Aaron M. Bornstein **Updated: October 25, 2025**

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CURRENT POSITION

2019- Assistant Professor, Department of Cognitive Sciences
Faculty, Institute for Mathematical Behavioral Sciences
Fellow, Center for the Neurobiology of Learning and Memory
University of California, Irvine

PREVIOUS APPOINTMENTS

2018 Associate Research Scholar, Princeton Neuroscience Institute
2013-2018 Postdoctoral Research Associate, Princeton Neuroscience Institute
2007-2013 Graduate researcher, New York University
2006 Research assistant, Deicken lab, UCSF/VA
2005-2007 Research assistant, Wagner lab, Stanford

EDUCATION

2013 Ph.D., Cognition & Perception, **New York University**
2003 S.B., Mathematics (additional concentration in Economics)
Massachusetts Institute of Technology

RESEARCH FUNDING

Ongoing

2025-2030 NIMH R01MH061285 (subaward; PI SD Pollak)
"Emotion Processing: Risk for Psychopathology in Children"

2025-2030 NIA R01AG088306 (PI; MPI IJ Bennett)
"Memory-guided decision making across the lifespan"

2023-2028 NIMH R01MH128306 (Co-I; PI MA Yassa)
"Testing a memory-based hypothesis for anhedonia"

2022-2027 NINDS R01NS119468 (Co-I; PI ER Chrastil)
"Cognitive graphs, active decision making, and brain network dynamics"

Completed

2022-2025 NIMH P50MH096889 (Co-I; PI TZ Baram)
"Fragmented early-life experiences, aberrant circuit maturation, emotional vulnerabilities"

2022-2025 UK MRC MR/W028476/1 (Collaborator; PI M Field)
"Reinforcer-specific value-based decision-making in persistence of and recovery from alcohol use disorder"

2021-2025 NIA R21AG072673 (PI)
"Improving multi-step planning in aging by overcoming deficits in memory encoding"

2021-2023 BBRF NARSAD Young Investigator award (PI)
"Determining the role of episodic memory in substance use disorder"

2020-2021 NIMH P50MH096889 (seed grant; PI TZ Baram)
"Early life adversity effects on event segmentation"

2011-2013 NIMH F31MH095501 (PI)
"Computational mechanisms of goal-directed control"

To lab members/trainees

2025 NIA/SRNDNA Collaboration award (Shensheng Wang)
2025 UROP Undergraduate Research Support Award (Jianle Guo & Rohin Pasule)
2024 ARCS Foundation Scholar (Bianca Leonard)
2024 UCI Summer Undergraduate Research Fellowship (Meghan Johnson)
2024 Indow Fellowship for Research Excellence (Jungsun Yoo)
2024 NIA/SRNDNA Summer Research award (Melisa Azimihashemi)
2024 NIA/SRNDNA Summer Research award (Ami Yamamoto)
2024 UROP Research Experience Fellowship (Ami Yamamoto)
2023-2026 Hewitt Foundation postdoctoral fellowship (Dale Zhou)
2023-2025 NIMH F31MH134620 (Nora Harhen)
2023-2025 NIMH T32MH119049 (Ari Khoudary)
2023 Robert J. Glushko prize for best undergraduate thesis (Gloria Cheng)
2023 CNLM Jared M. Roberts Graduate Student Award (Ari Khoudary)
2023 CNLM Jared M. Roberts Graduate Student Award (Nidhi Banavar)
2022 UCI Summer Undergraduate Research Fellowship (Gloria Cheng)
2022 Lambert prize in Foundations of Science (Nidhi Banavar)
2022-2025 NIA F32AG072836 (Sharon Noh)
2020-2023 National Defense Science & Engineering Graduate fellowship (Nora Harhen)
2019 UCI Summer Undergraduate Research Fellowship (Brianna Sarcos)

Publications

(∗ = *Equal contribution*; + = *UCI Lab member.*)

Preprints

PP8 Banavar NV+, **Bornstein AM**. Variability in Complex Constructs: Inferring risk preference and temporal discounting. *PsyArXiv*. doi:10.31234/osf.io/zdq5v

PP7 Harhen NC+, Budiono R, Hartley CA*, **Bornstein AM***. Developmental differences in exploration reveal underlying differences in structure inference. *PsyArXiv*. doi:10.31234/osf.io/t8hpr_v1

PP6 Harhen NC+, **Bornstein AM***, Hartley CA*. Developmental changes in memory structure and precision alter the use of retrieved episodes during decisions for reward. *PsyArXiv*.
doi:10.31234/osf.io/78zmx

PP5 Noh SM+*, Cooper KW*, Guo S+, Zhou D+, Stark CEL, **Bornstein AM**. Multi-step inference can be improved across the lifespan with individualized memory interventions. *PsyArXiv*.
doi:10.31234/osf.io/3mhj6

