Nathaniel D. Daw
Huo Professor in Computational and Theoretical Neuroscience
Princeton Neuroscience Institute and Department of Psychology,
Princeton University
Princeton NJ 08544

updated 4/2024

Experience:

Appointments:

- Huo Professor in Computational and Theoretical Neuroscience (2019-)
  Professor (2015-)
  Princeton Neuroscience Institute and Department of Psychology
  Princeton University
- Associate professor (2012- 2015)
  Assistant professor (2007-2012)
  Center for Neural Science and Department of Psychology; affiliated: Department of Computer Science
  New York University
- Royal Society USA research fellow (2003-2006)
  Gatsby Computational Neuroscience Unit
  University College London

Visiting appointments:

- Visiting Staff Research Scientist (AY 2022-23); Consultant (AY 2023-24)
  Google DeepMind
  London, UK
- Nirit and Michael Shaoul Fellow (AY 2018-19)
  Mortimer and Raymond Sackler Institute of Advanced Studies
  Tel Aviv University
- Visiting scientist (Spring 2013)
  Princeton Neuroscience Institute and Department of Psychology
  Princeton University
- Visiting scientist (Fall 2012)
  Department of Neurobiology
  Weizmann Institute of Science

Education:

- Carnegie Mellon University, Pittsburgh, PA (1997-2003)
  Advisor: David S. Touretzky
  M.S., May 2000 (Computer Science)
  Ph.D., Aug. 2003 (Computer Science with certification in Cognitive Neuroscience)
  Thesis: "Reinforcement learning models of the dopamine system and their behavioral implications,"
- Columbia University, New York, NY (1992-1996)
  B.A., *summa cum laude*, June 1996 (Philosophy of Science)

Funding & Awards:

Funding (ongoing):

- NIMH R01MH135587 (PI Daw; Co-Is Deserno and Reiter) "Computational foundations for internalizing and externalizing psychopathology" (8/3/2023-7/31/2026)
- NIMH R01MH121093 (PI Shohamy, Co-I Daw, 9/1/2019-6/30/2024 NCE)
  "Differentiating reward seeking and loss avoidance with reference-dependent learning models"

- NIH UL1 TR003017 (PI Panettieri; project PIs Daw, Cohen, Niv; 9/2019-8/2024)
  "New Jersey Alliance for Clinical and Translational Science: NJACTS Special Option: Machine Learning Approaches to Mental Illness and Chronic Disease"

Funding (completed):

- U.S. Army Research Office ARO W911NF-16-1-0474 (PI Grafton, Co-I Daw; 09/1/2016-12/31/2023)
  "Neural foundations of expertise based on optimal decision-making, physical control and response to stress"
- John Templeton Foundation grant 61454 (PI Cohen; Co-PIs Daw, Niv, Norman, Griffiths; 9/2019 – 9/2022)
  "Toward a Scientific Understanding of the Human Capacity for Autonomy"
- NSF IIS-1822571 (PI Daw; Co-I Shohamy 10/1/2018-9/30/2022)
  "Prioritization of Memory Reactivation for Decision-Making"
- NIDA 1R01DA038891 (PI Daw; Co-PI Shohamy; 9/15/2014-6/30/2019 NCE)
  "Computational and Neural Mechanisms of memory-guided decisions"
- Gift from Google DeepMind (PI Daw)
- NIMH 1R01MH109177 (Daw, Botvinick, Gershman, Konidaris; 9/1/2015-5/31/2018 NCE)
  "CRCNS: Representational foundations of adaptive behavior in natural and artificial agents"
- John Templeton Foundation grant 57876 (PI Cohen; Co-PIs Daw, Niv, Norman, Turk-Browne; 12/2015 – 11/2018)
  "Toward a Scientific Understanding of the Human Capacity for Cognitive Control"
- McDonnell Foundation Scholar Award (Daw; 9/2011-9/2015)
  "Dissecting learning: combining experimental and computational approaches"
- NINDS 1R01NS078784 (subcontract; PI Shohamy; Co-investigator Daw; 9/2011-9/2015)
  "Goals vs. habits in the human brain: Cognitive and computational mechanisms"
- NIMH 1R01MH087882 (PI Daw; Co-investigator Pesaran; 9/2009-5/2014)
  "Reinforcement learning in multi-dimensional action spaces"
- NIDA 1R01DA027794 (subcontract; PI Wager; Co-investigators Daw, Hart, Lindquist, Shohamy; 9/2009-9/2014)
  "Learning to avoid pain: Computational mechanisms and application to methamphetamine abuse"
- Human Frontiers Science Program Grant RGP0036/2009-C (PIs Nakamura, Daw, Cools; 12/2009-12/2012)
  "Serotonin and decision making: Integrating interspecies experimental and computational approaches"
- McKnight Scholar Award (Daw; 7/2009-7/2012)
  "Decision making in structured, sequential tasks"
- NARSAD Young Investigator Award (Daw; 1/2010-1/2012)
  "Distinguishing associative processes for isolating psychiatric deficits"
- US-Israel Binational Science Foundation Grant #200528 (PIs Joel, Rivka, O'Doherty, Daw; Daw added year 2; 10/2006-10/2009)
  "Deficient procedural learning in obsessive compulsive disorder: A functional MRI study"
- USA Research Fellowship, Royal Society (UK) (Daw; 2003-2006),
  "Dopamine and the neural basis of decision-making"
- Graduate Research Fellowship, National Science Foundation (Daw; 1998-2001)

Awards:

- NeurIPS Outstanding Paper Award (2022)
  Kumar et al., "Using natural language and program abstractions to instill human inductive biases in machines"
- BPS Cognitive Psychology Section Award (2019)
  Talmi, Lohnas & Daw, "A retrieved context model for the emotional modulation of memory"
- Fellow, Association for Psychological Science (elected 2018)
- Nirit and Michael Shaoul Fellowship, Mortimer and Raymond Sackler Institute of Advanced Studies, Tel Aviv University (2018)

- Young Investigator Award, Society for Neuroeconomics (2012)
- McDonnell Foundation Scholar Award in Understanding Human Cognition (2011)
- McKnight Scholar Award (2009)
- NARSAD Young Investigator Award (2009)
- NIPS Outstanding Student Paper Award (2005)
  Niv, Daw & Dayan, "How fast to work: Response vigor, motivation and tonic dopamine"
- NIPS Outstanding Student Paper Award (2004)
  Courville, Daw & Touretzky, "Similarity and discrimination in classical conditioning"
- John Jay Scholar (1992)
  Columbia University

Publications:

Preprints (not yet published elsewhere):

