PERSONAL INFORMATION

Full name:	Yinan Cao
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Google Scholar:	https://scholar.google.com/citations?user=Bh5cUIoAAAAJ/
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RESEARCH PROFILE

The central theme of my research is to uncover the neural and computational mechanisms of human information sampling and their role in flexible decision-making. I combine cognitive modeling (low-dimensional algorithmic models and high-dimensional neural networks) with model-based neuroimaging (magnetoencephalography, MEG) to link latent computations to their neural representations. This approach allows me to characterize the computational strategies that govern how the brain samples, filters, and represents information to guide decisions under uncertainty (Cao et al., 2019, *Neuron*; Cao & Tsetsos, 2022, *eLife*; Cao et al., 2020, *NeurIPS*). My work focuses on answering how these strategies adapt to context and task structure (Siems et al., 2026, *Nature Communications*), and how they are shaped by internal optimization signals (Cao et al., 2025, *bioRxiv*, under review).

ACADEMIC & PROFESSIONAL APPOINTMENTS

01/10/2024–present	**Marie Skłodowska-Curie Fellow**, École Normale Supérieure, Paris, France Host laboratory: Laboratoire de Neurosciences Cognitives et Computationnelles Advisor: Valentin Wyart Secondment advisor: Tobias H. Donner
01/08/2020–30/09/2024	**Postdoctoral Researcher**, Institute of Neurophysiology and Pathophysiology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany Host laboratories: Decision Neuroscience Group (Tsetsos lab); Computational Cognitive Neuroscience Section (Donner lab) Advisors: Konstantinos Tsetsos, Tobias H. Donner
01/01/2020–30/07/2020	**Research Specialist**, University of Oxford, Oxford, United Kingdom Advisors: Christopher Summerfield, Andrew Saxe
01/10/2015–29/11/2019	**PhD (Clarendon Scholar)** in Experimental Psychology, University of Oxford, Oxford, United Kingdom Supervisors: Christopher Summerfield (primary), Christoph Kayser (co-supervisor)

EDUCATION

01/10/2015–29/11/2019	PhD, University of Oxford, Oxford, United Kingdom
01/09/2011–15/07/2014	MA, McGill University, Montréal, Canada Supervisor: Stephen McAdams
01/09/2007–15/07/2011	BEng, Tsinghua University, Beijing, China

RESEARCH TRAINING & VISITING POSITIONS (BEFORE PHD)

2014–2015	NSERC-Create Research Intern in Neuroimaging, International Laboratory for Brain, Music and Sound Research (BRAMS), Montréal, Canada
2013–2015	Visiting Researcher, Institute of Neuroscience and Psychology, University of Glasgow, Glasgow, United Kingdom

FELLOWSHIPS & COMPETITIVE FUNDING

- **Marie Skłodowska-Curie Fellowship** (€195,915), European Commission, 2024–present
- Clarendon Scholarship & Brasenose-Kwai Cheong Scholarship, University of Oxford (full doctoral funding, ~£44,331), 2015–2019
- NSERC-Create Auditory Cognitive Neuroscience Research Award ($3,550) & Graduate Fellowship ($17,300), Natural Sciences and Engineering Research Council of Canada, 2011–2015
- CIRMMT Research Exchange Award ($3,000), McGill University, 2013
- GREAT Travel Awards ($375), McGill University, 2013
- Graduate Excellence Fellowship ($10,500), McGill University, 2011–2013

SCIENTIFIC OUTPUTS

Cao, Y., Summerfield, C., Park, H., Giordano, B. L., & Kayser, C. (2019). Causal inference in the multisensory brain. ***Neuron****, 102*(5), 1076–1087. doi: https://doi.org/10.1016/j.neuron.2019.03.043

Cao, Y. & Tsetsos, K. (2022). Clarifying the role of an unavailable distractor in human multi-attribute choice. ***eLife***, *11*, e83316. doi: https://doi.org/10.7554/eLife.83316

Siems, M., **Cao, Y.**, Tohidi-Moghaddam, M., Donner, T. H., & Tsetsos, K. (2026). Rhythmic sampling of multiple decision alternatives in the human brain. ***Nature Communications***. doi: https://doi.org/10.1038/s41467-026-69379-z

Cao, Y., Summerfield, C., & Saxe, A. (2020). Characterizing emergent representations in a space of candidate learning rules for deep networks. ***Advances in Neural Information Processing Systems (NeurIPS)****, 33*, 8660–8670. [link to paper]

Cao, Y., Alméras, C., Lee, J. K., Inès Maye, & Wyart, V. (2025, under review at *Nature Human Behaviour*). Humans use a dual policy to improve inferences during epistemic information seeking. *bioRxiv*. doi: https://doi.org/10.1101/2025.10.08.681186