PP4 Noh SM+*, Zhou D*+, Cooper KW+, Guo S+, Dinh ET+, **Bornstein AM.** Sparsity and memory constraints interact with training sequence to bias learning of associative maps. *PsyArXiv*.
doi:

PP3 Wang W, Chierchia G, Cooley BJ, Chang T, **Bornstein AM**, Schweizer S. Social decision-making under uncertainty. *PsyArXiv*.
doi:10.31234/osf.io/z6vej

PP2 Yoo J+, **Bornstein AM**. Temporal dynamics of model-based control reveal arbitration between multiple task representations. *PsyArXiv*.
doi:10.31234/osf.io/sgcy5

PP1 Zhou D+, Noh SM+, Harhen NC+, Banavar NV+, Kirwan B, Yassa MA, **Bornstein AM**. A compressed code for memory discrimination. *bioRxiv*.
doi:10.1101/2025.10.12.681901

Peer-reviewed journal articles

JP24 Hadj-Amar B, **Bornstein AM**, Guindani M, Vannuci M (2025). Discrete Autoregressive Switching Processes in Sparse Graphical Modeling of Multivariate Time Series Data. *Journal of Computational and Graphical Statistics*.

JP23 Schetzsle B, Lee J, **Bornstein AM**, Shahbaba B, Guindani M (2025). A Bayesian Time-Varying Psychophysiological Interaction Model. *Data Science in Science*, 4(1):2519436.
doi:10.1080/26941899.2025.2519436

JP22 Khoudary A+, Peters MAK*, **Bornstein AM*** (2025). Reasoning goals and representational decisions in computational cognitive neuroscience: lessons from the drift diffusion model. *European Journal of Neuroscience*, 61:e7009.
doi:10.1111/ejn.70098

JP21 Banavar NV+, Noh SM+, Wahlheim CN, Cassidy BS, Kirwan CB, Stark CEL, **Bornstein AM** (2024). A response time model of the three-choice Mnemonic Similarity Task provides stable, mechanistically interpretable individual-difference measures. *Frontiers in Human Neuroscience*, 18:137928.
doi:10.3389/fnhum.2024.137928

JP20 Yoo J+, Chrastil ER, **Bornstein AM** (2024). Cognitive graphs: Representational substrates for planning. *Decision*, 11(4), 537-556.
doi:10.1037/dec0000249

JP19 Chen J, **Bornstein AM** (2024). The causal structure and computational value of narratives. *Trends in Cognitive Sciences*, 28(8):769-781.
doi:10.1016/j.tics.2024.04.003

JP18 Harhen NC+, **Bornstein AM** (2024). Interval timing as a computational pathway from early life adversity to affective disorders. *Topics in Cognitive Science*, 16(2024):92-112. doi:10.1111/tops.12701

JP17 Noh SM+, Singla UK, Bennett IJ, **Bornstein AM** (2023). Memory precision and age differentially predict the use of decision-making strategies across the lifespan. *Scientific Reports*, 13:17014. doi:10.1038/s41598-023-44107-5

JP16 **Bornstein AM**, Aly M, Feng SF, Turk-Browne NB, Norman KA, Cohen JD (2023). Associative memory retrieval modulates upcoming perceptual decisions. *Cognitive, Affective, & Behavioral Neuroscience*, 23:645665. doi:10.3758/s13415-023-01092-6 doi:10.18112/openneuro.ds001614.v1.0.1

JP15 Harhen NC+, **Bornstein AM** (2023). Overharvesting in human patch foraging reflects rational structure learning and adaptive planning. *Proceedings of the National Academy of Sciences*, 120(13):e2216524120. doi:10.1073/pnas.2216524120

JP14 Otto AR, Devine S, Schultz E, **Bornstein AM***, Louie K* (2022). Context-dependent choice and evaluation in real-world consumer behavior. *Scientific Reports*, 12:17744. doi:10.1038/s41598-022-22416-5 doi:10.17605/OSF.IO/EC5DX

JP13 Rmus M, Ritz H, Hunter LE, **Bornstein AM***, Shenhav A* (2022). Humans can navigate complex graph structures acquired during latent learning. *Cognition*, 225:105103. doi:10.1016/j.cognition.2022.105103

JP12 Wang S, Feng SF, **Bornstein AM** (2021). Mixing memory and desire: How decisions for reward depend on the dynamics and content of memory reinstatement. *Wiley Interdisciplinary Reviews: Cognitive Science*, e1581. doi:10.1002/wcs.1581
Featured on the cover.
Recognized as one of the top-ten most-cited papers from this journal/year.