1. Piray, P., and **Daw, N.D.** (2024) Reconciling Flexibility and Efficiency: Medial Entorhinal Cortex Represents a Compositional Cognitive Map. *bioRxiv* 2024.05.16.594459
2. Pan-Vazquez, A, Sanchez Araujo, Y., McMannon, B., Louka, M., Bandi, A., Haetzel, L., International Brain Laboratory, Pillow, J.W., **Daw, N.D.,** and Witten I.B. (2024) Pre-existing visual responses in a projection-defined dopamine population explain individual learning trajectories. *bioRxiv* 2024.02.26.582199
3. Sagiv, Y., Akam, T., Witten, I.B., and **Daw, N.D.** (2024) Prioritizing replay when future goals are unknown. *bioRxiv* 2024.02.29.582822
4. Bustamante, L.A., Barch, D.M., Solis, J., Oshinowo, T., Grahek, I., Konova, A.B., **Daw, N.D.**, and Cohen, J.D. (2024) Anxiety symptoms of major depression associated with increased willingness to exert cognitive, but not physical effort. *medRxiv* 2024.02.18.24302985.
5. Tafazoli, S., Bouchacourt, F.M., Ardalan, A., Markov, N.T., Uchimura, M., Mattar, M.G., **Daw, N.D.,** and Buschman T.J. (2024) Building compositional tasks with shared neural subspaces. *bioRxiv* 2024.01.31.578263.
6. Nicholas, J., **Daw, N.D.**, and Shohamy, D. (2023) Proactive and reactive construction of memory-based preferences. *bioRxiv* 2023.12.10.570977
7. Correa, C.G., Sanborn, S., Ho, M.K., Callaway, F., **Daw, N.D.**, and Griffiths, T.L. (2023) Exploring the hierarchical structure of human plans via program generation. *arXiv* 2311.18644
8. Kahn, A.E., and **Daw, N.D.** (2023) Humans rationally balance mental simulation and temporally abstract heuristics. *bioRxiv* 2023.11.28.569070
9. Zorowitz, S., Karni, G., Paredes, N., **Daw, N.D.**, and Niv, Y. (2023) Improving the reliability of the Pavlovian go/no-go task. *PsyArxiv* eb697
10. Velazquez-Vargas, C.A., **Daw, N.D.,** and Taylor, J.A. (2023) Learning generalizable visuomotor mappings for de novo skills. *bioRxiv* 2023.07.18.549179
11. Piray, P., and **Daw, N.D.** (2023) Computational processes of simultaneous learning of stochasticity and volatility in humans. *PsyArXiv* kz5ua
12. Zhou, C.Y., Talmi, D., **Daw, N.D.***, and Mattar, M.G.* (2023) Episodic retrieval for model-based evaluation in sequential decision tasks. *PsyArXiv* 3sqjh
13. Salomon, T., Itzkovitch, A., **Daw, N.D.,** and Schonberg, T. (2022) A computational model for individual differences in non-reinforced learning. *bioRxiv* 2022.03.20.484477
14. Russek, E.M., Momennejad, I., Botvinick, M.M., Gershman, S.J., and **Daw, N.D.** (2021) Neural evidence for the successor representation in choice evaluation. *bioRxiv* 2021.08.29.458114.
15. Constantino, S.M., Dalrymple, J., Gilbert, R.W., Varenese, S., Di Rocco, A., and **Daw, N.D.** (2017) A neural mechanism for the opportunity cost of time. *bioRxiv* 173443

Peer-reviewed journal articles:

1. Venditto, S.J.C., Miller, K.J., Brody, C.D., and **Daw, N.D.** (2024) Dynamic reinforcement learning reveals time-dependent shifts in strategy during reward learning *eLife* (post-2023 reviewed preprint model: "important," "convincing") 97612.1.
2. Lee, R.S., Sagiv, Y., Engelhard, B., Witten, I.B., and **Daw, N.D.** (in press) A feature-specific prediction error model explains dopaminergic heterogeneity. *Nature Neuroscience*.
3. Jahn, C.I., Markov, N.T., Morea, B., **Daw, N.D.,** Ebitz, R.B., and Buschman, T. (2024) Learning attentional templates for value-based decision-making. *Cell* 87:1476-1489.e21.
4. Rich, P.D., Thiberge, S.Y., Scott, B.B., Guo, C. Tervo, D.G., Brody, C.D., Karpova, A.Y., **Daw, N.D.**, and Tank, D.W. (2024) Magnetic voluntary head fixation in transgenic rats enables lifetime imaging of hippocampal neurons. *Nature Communications* 15:4154.
5. Bustamante, L.A., Oshinowo, T., Lee, J.R., Tong, E., Burton, A.R., Shenhav, A.S., Cohen, J.D., and **Daw, N.D.** (2023) Effort foraging task reveals positive correlation between individual differences in the cost of cognitive and physical effort in humans and relationship to self-reported motivation and affect. *Proceedings of the National Academy of Science* 120 e2221510120.
6. Krausz, T.A., Comrie, A.E., Kahn, A.E., Frank, L.M., **Daw, N.D.**, and Berke, J.D. (2023) Dual credit assignment processes underlie dopamine signals in a complex spatial environment. *Neuron* 111 3465–3478.
7. Kumar, S., Dasgupta, I.., Marjieh, R., **Daw, N.D.,** Cohen J.D., and Griffiths, T.L. (2023) Disentangling abstraction from statistical pattern matching in human and machine learning. *PLoS Computational Biology* 19: e1011316.
8. Correa, C.G., Ho, M.K., Callaway, F., **Daw, N.D.**, and Griffiths, T.L. (2023) Humans decompose tasks by trading off utility and computational cost. *PLoS Computational Biology* 19: e1011087.
9. Garrett, N., Allan, S., and **Daw, N.D.**, (2023) Model-based control can give rise to devaluation insensitive choice. *Addiction Neuroscience* 6: 100070
10. Zorowitz, S., Chierchia, G.,Blakemore S.-J., and **Daw, N.D.** (2023) An item response theory analysis of the Matrix Reasoning Item Bank (MaRs-IB). *Behavior Research Methods* 10.3758/s13428-023-02067-8.
11. Nicholas, J., **Daw, N.D.**, and Shohamy, D. (2022) Uncertainty alters the balance between incremental learning and episodic memory. *eLife* 81679. (published under pre-2023 selective model)
12. Bouchacourt, F., Tafazoli, S., Mattar, M.G., Buschman, T.J., and **Daw, N.D.** (2022) Fast rule switching and slow rule updating in a perceptual categorization task. *eLife* 82531. (published under pre-2023 selective model)
13. Bang, D., Moran, R., **Daw, N.D.**, and Fleming, S.M. (2022) Neurocomputational mechanisms of confidence in self and others. *Nature Communications* 13:4238
14. Kane, G.A., James, M.H., Shenhav, A., **Daw, N.D.,** Cohen, J.D., and Aston-Jones, G. (2022) Rat anterior cingulate cortex continuously signals decision variables in a patch foraging task. *Journal of Neuroscience* 42: 5730-5744
15. Talmi, D., Kavaliauskaite, D., and **Daw, N.D.** (2021) In for a pound, in for a penny: How the opportunity to gain reward influences the competition for memory resources. *Learning and Memory* 28:445-456
16. Piray, P., and **Daw, N.D.** (2021) A model for learning based on the joint estimation of stochasticity and volatility. *Nature Communications* 12:6587.
17. Piray, P., and **Daw, N.D.** (2021) Linear reinforcement learning in planning, grid fields, and cognitive control. *Nature Communications* 12:4942.sch
18. Hunter, L.E., Meer., E.A., Gillan, C.M., Hsu, M., and **Daw, N.D.** (2022) Increased and biased deliberation in social anxiety. *Nature Human Behavior* 6:146-154.

