Vancouver, BC.
- 2022-11 **Prat-Carrabin, A.**, Woodford, M. Constrained representations of numerical magnitudes. *3rd Workshop on Mental Effort*. Brown University, Providence, RI.
- 2022-10 **Prat-Carrabin, A.**, Woodford, M. Constrained representations of numerical magnitudes. *Society for NeuroEconomics Meeting 2022*. Arlington, VA.
- 2022-08 **Prat-Carrabin, A.**, Woodford, M. Constrained representations of numerical magnitudes. *Conference on Cognitive Computational Neuroscience (CCN 2022)*. San Francisco, CA.
- 2022-07 **Prat-Carrabin, A.**, Woodford, M. Imprecise Probabilistic Inference from Sequential Data. *Cognitive Science Society Annual Conference (Cogsci)*. Toronto.
- 2022-07 **Prat-Carrabin, A.**, Woodford, M. Imprecise Probabilistic Inference from Sequential Data. *Computational Psychiatry Course (CPC++)*. New York.
- 2021-12 **Prat-Carrabin, A.**, Woodford, M. Bias and variance of the Bayesian-mean decoder. *35th Conference on Neural Information Processing Systems (NeurIPS 2021)*. Online.
- 2021-09 **Prat-Carrabin, A.**, Woodford, M. Imprecise Probabilistic Inference from Sequential Data. *Society for NeuroEconomics Meeting 2021*. Online.

- 2020-10 “Poster Spotlight” – **Prat-Carrabin, A.**, Woodford, M. Efficient encoding of numbers explains biased judgments. *Society for NeuroEconomics Meeting 2020*.
- 2020-09 **Prat-Carrabin, A.**, Woodford, M. Efficient encoding of numbers explains biased judgments. *Online Bernstein Conference 2020*.
- 2019-05 **Prat-Carrabin, A.**, Ho, B., Woodford, M. Efficient encoding of numbers explains biased judgments. *Zuckerman Institute Mind Brain Behavior Symposium*, Columbia University, New York, USA.
- 2019-02 **Prat-Carrabin, A.**, Ho, B., Woodford, M. Efficient encoding of numbers explains biased judgments. *Computational and Systems Neuroscience (Cosyne)*, Lisbon.
- 2018-10 **Prat-Carrabin, A.**, Ho, B., Woodford, M. Efficient encoding of numbers explains biased judgments. *Society for Neuro-Economics 2018 Annual Meeting*, The Wharton School, University of Pennsylvania, Philadelphia.
- 2016-05 **Prat-Carrabin, A.**, Azeredo da Silveira, R. Modulation of inference by the temporal statistics of stimuli. *Symposium on Biology of Decision Making 2016 (SBDM)*, Institut du Cerveau et de la Moelle Épineière (ICM), Paris.
- 2014-05 **Prat-Carrabin, A.**, Azeredo da Silveira, R. Inference of change-point signals with temporal structure. *Symposium on Biology of Decision Making 2014 (SBDM)*, Institut du Cerveau et de la Moelle Épineière (ICM), Paris.

OTHER PROFESSIONAL EXPERIENCE

- S1 2015 **Innhotep**, Innovation Consulting, Paris
Consulting analyst in Tech & Innovation. Main assignment: Réseau de Transport d'Électricité (French electricity transmission operator).
- 2011 - 2014 **Whale Street SAS**, Co-Founder
Social media analysis for financial markets. Startup selected by the City of Paris startup accelerator program. Worked on Natural Language Processing, statistics algorithms, and database administration.
- 2009 - 2011 **InfraRed Capital Partner**, Paris (*formerly HSBC Specialist Investment*)
Motorways and High-Speed railways investments. Worked on financial stress tests, risk analysis, traffic prediction models, legal issues and negotiations.
- 2010 - 2011 **Mobile application development**, Android
Developed ClopClop, a mobile application that locates open retailers nearby.
- 2008 - 2009 **Mathematics & Physics Oral Examiner**, Lycée Henri IV, Paris
Examiner for weekly oral exams of students in the new “Classes Préparatoires aux Études Supérieures”.
- 2008 **Financial Agency of the Embassy of France**, New York
Study on investment banks: activity and regulation before and after Bear Stearns.
- 2005 - 2006 **Military training in the French Military Police Force**
Midshipman, in the French “Gendarmerie” Polynesian Base.

COMMUNITY SERVICE AND HUMANITARIAN WORK

- 2021-2023 **Reviewer:** PLOS Computational Biology, Scientific Reports, American Economic Journal: Microeconomics, Open Mind: Discoveries in Cognitive Science, Conference on Cognitive Computational Neuroscience: Generative Adversarial Collaborations (2021), and Papers (2022).
- 2022-09 **Teaching Assistant** – *Barcelona Summer School for Advanced Modeling of Behavior*. In charge of a tutorial and of supervising two group projects.
- 2018-2020 **Co-organizer** – *Cognition and Decision “pre-seminar” for PhDs and postdocs*, Columbia University.
- 2007 **A.S.E. humanitarian association**, Huaviña, Chile
Two-month work on the construction of a local product factory.
- 2007 **President of student orientation retreat**, École Polytechnique
Managed a twelve-person team to organize a €130k four-day event to welcome the 500 freshman students to École Polytechnique
- 2006 **Founder of a student association (“Atypix”)**
Organized a forum to meet Ecole Polytechnique alumni with unexpected careers.

OTHER SKILLS & INTERESTS

- Languages **French, English, and Spanish** (intermediate level).
- Computer skills **Python**, javascript (good level) ; working knowledge of Django, Matlab, C++, PostgreSQL, Objective-C, Java, Ruby, Stata, Mathematica, SAS, and R.
- Other Interests in contemporary dance, literature, kiteboarding, and music.

REFERENCES

Samuel Gershman, Harvard University – gershman@fas.harvard.edu

Michael Woodford, Columbia University – mw2230@columbia.edu

Rava Azeredo da Silveira, École Normale Supérieure, Paris, and Institute of Molecular and Clinical Ophthalmology Basel – rava@iob.ch

Christopher Summerfield, University of Oxford – christopher.summerfield@psy.ox.ac.uk

Alan Stocker, University of Pennsylvania – astocker@psych.upenn.edu

Florent Meyniel, INSERM-CEA Cognitive Neuroimaging unit; CEA-Saclay, Neurospin center – florent.meyniel@cea.fr