JP11 Rouhani N, Norman KA, Niv Y, **Bornstein AM** (2020). Reward prediction errors create event boundaries in memory. *Cognition*, 203:104269. doi:10.1016/j.cognition.2020.104269

JP10 **Bornstein AM***, Pickard H* (2020). Chasing the first high: Memory sampling in drug choice. *Neuropsychopharmacology*, 45(6):907-915. doi:10.1038/s41386-019-0594-2 **Featured on the cover.**

JP9 Kane GA, **Bornstein AM**, Shenhav A, Wilson RC, Daw ND, Cohen JD (2019). Rats exhibit similar biases in foraging and intertemporal choice tasks. *eLife*, 8:e48429. doi:10.7554/eLife.48429

JP8 Millner AJ, den Ouden HEM, Gershman SJ, Glenn CR, Kearns J, **Bornstein AM**, Marx BP, Keane TM, Nock MK (2019). Suicidal thoughts and behaviors are associated with an increased decision-making bias for active responses to escape aversive states. *Journal of Abnormal Psychology*, 128(2):106-118. doi:10.1037/abn0000395

JP7 Hoskin AN, **Bornstein AM**, Norman KA, Cohen JD (2018). Refresh my memory: Episodic memory reinstatements intrude on working memory maintenance. *Cognitive, Affective, & Behavioral Neuroscience*, 19:338-354.

doi:10.3758/s13415-018-00674-z
doi:10.18112/openneuro.ds001576.v1.0.0

JP6 **Bornstein AM**, Khaw MW, Shohamy D, Daw ND (2017). Reminders of past choices bias decisions for reward in humans. *Nature Communications*, 8:15958.
doi:10.1038/ncomms15958

JP5 **Bornstein AM**, Norman KA (2017). Reinstated episodic context guides sampling-based decisions for reward. *Nature Neuroscience*, 20:997-1003.
doi:10.1038/nn.4573
doi:10.18112/openneuro.ds001607.v1.0.1

JP4 **Bornstein AM**, Daw ND (2013). Cortical and hippocampal correlates of deliberation during model-based decisions for rewards in humans. *PLoS Computational Biology*, 9(12):e1003387.
doi:10.1371/journal.pcbi.1003387

JP3 **Bornstein AM**, Daw ND (2012). Dissociating hippocampal and striatal contributions to sequential prediction learning. *European Journal of Neuroscience*, 35:1011-1023.
doi:10.1111/j.1460-9568.2011.07920.x

JP2 **Bornstein AM**, Daw ND (2011). Multiplicity of control in the basal ganglia: computational roles of striatal subregions. *Current Opinion in Neurobiology*, 21(3):374-380.
doi:10.1016/j.conb.2011.02.009

JP1 Preston AR, **Bornstein AM**, Hutchinson JB, Gaare ME, Glover GH, Wagner AD (2010). High-resolution fMRI of content-sensitive subsequent memory responses in human medial temporal lobe. *Journal of Cognitive Neuroscience*, 22:156-173.
doi:10.1162/jocn.2009.21195

Articles in conference proceedings

CP16 Khoudary A+, **Bornstein AM***, Peters MAK* (2025). Subjective and objective cue probability interact to shape perceptual decisions. *Proceedings of the 47th Annual Conference of the Cognitive Science Society.*

CP15 Chen Y+, Harhen NC+, Stout DA, **Bornstein AM** (2024). Early life unpredictability modulates planning horizon in a structured foraging task. *Cognitive Computational Neuroscience.*

CP14 Harhen NC+, Hartley CA*, **Bornstein AM*** (2024). Development of structure inference contributes to age-related differences in exploration. *Cognitive Computational Neuroscience.*

CP13 Yoo J+, Zhou D+, **Bornstein AM** (2024). Latent cause inference as an efficient and flexible learning rule for cognitive graphs. *Cognitive Computational Neuroscience.*

CP12 Zhou D+, Noh SM+, Yassa MA, **Bornstein AM** (2024). Pattern separation using compressed and semantic representations of memory. *Cognitive Computational Neuroscience.*

CP11 Khoudary A+, Peters MAK*, **Bornstein AM*** (2022). Precision-weighted evidence integration predicts time-varying influence of memory on perceptual decisions. *Cognitive Computational Neuroscience.*

CP10 Banavar NV+, **Bornstein AM** (2022). Response time modeling provides stable and mechanistically interpretable measures of individual differences in behavioral pattern separation. *Proceedings of the 20th International Conference on Cognitive Modeling.*
Selected for a talk.

CP9 Harhen NC+, **Bornstein AM** (2022). Learning to expect change: Volatility during early experience alters reward expectations in a model of interval timing. *Proceedings of the 20th International Conference on Cognitive Modeling.*
Selected for a talk.
Selected for a best paper award.