19. Agrawal, M., Mattar, M.G., Cohen, J.D., and **Daw, N.D.** (2022) The temporal dynamics of opportunity costs: A normative account of cognitive fatigue and boredom. *Psychological Review* 42: 5730-5744
20. Liu, Y., Mattar, M.G., Behrens, T.E.J., **Daw., N.D.***, Dolan, R.J.* (2021) Experience replay is associated with efficient non-local learning. *Science* 372:eabf1357.
21. Foerde, K., Walsh, T.B., Dalack, M., **Daw, N.D.**, Shohamy, D., and Steinglass, J.E. (2021) Changes in brain and behavior during food-based decision-making following treatment of anorexia nervosa. *Journal of Eating Disorders* 9:48.
22. Hunt, L.T., **Daw, N.D.**, Kaanders, P., MacIver, M.A,. Mugan, U., Procyk, E., Redish, A.D., Russo, E., Scholl, J., Stachenfeld, K., Wilson, C.R.E, and Kolling, N. (2021) Formalising planning and information search in naturalistic decision-making. *Nature Neuroscience* 24:1051-1064
23. Foerde, K., **Daw, N.D.**, Rufin, T., Walsh, B.T., Shohamy, D., and Steinglass, J. (2021) Deficient goal-directed control in a population characterized by extreme goal pursuit. *Journal of Cognitive Neuroscience* 33:463-481
24. Foerde, K., Schebendach, J., Davis, L, **Daw, N.D.**, Walsh, T., Shohamy, D, and Steinglass, J.E. (2020) Restrictive eating across a spectrum from healthy to unhealthy: Behavioral and neural mechanisms. *Psychological Medicine* 13:1-10
25. Garrett, N., and **Daw, N.D.** (2020) Biased belief updating and suboptimal choice in foraging decisions. *Nature Communications* 11:3417
26. Dundon, N.M., Garrett, N., Babenko, V., Cieslak, M., **Daw, N.D,** and Grafton, S.T. (2020) Sympathetic and parasympathetic involvement in time constrained sequential foraging. *Cognitive Affective and Behavioral Neuroscience* 20:730-745
27. Piray, P., and **Daw, N.D.** (2020) A simple model for learning in volatile environments. *PLoS Computational Biology* 16:e1007963
28. Zorowitz, S., Momennejad, I., and **Daw, N.D.** (2020) Anxiety, avoidance, and sequential evaluation. *Computational Psychiatry* 4:1-17.
29. Jaffe-Dax, S., Boldin, A.M., **Daw, N.D**., and Emberson, L.L. (2020) A computational role for top-down modulation from frontal cortex in infancy. *Journal of Cognitive Neuroscience* 32:508-514.
30. Gillan, C.M., Kalanthroff, E., Evans, M., Weingarden H.M., Jacoby, R.J., Gershkovich, M., Snorrason, I., Campeas R. Cervoni C., Crimarco, N., Sokol, Y., Garnaat, S.L., Mclaughlin, N., Phelps, E.A., Pinto, A., Boisseau, C.L., Wilhelm, S., **Daw, N.D.**, and Simpson, H.B. (2020) Comparison of the association between goal-directed planning and self-reported compulsivity vs. obsessive-compulsive disorder diagnosis. *JAMA Psychiatry* 77:77-85.
31. Wyckmans, F., Otto, A.R., Sebold, M., **Daw, N.**, Bechara, A., Saeremans, M., Kornreich, C., Chatard, A., Jaafari, N., Noël, X. (2019) Reduced model-based decision-making in gambling disorder. *Scientific Reports* 9:19625.
32. Kane, G.A., Bornstein, A.M., Shenhav, A., Wilson, R.C., **Daw, N.D.**, and Cohen, J. (2019) Rats exhibit similar biases in foraging and intertemporal choice tasks. *eLife* pii: e48429.
33. Piray, P., Dezfouli, A., Heskes, T., Frank, M., and **Daw, N.D.** (2019) Hierarchical Bayesian inference for concurrent model fitting and comparison for group studies. PLoS Computational Biology 15:e1007043
34. Lee, R.S., Mattar, M.G., Parker, N.F., Witten, I.B., and **Daw, N.D.** (2019) Reward prediction error does not explain movement selectivity in DMS-projecting dopamine neurons. *eLife* pii: e42992.
35. Fung, B., Qi, S., Hassabis, D., **Daw, N.D.**, and Mobbs, D. (2019) Slow escape decisions are driven by trait anxiety. *Nature Human Behavior* 3:702-708.
36. Engelhard, B., Finkelstein, J., Cox, J., Fleming, W., Jang, H.J., Ornelas, S., Koay, S., Thiberge, S., **Daw, N.D.**, Tank, D., and Witten, I, (2019) Specialized coding of sensory, motor, and cognitive variables in midbrain dopamine neurons. *Nature* 570: 509-513.

37. Dunsmoor, J.E., Kroes, M.C.W., Li, J., **Daw, N.D**., Simpson, H.B., and Phelps, E.A. (2019) Role of human ventromedial prefrontal cortex in learning and recall of enhanced extinction. *Journal of Neuroscience* 39: 3264-3276.

38. Vikbladh, O.M., Meager, M.R., King, J., Blackmon, K., Devinsky, O., Shohamy, D., Burgess., N., and **Daw, N.D.** (2019) Hippocampal contributions to model-based planning and spatial memory. *Neuron* 102:683-693.

39. Baker, S.C., Konova, A.B., **Daw, N.D.**, and Horga, G. (2019) A distinct inferential mechanism for delusions in schizophrenia. *Brain* 142:1797-1812.

40. Talmi, D., Lohnas L., and **Daw, N.D.** (2019) A retrieved context model of the emotional modulation of memory. *Psychological Review* 126: 455-485.

41. Otto, A.R., and **Daw, N.D.** (2019) The opportunity cost of time modulates cognitive effort. *Neuropsychologia* 123:92-105.

42. Momennejad, I., Otto, A.R., **Daw, N.D.,** and Norman, K. (2018) Offline replay supports planning in human reinforcement learning. *eLife* pii: e32548.

43. Mattar, M.G., and **Daw, N.D.** (2018) Prioritized memory access explains planning and hippocampal replay. *Nature Neuroscience* 21:1609-1617.

44. Duncan, K., Doll, B.B., **Daw, N.D.,** and Shohamy, D. (2018), More than the sum of its parts: a role for hippocampus in configural reinforcement learning. *Neuron* 98:645-657.

45. Ledoux, J., and **Daw, N.D.** (2018) Surviving threats: neural circuit and computational implications of a new taxonomy of defensive behavior. *Nature Reviews Neuroscience* 19:269-282.

46. Qi, S., Hassabis, D., Sun, J., Guo, F., **Daw, N.D.**, and Mobbs, D., (2018) How cognitive and reactive fear circuits optimize escape decisions in humans. *Proceedings of the National Academy of Sciences* 115:3186-3191.

47. Fleming, S.M., van der Puten, E.J., and **Daw, N.D.** (2018) Neural mediators of changes of mind about perceptual decisions. *Nature Neuroscience* 21:617-624.

48. Cassidy, C.M., Balsam, P.D., Weinstein, J.J, Rosengard, R.J., Slifstein, M., **Daw, N.D.**, Abi-Dargham, A., and Horga, G. (2018) A perceptual inference mechanism for hallucinations linked to striatal dopamine. *Current Biology* 28:503-514.

49. Russek, E.M., Momennejad, I., Botvinick, M.M., Gershman, S.J., and **Daw, N.D.** (2017) Predictive representations can link model-based reinforcement learning to model-free mechanisms. *PLoS Computational Biology* 13:e1005768

50. Momennejad, I.; Russek, E.; Cheong, J.; Botvinick, M., **Daw, N.D.**, and Gershman, S.J. (2017) The successor representation in human reinforcement learning. *Nature Human Behavior* 1, 680–692.

51. Kane, G.A., Vazey, E.M., Wilson, R.C., Shenhav, A., **Daw, N.D.,** Aston-Jones, G., and Cohen, J.D (2017) Increased locus coeruleus tonic activity causes disengagement from a patch-foraging task. *Cognitive Affective and Behavioral Neuroscience* 17:1073-1083.

52. Bornstein, A.M., Khaw, M.W., Shohamy, D., and **Daw, N.D.** (2017) What's past is present: Reminders of past choices bias decisions for reward in humans. *Nature Communications* 8:15958.

53. Lenow, J.K, Constantino, S.M., **Daw, N.D.,** and Phelps, E.A. (2017) Chronic and acute stress promote overexploitation in serial decision making. *Journal of Neuroscience* 37:5681-5689.

