

CONTACT aaron.bornstein@uci.edu<http://aaron.bornstein.org/>**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**APPOINT-
MENTS**

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](https://doi.org/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](https://doi.org/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:[10.31234/osf.io/qb5z2](https://doi.org/10.31234/osf.io/qb5z2)
- 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](https://doi.org/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](https://doi.org/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](https://doi.org/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 with Cumulative Shrinkage Priors for Graphical Modeling of Time Series Data. *Journal of Computational and Graphical Statistics*.
doi:[10.1080/10618600.2025.2551271](https://doi.org/10.1080/10618600.2025.2551271)
- JP23 Schetztsle 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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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

| | |
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| 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

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|---------------------------|--|
| 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

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| 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

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| 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

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| 2025- | Associate Editor, <i>Cognitive Science</i> . |
| 2025- | Justice, Diversity, Equity, and Inclusion Committee, <i>Memory Disorders Research Society</i> . |
| 2025- | Advisor, <i>All People’s Health Collective</i> . |
| 2024- | Editorial board, <i>Translational Neuroscience</i> . |
| 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)