CP8 Banavar NV+, **Bornstein AM** (2022). Decision difficulty modulates the re-use of computations across trials in non-sequential decision tasks. *Proceedings of the 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM 2022)*

CP7 Harhen NC+, **Bornstein AM** (2022). Humans adapt their foraging strategies and computations to environment complexity. *Proceedings of the 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM 2022)*

CP6 Yoo J+, **Bornstein AM** (2022). Two-stage task with increased state space complexity to assess online planning. *Proceedings of the 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM 2022)*

CP5 Banavar NV+, Lee MD, **Bornstein AM** (2021). Sequential effects in non-sequential tasks. *Proceedings of the 19th International Conference on Cognitive Modeling.*

CP4 Harhen NC+, **Bornstein AM** (2021). Structure learning as a mechanism of overharvesting. *Proceedings of the 19th International Conference on Cognitive Modeling.*

CP3 Harhen NC+, Hartley CA, **Bornstein AM** (2021). Model-based foraging using latent-cause inference. *Proceedings of the 43rd Annual Conference of the Cognitive Science Society.*
doi:10.31234/osf.io/dfztu
https://github.com/uciccnl/CogSci2021-HarhenHartleyBornstein

CP2 Kane GA, **Bornstein AM**, Shenhav A, Wilson RC, Daw ND, Cohen JD (2017). Mechanisms of overharvesting in patch foraging. *Proceedings of the 39th Annual Conference of the Cognitive Science Society*, 637-642.

CP1 Floares A, Jakary A, **Bornstein A**, Deicken R (2006). Neural networks and classification and regression trees are able to distinguish females with major depression from healthy controls using neuroimaging data. *Proceedings of the IEEE International Joint Conference of Neural Networks, 2006*, 4605-4611.
doi:10.1109/ijcnn.2006.247090

Awards

2024	CNLM Exceptional Mentor Award
2023	Election to the Memory Disorders Research Society
2020	Association for Psychological Science "Rising Star" Award
2020	Brain and Behavior Research Foundation NARSAD Young Investigator Award
2005,6,8	Honorable mention, NSF Graduate Research Fellowship
2000	Runner up, MIT $50k Business Plan competition

Teaching/Service

UC Irvine

Fall 2025 Resisting "Neuro-narratives" (Undergraduate)

Winter 2025 LIFTED UC Irvine Prison Education Program (Memory course)

Spring 2023- Memory (Undergraduate)

Spring 2023-24,Fall 2025- Decision making (Graduate)

Spring 2021-22 Decision making & Problem solving (Graduate; with Prof. Zygmunt Pizlo)

Spring 2020 Topics in Reinforcement Learning (Graduate; with Prof. Mimi Liljeholm)

Spring 2019-22 Research in Exp Psych (Undergraduate; with Prof. Nadia Chernyak)

Winter 2019-22 Advanced Experimental Psychology (Undergraduate)

Other teaching/mentorship

Fall 2020 Neuromatch academy mentor

Summer 2020 Neuromatch academy group leader

Summer 2020 GSMI Cientifico Latino

2019 MEET alumni mentor

Summer 2018 Computational & Cognitive Neuroscience Summer School, Suzhou, China

2016-2018 Princeton Prison Teaching Initiative

Summer 2007,08 MIT Middle East Education through Technology (MEET), Jerusalem

University/Department service

2024- UCI Research Imaging Equipment Committee

2022-2025 Cognitive Sciences Colloquium committee, faculty advisor

2021- Irvine Faculty Association, Executive board member; 2023-2025 Treasurer; 2025- Co-Chair

2020 CNLM "Evening to Remember" organizational committee

2019- First-Generation Faculty Initiative

2019- UCI Prison Education Program, advisory board, curriculum committee

2019,23 Cognitive Sciences faculty search committee

2018,20,22,24 Cognitive Sciences PhD admissions committee

Organizational/Field service

2025- Associate Editor, *Cognitive Science*.

2025- Justice, Diversity, Equity, and Inclusion Committee, *Memory Disorders Research Society*.

2025- Advisor, *All People's Health Collective*.

2024- Editorial board, *Translational Neuroscience*.

2023 UCI Conte Center annual symposium, organized with the Conte Center Team.

2022 NSF/Simons NeuroDataScience workshop, Co-Organizer (with Norbert Fortin and Babak Shahbaba)

2021 Center for Neurobiology of Learning and Memory Spring Meeting Co-organizer (with Lulu Chen)

2018 Princeton Neuroscience Institute "Inside-Out" seminar series Co-organizer (with Ahmed El Hady)

2018 "Goal-Directed Decision Making: Computations and Circuits" *Elsevier* Co-editor (with Richard Morris & Amitai Shenhav)

2015 COSYNE Workshop "Memory in action: The role(s) of the hippocampus in decisions for reward" Co-organizer (with G. Elliott Wimmer)