54. Goldfarb, E.V., Shields, G.S., **Daw, N.D.,** Slavich, G.M., and Phelps, E.A. (2017) Low lifetime stress exposure is associated with reduced stimulus-response memory. *Learning and Memory* 24:162-168.

55. Norton, E.H., Fleming, S.M., **Daw, N.D.**, and Landy, M.S. (2017) Suboptimal criterion learning in static and dynamic environments. *PLoS Computational Biology*: 13:e1005304.

56. Fleming, S., and **Daw, N.D.** (2017) Self-evaluation of decision-making: A general Bayesian framework for metacognitive computation. *Psychological Review* 124:91-114.

57. Campbell-Meikeljohn, D., Simonsen, A., Frith, C., and **Daw, N.D.** (2017) Independent neural computation of value from other people's confidence. *Journal of Neuroscience* 37:673-684.

58. Culbreth, A.J., Westbrook, A., **Daw, N.D.**, Botvinick., N.D., and Barch, D.M (2016) Reduced model-based decision making in schizophrenia. *Journal of Abnormal Psychology* 125:777-87.

59. Atlas, L.Y., Doll, B.B., Li, J., **Daw, N.D.**, and Phelps, E.A. (2016) Instructed knowledge shapes feedback-driven aversive learning in striatum and orbitofrontal cortex, but not the amygdala. *eLife* 5. pii: e15192.

60. Parker, N.F, Cameron, C.M., Taliaferro, J.P., Lee, J., Choi, J.Y., Davidson, T.J., **Daw, N.D.**, and Witten, I.B. (2016) Reward and choice encoding in terminals of midbrain dopamine neurons depends on striatal target. *Nature Neuroscience* 19:845-54.

61. Reinen, J.M., Van Snellenberg, J.X., Horga, G., Abi-Dargham, A., **Daw, N.D.***, and Shohamy, D.S.* (2016) Motivational context modulates prediction error response in schizophrenia. *Schizophrenia* 42:1467-1475.

62. Decker, J.H., Otto, A.R., **Daw, N.D.**, and Hartley, C.A. (2016) From creatures of habit to goal-directed learners: Tracking the developmental emergence of model-based reinforcement learning. *Psychological Science* 27:848-58.

63. Gillan, C.M., Kosinski, R.W., Phelps, E.A., and **Daw, N.D.** (2016) Characterizing a psychological dimension related to deficits in goal-directed control. *eLife* 5 pii: e11305.

64. Doll, B.B., Bath, K.G., **Daw, N.D.***, and Frank, M.J.* (2016) Variability in dopamine genes dissociates model-based and model-free reinforcement learning. *Journal of Neuroscience* 36:1211-22.

65. Wong, Y.T., Fabiszak, M.M., Novikov, Y., **Daw, N.D.**, and Pesaran, B. (2016) Coherent neural ensembles are rapidly recruited when making a look-reach decision. *Nature Neuroscience* 19:327-34.

66. Morris, L.S., Kundu, P., Dowell, N., Mechelmans, D.J., Favre, P., Irvine, M.A., Robbins, T.W., **Daw, N.D.**, Bullmore, E.T., Harrison, N.A., and Voon, V. (2015) Fronto-striatal organization: Defining functional and microstructural /substrates of behavioral flexibility. *Cortex* 74:118-133.

67. Boureau, Y.-L., Sokol-Hessner, P., and **Daw, N.D.** (2015) Deciding how to decide: self-control and meta-decision making. *Trends in Cognitive Sciences* 19:700-710.

68. Dunsmoor, J.E., Niv, Y., **Daw, N.D.**, and Phelps, E.A. (2015) Rethinking extinction. *Neuron* 88:47-63.

69. Sharp, M.E., Foerde, K., **Daw, N.D.,** and Shohamy, D. (2016) Dopamine selectively remediates model-based reward learning: a computational approach. *Brain* 139:355-64.

70. Voon, V., Back, K., Enander, J., Worbe, Y., Morris, L.S., Harrison, N.A., Robbins, T.W., Ruck, C., and **Daw, N.D.** (2015) Motivation and value influences in the relative balance of goal-directed and habitual behaviours in obsessive-compulsive disorder. *Translational Psychiatry* 5:e670.

71. Zhang, H., **Daw, N.D.,** and Maloney, L.T. (2015) Human representation of visuo-motor uncertainty as mixtures of orthogonal basis distributions. *Nature Neuroscience* 18: 1152-1158.

72. Constantino, S., and **Daw**, **N.D.** (2015) Learning the opportunity cost of time in a patch foraging task. *Cognitive, Affective and Behavioral Neuroscience* 15:837-53.

73. Worbe, Y., Savulich, G., **Daw, N.D.**, Emilio, F.-E., Robbins, T.W., Voon, V., and Palminteri, S. (2015) Valence-dependent influence of serotonin depletion on model-based choice strategy. *Molecular Psychiatry* 21:624-9

74. Gillan, C.M., Otto, A.R., Phelps, E.A., and **Daw, N.D.** (2015) Model-based learning protects against forming habits. *Cognitive, Affective and Behavioral Neuroscience* 15: 523-536.

75. Doll, B.B., Duncan, K.D., Simon, D.A., Shohamy, D.S., and **Daw, N.D.**, (2015) Model-based choices involve prospective neural activity. *Nature Neuroscience* 18:767-72.

76. Huys, Q.J., **Daw, N.D.**, and Dayan, P. (2015) Depression: A decision theoretic analysis. *Annual*

Reviews of Neuroscience 8:1-23.

77. Roy, M., Shohamy, D., **Daw, N.D.**, Jepma, M., Wimmer, G.E., and Wager, T.D., (2014) Representation of aversive prediction errors in the human periacqueductal gray. *Nature Neuroscience* 17:1607-12.
78. Wimmer, G.E, Braun, E.K., **Daw, N.D.**, and Shohamy, D. (2014) Episodic memory encoding interferes with reward learning and decreases striatal prediction errors. *Journal of Neuroscience* 34:14901-12.
79. Otto, A.R., Skatova, A., Madlon-Kay, S., and **Daw, N.D.** (2014) Cognitive Control Predicts Use of Model-Based Reinforcement-Learning. *Journal of Cognitive Neuroscience* 27, 319–333.
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* *These authors contributed equally to these articles and ordering was determined arbitrarily.*

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1. Correa, C.G., Griffiths, T.G., and **Daw, N.D.** (2024) Program-based strategy induction for reinforcement learning. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society* (oral presentation).

2. Eckstein, M.K., Summerfield, C., **Daw, N.D.**, and Miller, K.J. (2023) Predictive and Interpretable: Combining Artificial Neural Networks and Classic Cognitive Models to Understand Human Learning and Decision Making *Proceedings of the 44th Annual Meeting of the Cognitive Science Society* (oral presentation).

3. Meulemans, A., Schug, S., Kobayashi, S., **Daw, N.D.**, and Wayne, G. (2023) Would I have gotten that reward? Long-term credit assignment by counterfactual contribution analysis. *Advances in Neural Information Processing Systems* 2023 (spotlight).

4. Kumar, S., Correa, C., Dasgupta, I.., Marjieh, R., Hu, Michael Y., Hawkins, R.D., Cohen, J.D., **Daw, N.D.,** Narasimhan, K., and Griffiths, T.L. (2022) Using natural language and program abstractions to instill human inductive biases in machines. *Advances in Neural Information Processing Systems* 2022 (oral presentation; outstanding paper award).