Siems, M., **Cao, Y.**, Donner, T. H., Tsetsos, K., & Engel, A. K. (2025, under review at *Nature Communications*). High-amplitude oscillatory events orchestrate cortical activity for efficient cognition. *bioRxiv*. doi: https://doi.org/10.1101/2025.11.21.689181

Cao, Y., Giordano, B. L., Avanzini, F., & McAdams, S. (2016). The dominance of haptics over audition in controlling wrist velocity during striking movements. ***Experimental Brain Research****, 234*(4), 1145–1158. doi: https://doi.org/10.1007/s00221-015-4529-9

Tsetsos, K. & **Cao, Y.** (2025). Perspectives on the mechanistic underpinnings of choice biases. In: Ettinger, U., Heinrichs, B., Murawski, C. (eds) ***Decision Making. Studies in Neuroscience, Psychology and Behavioral Economics.*** **Springer, Cham**. https://doi.org/10.1007/978-3-032-00880-0_5
Preprint: doi: https://doi.org/10.31234/osf.io/2bjae

Cao, Y. & Tsetsos, K. (2023). Decision bias and sampling asymmetry in reward-guided learning. *bioRxiv*. doi: https://doi.org/10.1101/2023.09.10.557023

Cheng, Y., Yuan, X., Jiang, Y., & **Cao, Y.** (2025). Computational models and neural mechanisms of causal inference in multisensory integration. ***SCIENTIA SINICA Vitae****, 55*(7), 1395–1408. doi: https://doi.org/10.1360/SSV-2024-0160

SCIENTIFIC IMPACT & RECOGNITION

- Invited speaker at major international conferences and symposia, including the FENS Symposium.
- Regularly invited to present at international institutes and workshops spanning cognitive neuroscience, computational neuroscience, and decision science.

- Invited speaker at NeuroChat, a large international science dissemination platform reaching more than one thousand multidisciplinary attendees worldwide, including biologists, philosophers, and science journalists.
- Regular presenter at leading international conferences, including Society for Neuroscience (SfN) Annual Meeting, the Federation of European Neuroscience Societies (FENS) Forum, the Conference on Cognitive Computational Neuroscience (CCN), and The Bernstein Conference on Computational Neuroscience.
- Recipient of highly competitive fellowships, including the Marie Skłodowska-Curie Fellowship and the Clarendon Scholarship.

Invited Talks (selected):

2025 Workshop on Cognitive Modeling (WoCoMo), Marseille, France
Unpacking the black box: Building recurrent neural networks from scratch
2025 Institut de Neurosciences de la Timone (invited by Andrea Brovelli), Marseille, France
Flexible human information seeking in decisions under uncertainty
2023 École Normale Supérieure (invited by Valentin Wyart), Paris, France
Emergent bias in reward-guided learning
2023 NeuroChat (international public neuroscience forum, online)
Flexible information sampling in human decision-making
2021 Max Planck Institute for Human Development, Berlin, Germany
Emergent representations in a space of learning rules for deep networks
2020 The FENS Forum 2020—Symposium "The flexible use of multisensory information for behavior – models, neurons and neuroimaging" (Chairs: Uta Noppeney, Christoph Kayser)
Unfolding of multisensory inference in mind and behavior

Conference Presentations (selected):

2025 Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM), Dublin, Ireland
2024 Foraging and Information Seeking Conference, Lyon, France
2023 International Symposium on Biology of Decision Making (SBDM), Paris, France
2022 Society for Neuroscience Annual Meeting (SfN), San Diego, CA, USA
2022 Bernstein Conference on Computational Neuroscience, Berlin, Germany
2019 Conference on Cognitive Computational Neuroscience (CCN), Berlin, Germany
2019 Organization for Human Brain Mapping (OHBM) Annual Meeting, Rome, Italy

SUPERVISION & TEACHING

Supervised 1 MSc student (Inès Maye), École Normale Supérieure (2024–2025).
Supervised 2 BSc students (Fabian Otto, Xavier Roberts-Gaal), University of Oxford (2020).
Co-supervised 1 BSc student (Emily Wilson), McGill University (2013).
Teaching assistant, Cognitive Science (COGS 444, Honors Research, 6 credits), McGill University (2012).

SERVICE TO THE SCIENTIFIC COMMUNITY

Ad-hoc reviewer for journals: PNAS, Nature Communications, PLOS Computational Biology, Open Mind: Discoveries in Cognitive Science, Auditory Perception and Cognition, The Journal of the Acoustical Society of America (JASA), eLife etc.