

# 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

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- 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

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- 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

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- 2024 **Prat-Carrabin, A.**, Woodford, M. *Imprecise counting of observations in averaging tasks predicts primacy and recency effects*. *bioRxiv*. <https://doi.org/10.1101/2024.09.29.615676>
- 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*. *eLife* (Reviewed Preprint). <https://doi.org/10.7554/eLife.101277.1>
- 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

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- 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

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

- 2020-02 Cognition and Decision Making Joint Lab Meeting, Columbia University, New York. *“Efficient encoding of numbers explains biased judgments”*
- 2019-02 2019 Sloan-Nomis Workshop on the Cognitive Foundations of Economic Behavior, NYU, New York. *“Encoding-decoding of numbers explains biased judgments”*
- 2017-11 Flowers Lab (PI: Pierre-Yves Oudeyer), INRIA (Institut National de Recherche en Informatique et en Automatique), Bordeaux, France. *“Models of human online inference in the presence of temporal structure”*
- 2017-01 2017 ELSC Annual Retreat in Ein Gedi, Hebrew University of Jerusalem, Israel. *“Modulation of inference by the temporal statistics of stimuli”*
- 2016-08 Champalimaud Center for the Unknown, Lisbon, Portugal. *“Robustness and variability of efficient spiking networks”*, with Lueckmann, J.-M. & Gabor L.
- 2016-03 Laboratoire de Physique Statistique (LPS), École Normale Supérieure, Paris. *“Inference in presence of temporal structure in the signal”*
- 2015-07 Institut des Systèmes Intelligents et de Robotique (ISIR), Université Pierre et Marie Curie, Paris. *“Inference of change points with temporal structure”*
- 2014-04 Laboratoire de Neurosciences Cognitives (LNC), École Normale Supérieure, Paris. *“Inference of change-point stimulus with temporal structure”*
- 2014-02 Princeton Neuroscience Institute (PNI), Princeton, NJ. *“Inference of change-point stimulus with temporal structure”*

## POSTERS

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- 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. *35<sup>th</sup> 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

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- 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**, Androïd  
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

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2021-2024 **Reviewer:** Nature Communications, 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

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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

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**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

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

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

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