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1. LeDoux, J., Birch, J., Andrews, K., Clayton, N.S., **Daw, N.D.**, Frith, C., Lau, J., Peters, M.A.K,., Schneider, S., Seth, A., Suddendorf, T., and Vandekerckhove, M.M.P. (2023) My Word: Consciousness beyond the human case. *Current Biology* 33, PR832-R840.
2. Hunter, L.E., and **Daw, N.D.** (2021) Context-sensitive valuation and learning. *Current Opinion in Behavioral Sciences* 24:499-501.
3. Langdon, A.J. and **Daw, N.D.** (2020) Beyond the average view of dopamine. *Trends in Cognitive Sciences* 24:499-501.
4. **Daw, N.D.** (2018) Are we of two minds? *Nature Neuroscience* 21(11):1497-1499.
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7. Gillan, C.M., and **Daw, N.D**., (2016) Taking psychiatry research online. *Neuron* 91:19-23.
8. **Daw, N.D.** (2016) Reinforcement learning, in Arbib, M., and Bonaiuto, J., ed., *From Neuron to Cognition via Computational Neuroscience,* MIT press.
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11. Shohamy, D., and **Daw, N.D.** (2015) Integrating memories to guide decisions. *Current Opinion in Behavioral Sciences* 5:85-90.
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26. Balleine, B.W., **Daw, N.D.**, and O'Doherty, J.P. (2008) Multiple forms of value learning and the function of dopamine, chapter in Glimcher, P.W. et al., eds., *Neuroeconomics*, Amsterdam: Elsevier.
27. **Daw, N.D.**, Courville, A.C., and Dayan, P. (2008) Semi-rational models of conditioning: The case of trial order, chapter in N. Chater & M. Oaksford, eds., *The Probabilistic Mind: Prospects for Rational Models of Cognition*, Oxford: Oxford University Press.
28. **Daw, N.D.**, (2007) Dopamine: at the intersection of reward and action *Nature Neuroscience* 10: 1505-1507.
29. **Daw, N.D.**, and Doya, K. (2006) The computational neurobiology of learning and reward, *Current Opinion in Neurobiology* 16:199-204.
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31. Niv, Y., **Daw, N.D.**, and Dayan, P. (2006) Choice values, *Nature Neuroscience* 9:987-988.
32. **Daw, N.D.**, and Dayan, P. (2004) Matchmaking, *Science* 304:1753-1754.

Talks and seminars:

Invited:

- Psychology department colloquium, Stanford (17 April 2024)
- Alcohol and Addiction Research Group seminar, UCSF (14 March 2024)
- Mechanistic Basis of Foraging, Janelia Research Campus (27 Feb 2024)
- Riken Center for Brain Science, Tokyo (15 Dec 2023)
- IRCN, University of Tokyo (11 Dec 2023)
- Neural and Behavioral Science Seminar, SUNY Downstate (18 Oct 2023)
- 25th birthday event, Gatsby Computational Neuroscience Unit, London (17 June 2023)
- Cognitive neuroscience colloquium, School of Psychological Sciences, Tel Aviv University (22 May 2023)
- Adrian Seminar, Cambridge University (9 May 2023)
- IRCN Computational Psychiatry Workshop, University of Tokyo (31 Mar 2023)
- 126th International Titisee Conference on NeuroAI, Titisee Germany (2 Mar 2023)
- Departmental seminar, Experimental Psychology, Oxford (20 Feb 2023)
- DeepTalk series, DeepMind, London (Dec 2022)
- Arrowhead Decision Neuroscience Meeting, UCLA (11 May 2022)
- UCL NeuroAI talk series (20 Apr 2022)
- Neuroscience and Cognitive Sciences Seminar, University of Maryland (8 Apr 2022)
- Brain and Cognitive Sciences Colloquium, MIT (31 Mar 2022)
- Keynote, Future of Foraging seminar series (30 Mar 2022)
- Zangwill Lecture Series, Cambridge (25 Mar 2022)
- Computational Properties of Prefrontal Cortex meeting, Oxford (24 Mar 2022)
- The Learning Salon series (18 Mar 2022)
- Computational Neuroscience Affinity Group, UCLA (28 Feb 2022)
- Science by the scoop, Princeton (13 Dec 2021)
- Reinforcement learning workshop, Microsoft Research Summit (21 Oct 2021)
- Center for Computational Psychiatry speaker series, Mount Sinai (1 Oct 2021)
- Mind Meeting, MPI for Cognitive and Brain Sciences, Leipzig (9 Sep 2021)
- Grand Rounds, Rutgers Cancer Institute of New Jersey (5 May 2021)
- Social and Decision Neuroscience seminar, Caltech (4 March 2021)
- Max Planck Centre for Computational Psychiatry, UCL (18 Feb 2021)
- Institute for Cognitive Neuroscience seminar, UCL (25 Jan 2021)
- Center for Theoretical Neuroscience seminar, Columbia University (6 Nov 2020)
- Johns Hopkins Dept. of Psychiatry and Behavioral Sciences Research Conference (20 Oct 2020)
- Invited symposium, BRAIN initiative investigators meeting (1 June 2020)
- Virtual Dopamine Conference, online (22 May 2020)
- Psychology Colloquium, University of Wisconsin, Madison (20 Feb 2020)
- Neurobiology colloquium, Northwestern University (21 Jan 2020)
- Pioneers in Biomedical Research Seminar, Virginia Tech (23 Nov 2019)
- Neural Theories of Cognition meeting, Aspen (9 Oct 2019)
- Center for the Neural Basis of Cognition colloquium, Pittsburgh (3 Oct 2019)
- Keynote address, Conference on Cognitive Computational Neuroscience, Berlin (16 Sept 2019)
- Donders Center for Cognition Lecture, Nijmegen, Netherlands (25 June 2019)
- Psychology Department Colloquium, Hebrew University, Jerusalem (20 June 2019)
- Faculty of Industrial Engineering and Management seminar, Technion, Haifa (2 June 2019)
- EMBO EMBL Symposium: Probing Neural Dynamics with Behavioural Genetics, Heidelberg (12 Apr 2019)
- Minisymposium on decision making, Tel Aviv University (31 Mar 2019)
- Keynote address, Expert Meeting on Fear, Pain, and Avoidance, Leuven Belgium (28 Mar 2019)
- Keynote address, Israeli Society for Biological Psychiatry (13 Mar 2019)
- Workshop on “beyond trial-based choice,” COSYNE 2019 Workshops, Portugal (5 Mar 2019)

- Workshop on “dopamine updated,” COSYNE 2019 Workshops, Portugal (4 Mar 2019)
- Brain research center colloquium, Bar Ilan University, Israel (25 Feb 2019)
- Neurobiology seminar, Weizmann institute, Rehovot Israel (12 Feb 2019)
- ELSC seminar, Hebrew University, Jerusalem (15 Jan 2019)
- Radcliffe Institute Seminar, Harvard (10 Jan 2019)
- Cognitive Psychology, Brain and Cognition Colloquium, Tel Aviv University (17 Dec 2018)
- School of Psychology, Trinity College Dublin (29 Nov 2018)
- Invited presentation, Symposium on “From intelligent animals to intelligent machines,” Institute of Neuroscience, Universite Catholique de Louvain, Belgium (16 Nov 2018)
- Keynote, Flexible Learning Under Stress, Hamburg (21 Sep 2018)
- Keynote, Australian Learning Group, Katoomba, New South Wales (11 July 2018)
- Featured talk, UCI addiction symposium, Irvine (12 June 2018)
- Social and Affective Neuroscience Society meeting, New York (5 May 2018)
- Computational Neurosceince of Prediction, FENS Spring Brain Conference, Copenhagen (18 Apr 2018)
- Keynote presentation, Neuroeconomics talks, Maastricht University (13 Apr 2018)
- Center for Cognitive Science Colloquia, Rutgers University (10 Apr 2018)
- Keynote presentation, Computational models of decision making across scales symposium, Institute for Advanced Studies, Paris (2 Feb 2018)
- Computational neuroscience seminar, University of Chicago (2 Nov 2017)
- Neuroscience seminar, University of Manchester (20 Oct 2017)
- 44th Naito Conference, Sapporo Japan (5 Oct 2017)
- Computational Neuroscience Initiative, University of Pennsylvania (8 May 2017)
- Inaugural symposium, Rutgers-Princeton Center for Computational Neuro-Psychiatry (5 May 2017)
- Clinical, Cognitive and Computational Neuroscience seminar, Columbia University School of Medicine (3 May 2017)
- Templeton meeting on Survival Circuits, NYU (26 Apr, 2017)
- Conference on New Insights into Affective and Behavioral Regulatory Processes, Rutgers (15 Apr 2017)
- Cognitive Science Colloquium, Indiana Unversity (23 Jan 2017)
- Neural basis of decision making, UNSW, Sydney (13 Dec 2016)
- Computational Psychiatry Symposium, Donders Institute, Nijmegen (30 Nov 2016)
- Control Processes Conference, San Diego (10 Nov 2016)
- Center for Perceptual Systems seminar, University of Texas, Austin (3 Oct 2016)
- Neuroeconomics seminar series, University of Zurich, Department of Economics (1 Sep 2016)
- Workshop on attention, value and decision making, Marburg, Germany (20 July 2016)
- Frontiers in memory research, Florence (28 June 2016)
- Invitational Choice Symposium, Alberta (15 May 2016)
- Addiction in Theory workshop, University College London (10 May 2016)
- Data Science seminar series, Rutgers University (6 May 2016)
- 38th International Symposium of the GNSRC: Neuroscience of Decision Making, University of Montreal (2 May 2016)
- Current Works in Behavior, Genetics, and Neuroscience series, Yale University (22 Apr 2016)
- Center for Brain Science, Harvard University (12 Apr 2016)
- Center for Cognitive Computational Neuropsychiatry, Rutgers University (3 Feb 2016)
- Multidisciplinary Brain Research Center, Bar Ilan University, Israel (4 Jan 2016)
- International Symposium on Prediction and Decision Making, Tokyo (1 Nov 2015)
- Group for Neural Theory, ENS, Paris (6 Oct 2015)
- Advances in Memory Systems symposium, NYU (29 May 2015)
- Association for Psychological Science convention, New York (22 May 2015)
- Workshop on Perception and Choice, Columbia University (8 May 2015)
- Behavioral and Cognitive Neuroscience Colloquium, CUNY (27 Mar 2015)
- Okinawa Institute of Science and Technology, Japan (19 Mar 2015)

- Workshop on hippocampus and decisions, COSYNE, Snowbird (10 Mar 2015)
- Department of Psychology, Princeton (10 Feb 2015)
- Grand Rounds, Department of Psychiatry, Columbia University (28 Jan 2015)
- Brain Meeting, Wellcome Trust Centre for Neuroimaging, UCL (5 Dec 2014)
- Swiss Computational Neuroscience Seminar, Bern (30 Oct 2014)
- Center for the Neural Basis of Cognition 20th Anniversary Celebration (18 Oct 2014)
- International Workshop on Neuroeconomics: Recent Advances and Future Directions, Erice (June 20, 2014)
- Fourth Symposium on the Biology of Decision Making, Paris (May 26, 2014)
- Cognitive Science 2.0: Implications for Intelligence Analysis, intelligence agencies briefing, Maryland (May 9 2014)
- Psychology Department seminar series, Hunter College (2 Apr 2014)
- Workshop on Computational Psychiatry, COSYNE, Snowbird (3 Mar 2014)
- Winter Conference on Neural Plasticity, Vieques (24 Feb 2014)
- Cognitive Brown Bag, Princeton University (19 Feb 2014)
- Functional MRI speaker series, University of Michigan (11 Feb 2014)
- Implications of Bayesian Cognitive Modeling for the Intelligence Community (13 Dec 2013)
- Interfacing Models with Brain Signals to Investigate Cognition, Irvine (7 Nov 2013)
- Learning to Attend, Attending to Learn, San Diego (6 Nov 2013)
- First Conference on Reinforcement Learning and Decision Making, Princeton (26 Oct 2013)
- First Conference on Computational Psychiatry, Miami (22 Oct 2013)
- Department of Neurobiology and Behavior, SUNY Stony Brook, (19 Sep 2013)
- Society for Mathematical Psychology, Potsdam (6 Aug 2013)
- Emotion Club, UCL (6 June 2013)
- Seminar on Parallel Distributed Processing, Princeton University (31 May 2013)
- Theoretical Neuroscience Seminar, Columbia University (10 May 2013)
- Neuroscience Seminar, Cold Spring Harbor Laboratory (6 May 2013)
- Kavli Futures Symposium on Neuroeconomics and Urban Big Data, New Paltz, NY (22 April 2013)
- Conference on Theoretical Organizational Models, New York (19 April 2013)
- Swartz Symposium on Neural Circuits for Decision Making and Reinforcement Learning, Yale (12 April 2013)
- Princeton Neuroscience Institute Seminar, Princeton (11 April 2013)
- Advances in Memory Systems Symposium, NYU (4 April 2013)
- Tamagawa/Caltech meeting on Reward and Decision Making, Hawaii (8 March 2013)
- International Conference on Applications of Neuroimaging to Alcoholism, Yale (18 Feb 2013)
- Department of Neurobiology symposium, Weizmann Institute of Science, Rehovot, Israel (4 Dec 2012)
- Department of Neurobiology symposium, University of Haifa, Israel (19 Nov 2012)
- Symposium on model-based decision making, Comprehensive Brain Science Network meeting, Sendai, Japan (27 July, 2012)
- Society for Philosophy and Psychology, Annual Meeting, Boulder CO (22 June, 2012)
- Sixteenth International Conference on Cognitive and Neural Systems, Boston (1 June, 2012)
- Affective Brain Lab Online Talk Series, University College London (29 May, 2012)
- Science Meeting, Sackler Institute for Developmental Psychobiology, New York (10 May, 2012)
- Meeting on Canonical Neural Computation, Florence (May 3, 2012)
- Center for Molecular and Behavioral Neuroscience Colloquium, Rutgers Newark (11 April, 2012)
- Department of Neuroscience seminar series, Johns Hopkins University School of Medicine (Apr 5, 2012)
- Neural and Behavioral Science Seminar Series, SUNY Downstate, New York (Oct 19, 2011)
- Army Research Office Workshop on Augmenting Human Choice, Evanston (Sep 29, 2011)
- John B. Pierce Laboratory, Yale (Sep 19, 2011)
- Workshop on the Psychophysiology and Neuroscience of Experience-Based Decisions, Technion, Haifa (Jun 16, 2011)

- Cognitive Systems Area/Imaging Center talk series, University of Texas, Austin (Apr 22, 2011)
- IRCS/Computational Neuroscience Seminar, University of Pennsylvania (Nov 5, 2010)
- Neuroeconomics Seminar Series, Duke (Oct 21, 2010)
- Symposium on Machine Learning and the Brain, APA Annual Convention, San Diego (Aug 12, 2010)
- Cognitive Neuroscience Seminar, Taub and Sergievsky Institutes, Columbia University, NY (June 24, 2010)
- Emotion Club, Wellcome Trust Centre for Neuroimaging, UCL (May 27, 2010)
- Gatsby Computational Neuroscience Unit, UCL (May 25, 2010)
- Symposium on "Dopamine and Adaptive Memory," Cognitive Neuroscience Society Meeting, Montreal (Apr 20, 2010)
- 5th Barbados Workshop on Reinforcement Learning, Bellairs Institute (Apr 7, 2010)
- COSYNE workshop on "Decision Making: Beyond the Basics," Salt Lake City (March 2, 2010)
- COSYNE workshop on "Is Optimality Reaching a Dead End," Salt Lake City (March 1, 2010)
- Batsheva Seminar on Reward and Decision Making in the Brain, Jerusalem (Feb 16, 2010)
- Workshop on "Goal-directed decision-making", Princeton (Oct 24, 2009)
- Donders Centre for Neuroimaging, Nijmegen (Aug 28, 2009).
- Institute for Empirical Research in Economics, University of Zurich (Aug 25, 2009).
- Gordon Research Conference on Catecholamines (Aug. 11 2009).
- Janelia Farm (July 30 2009).
- IARPA workshop on "Integrated Cognitive Architectures for Understanding Sensemaking," DC (July 22 2009).
- Medical Department, Brookhaven National Laboratory (July 16 2009).
- First Symposium on "The Biology of Decision Making," Bordeaux (June 10 2009).
- Workshop on "Future of cognitive science," UC Merced (May 29 2009).
- Computational Neuroscience Research Seminar Series, University of Chicago (May 5 2009)
- BCS colloquium, MIT (3 April 2009).
- Psychology department colloquium, Rutgers University (27 March 2009)
- Science Focus Day, NYU (23 March 2009)
- CELEST Science of Learning Seminar, Boston University (21 Nov, 2008).
- Workshop on "Open problems in the neuroscience of decision making," Okinawa, Japan (Oct 2008).
- Conference on Addiction Research, Kunming, China (Oct 2008).
- MURI workshop on "Statistical learning and transfer of learning," Washington DC (Oct 2008).
- International Symposium on Attention & Performance, Vermont (14 July 2008).
- Club Neuron, New York Medical College (25 June 2008).
- Neuroscience of Social Decision Making series, Princeton University (21 May 2008).
- National Academy study panel on "Opportunities in neuroscience for future Army applications" (12 Feb 2008).
- Cognitive lunch, Columbia University (4 Feb 2008).
- Workshop on Neural Mechanisms of the Social Mind, Machida, Tokyo (8 Dec 2007).
- Theoretical Neuroscience Seminar Series, Columbia University (9 Nov 2007).
- Mathematical Biology Seminar Series, New Jersey Institute of Technology (23 Oct 2007).
- Champalimaud workshop on serotonin, Lisbon (6 Oct 2007).
- Neurofinance Symposium, Swiss Banking Institute, University of Zurich (7 July 2007).
- Association for Psychological Science, annual convention, Washington, DC (25 May 2007).
- Swartz Theoretical Neurobiology series, Yale University (18 May 2007).
- Brain, Mind and Society series, California Institute of Technology (8 March 2007).
- Symposium on "Is reinforcement learning coming of cognitive age?" Psychonomic Society, Houston, TX (16 Nov 2006).
- Symposium on "Basal ganglia, dopamine and learning," meeting of the Pavlovian Society, Philadelphia PA (16 Sept 2006).
- Workshop on "The probabilistic mind: prospects for rational models of cognition," London, UK (28 June 2006).

- Symposium on statistical learning and brain plasticity, Center for Visual Science, University of Rochester (2 June, 2006).
- Workshop on associative learning and reinforcement learning, Society for the Study of Artificial Intelligence and the Simulation of Behaviour meeting, Bristol, UK (3 April 2006).
- Neuroeconomics workshop series, Stanford University, Palo Alto, CA (3 March 2006).
- School of Computing and Technology, University of Sunderland, Sunderland, UK (6 Feb. 2006).
- London Judgement and Decision Making group (24 Jan. 2006).
- Workshop on models of behavioral learning, NIPS meeting, Whistler, BC (10 Dec. 2005).
- Neuroeconomics seminar series, NYU, New York (8 Nov. 2005).
- Brain Meeting, UCL/Wellcome Dept. of Imaging Neuroscience, London, UK (22 July 2005).
- Workshop on Basal Ganglia, Dopamine and Learning, Jerusalem, Israel (27 June 2005).
- Annual meeting, Society for Neuroeconomics, Kiawah Island, SC (17 Sept. 2004).
- Centre for Cognitive Neuroscience and Cognitive Systems, University of Kent, Canterbury UK (15 July 2004).
- Workshop on Dopamine and Memory: Integrating Computational and Empirical Approaches, Newark, NJ (March 2003).

Contributed:

- Society for Neuroscience Minisymposium: Alternative Conceptions of Habits (11 Nov 2021)
- CRCNS PI meeting (13 June 2018)
- Memory Disorders Research Society, Princeton (1 Oct 2016)
- Pavlovian Society, Jersey City (30 Sep 2016)
- Panel on hippocampus and model-based processing, Eastern Psychological Association, New York (2 Mar 2013)
- Symposium on Using models and fMRI, Cognitive Science Society (23 July 2011)
- Minisymposium on Model based neuroimaging and decision neuroscience, SFN (17 Nov 2010)
- Advances in Neural Information Processing Systems, Vancouver, spotlight (6 Dec 2007).
- Minisymposium on Serotonin and Decision Making, Society for Neuroscience, San Diego (6 Nov 2007).
- Gatsby Foundation Workshop on motivation and action selection in conditioned behavior, London, UK (20 June 2005).
- Computational and Systems Neuroscience COSYNE, Salt Lake City, Utah (20 Mar. 2005).
- Second International Conference on Development and Learning, Cambridge, MA (June 2002).
- Computational Neuroscience CNS*02 meeting, Chicago, IL, featured contributed talk (July 2002).
- Computational Neuroscience CNS*99 meeting, Pittsburgh, PA, featured contributed talk (July 1999).

Teaching, training & service:

Courses taught (Princeton):

- Neuroeconomics NEU/PSY 340 (2017, 2020, 2022, 2023)
- Computational psychiatry NEU/PSY 445 (2021)
- Statistics for neuroscience NEU 545 (2021)
- Quantitative methods for psychology: PSY 503 (2016, 2017, 2018)

Courses taught (NYU):

- Math tools for neural science and psychology G80.2207/G89.2211 (2008, 2011, 2013, 2014, 2015)
- Neuroeconomics and decision making (former title: Decision making, neural and behavioral basis) V80.0302/V89.0300 (2007, 2009, 2011, 2014)
- Neuroeconomics G80.3410/G89.3394 (2010, Neurl-GA 3042/Psych-GA 3404: 2012, 2015)
- Cognitive neuroscience V89.0025 (2009)
- Reinforcement learning G80.3042/G89.3406 (2008)

Courses taught (summer schools and other visiting teaching):

- Advanced Summer School in Neuroeconomics, Shanghai (2019, 2017, 2015); Philadelphia (2023)
- Computational Psychiatry Course, New York (2022, 2019)

- Neuroscience School of Advanced Studies, Computational Psychiatry, Venice (2022)
- MBL Methods in Computational Neuroscience, Woods Hole (2021)
- NJACTS Machine Learning workshop (2021)
- Neurotechnologies for analysis of neural dynamics, Princeton (2018, 2017, 2016)
- Kavli Summer Institute in cognitive neuroscience, UCSB (2017)
- Science education intensive course for rabbinical trainees, Hebrew Union College (2017)
- Third Symposium and Advanced Course on Computational Psychiatry and Ageing Research, Bavaria (2016)
- Computational Psychiatry Course, ETH Zurich (2016)
- Tutorial on brain and behavior, 2nd Multidisciplinary Conference on Reinforcement Learning and Decision Making, Edmonton (2015)
- Workshop on computational models and fMRI, Scientific Research Network on Decision Neuroscience and Aging conference, Miami (2015)
- FENS-Hertie Winter School on the neuroscience of decision making, Obergurgl, Austria (2015)
- MBL Methods in Computational Neuroscience, Woods Hole (2014)
- PhD Program in Neuroscience, Champalimaud Center, Portugal (2012)
- MPS-UCL symposium and advanced course on computational psychiatry and aging research, Ringberg Castle (2012)
- Brains and Minds: The perceptual and computational bases of higher cognitive processes, Central European University (2011)
- Reinforcement learning in humans and other animals, NIPS tutorial, Vancouver (2010)
- Animal learning and decision making minicourse, Weizmann Institute (Summer 2010, with Y. Niv)
- Reinforcement learning, Hebrew University ICNC (Spring 2009, with H. Bergman and Y. Niv)
- EU Advanced Course in Computational Neuroscience, Freiburg, Germany (2008, 2009)
- PhD Program in Neuroscience, Gulbenkian Institute for Science, Portugal (2008, 2009)
- PhD Program in Computational Biology, Gulbenkian Institute for Science, Portugal (2007)
- IPAM summer school: Probabilistic Models of Cognition, UCLA (2007)
- Okinawa Computational Neuroscience Course, Okinawa, Japan (2005, 2007)
- Cognitive Neuroscience Course, Organization for Human Brain Mapping (2006, 2007)
- First Summer School in Neuroeconomics, Stanford (2006).

Predoctoral research trainees / lab managers, completed:

- Sean Allen (2019-2023)
- Yoel Sanchez Araujo (2017-2019)
- Elana Meer (2016-2017)
- Lindsay Hunter (2015-2016)
- Patricia Chan (2012-2013; co-advised with Todd Gureckis)
- Seth Madlon-Kay (2009-2012)
- Samuel Gershman (2007-8; co-advised with Bijan Pesaran)

Doctoral trainees, completed:

- Sarah-Jo Venditto (PNI, 2018-present; co-advised with Carlos Brody)
- Carlos Correa (PNI, 2019-2024; co-advised with Tom Griffiths)
- Rachel Lee (PNI, 2018-2023; co-advised with Ilana Witten)
- Sam Zorowitz (PNI, 2018-2023; co-advised with Yael Niv)
- Laura Bustamante (PNI, 2016-2022, co-advised with Jon Cohen)
- Oliver Vikbladh (NYU CNS, 2013-2019)
- Evan Russek (NYU CNS, 2013-2017)
- Sara Constantino (NYU Cognition & Perception, 2009-2016)
- Dylan Simon (NYU Cognition & Perception, 2007-2012)
- Aaron Bornstein (NYU Cognition & Perception, 2007-2013)
- Nicholas Gustafson (NYU CNS, 2007-2013)
- Lindsay Hunter (Princeton psychology, 2016-2023 / ABD)

Doctoral trainees, ongoing:

- Yunchang Zhang (PNI, 2023-present; co-advised with Ilana Witten)
- Gili Karni (PNI, 2022-present; co-advised with Yael Niv)
- Yoel Sanchez Araujo (PNI, 2020-present; co-advised with Jonathan Pillow)
- Yotam Sagiv (PNI, 2019-present, co-advised with Ilana Witten)

Postdoctoral trainees, completed:

- Flora Bouchacourt (2017-2022; co-advised with Tim Buschman and Jon Cohen)
- Payam Piray (2018-2022)
- Marcelo Gomes Mattar (2016-2020)
- Neil Garrett (2016-2020)
- Kevin Lloyd (2017-2019; co-advised with Jon Cohen)
- Ida Momennejad (2015-2018; co-advised with Jon Cohen and Ken Norman)
- Claire Gillan (2013-2016; co-advised with Elizabeth Phelps)
- Ross Otto (2012-2016)
- Peter Sokol-Hessner (2013-2016; co-advised with Elizabeth Phelps)
- Bradley Doll (2011-2016; co-advised with Daphna Shohamy)
- Stephen Fleming (2011-2015)
- Y-Lan Boureau (2012-2015)
- Daniel Campbell-Meiklejohn (2011-2013)
- Hanneke Den Ouden (2011-2013; co-advised with Roshan Cools)
- Mattia Rigotti (2010-2013; co-advised with Stefano Fusi)
- Jian Li (2007-2012; co-advised with Elizabeth Phelps)

Postdoctoral trainees, ongoing:

- Kate Nussenbaum (2023-present)
- Mostafa Abdou (2022-present)
- Harrison Ritz (2022-present; co-advised with Jonathan Cohen and Jonathan Pillow)
- Ari Kahn (2020-present)
- Dylan Rich (2016-present; co-advised with David Tank)

Departmental service:

- Psychology Dept. Visiting Internship for Psychology PhD Students selection committee (2023)
- PNI faculty search committees (chair, 2016; chair, cog neuro subcommittee, 2017; chair, 2020; chair, 2023)
- co-PI, PNI quantitative neuroscience training program (2022-present)
- PNI curriculum committee (2022-present)
- PNI colloquium committee (2019-present)
- Psychology search committee for statistics lecturer (2022)
- Numerous tenure, promotion, and third-year review committees (Psych dept. and PNI; 2015-present)
- CV Starr Committee (2016-2022)
- PNI graduate admissions committee (2015-2017)
- CBI steering committee (academic years 2008-10; 2013-15)
- CBI pilot token review committee (2011-13)
- CNS colloquium committee (2007-2015)
- Psychology education & undergraduate honors committee (academic year 2007-8)
- Psychology personnel and awards committee (academic year 2008-9)
- CNS faculty search committee (Learning & Memory, academic year 2008-9)
- Psychology faculty search committee (Cognition & Perception, academic year 2011-12)

University service:

- Fellow, Whitman College, Princeton (2016-)
- NYU Committee on Information Technology and Library Services (2014-15)
- NYU Dean's Undergraduate Research Fellowship selection committee (2014-15)

- NYU Phi Beta Kappa selection committee (2009-15)

Editorial service:

- Consulting editor, *Behavioral Neuroscience* (2013-)
- Associate editor, *Cognitive, Affective and Behavioral Neuroscience* (2015-2018)
- Co-editor, special issue of *Brain Research* on computational cognitive neuroscience (2009)
- Co-editor, special issue of *Cognition* on reinforcement learning and higher cognition (2009)

Other service:

- Co-director, Advanced Summer Institute in Neuroeconomics, Philadelphia (2023); Shanghai (2019, 2017, 2015)
- Standing member, NIH HCMF study section (July 2021-)
- Awards committee, Society for Neuroeconomics (2020)
- Executive committee, Reinforcement Learning and Decision Making, Montreal (June 2019)
- Program co-chair, Reinforcement Learning and Decision Making, Ann Arbor (June 2017)
- Co-organizer, Symposium on Advances in Memory Systems (NYU, March 2015)
- Program committee member, Reinforcement Learning and Decision Making (Edmonton, June 2015)
- Co-organizer, Rumelhart Symposium in honor of Peter Dayan, Cognitive Science Society, Sapporo (August 2012)
- Co-organizer, Workshop on Computations, Decisions, and Movement, Germany (May 2010).
- Area chair (Cognitive Science & Neuroscience), Neural Information Processing Systems (NIPS) 2008 & 2009.
- Organizing committee, Computational Cognitive Neuroscience Conference (CCNC; 2007-present)
- Co-organizer, “Machine learning meets human learning” workshop, NIPS 2008 meeting.
- Co-organizer, "Motivation and action selection in conditioned behaviour," Gatsby Foundation Workshop, June 2005, London
- Co-organizer, “Reinforcement learning and the brain: Beyond the dopamine system,” workshop, NIPS 2004 meeting