Curriculum Vitae and significant publications

# Michael J. Frank

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## ***Employment*:**

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| July 2022—present | Professor of Brain Science, *Brown University* |
| July 2020 – present | Director, Carney Center for Computational Brain Science, *Brown University* |
| July 2018 – present | Edgar L. Marston Professor of Cognitive, Linguistic, and Psychological Sciences |
| July 2016 – present | Professor, Cognitive, Linguistic & Psychological Sciences, Carney Institute for Brain Science, *Brown University* |
| July 2011 – June 2016 | Associate Professor, Dept of Cognitive, Linguistic & Psychological Sciences, Brown Institute for Brain Science, *Brown University* |
| Jan 2009 – June 2011 | Assistant Professor, Dept of Cognitive, Linguistic & Psychological Sciences, Brown Institute for Brain Science, *Brown University* |
| Jan 2006 – Dec 2008 | Assistant Professor, Dept of Psychology, Program in Neuroscience, Cognitive Science Program, *University of Arizona* |

## ***Degrees:***

Ph.D., Neuroscience & Psychology (joint), University of Colorado at Boulder, 2004
Thesis: "Dynamic Dopamine Modulation of Striato-Cortical Circuits in Cognition."
Randall C. O'Reilly advisor.
M.S., Electrical Engineering (biomedicine), University of Colorado at Boulder, 2000
B.Sc., Electrical Engineering, Queen's University, Canada, 1997

## ***Research Interests*:**

Computational modeling of neural mechanisms underlying decision making, reinforcement learning, and cognitive control. I develop neural network and mathematical models across scales and levels of abstraction. At the neural level, I focus on interactions between basal ganglia, frontal cortex, and hippocampus, and their modulation by dopamine and other neuromodulators. I test theoretical model predictions using cognitive paradigms in tandem with various neural measurements and manipulations across species, which are used to iteratively refine and improve models.

## ***Awards and Honors*:**

- National Academy of Sciences Troland Research Award, 2021
- Kavli Science Fellow, 2016
- Radboud Excellence Professorship, 2015, for “eminent researchers who have had a significant impact in their discipline and beyond” Radboud University Nijmegen, The Netherlands
- Fellow, Association for Psychological Science, 2012
- Cognitive Neuroscience Society Young Investigator Award, 2011
- Janet T Spence Award for Transformative Early Career Contributions, APS, 2010
- Neural Networks journal award for most cited article between 2006-2010
- D.G. Marquis Behavioral Neuroscience Award, best paper in Behavioral Neuroscience, 2006
- Dozier Award for outstanding scholarly record, University of Colorado, 2004
- Natural Sciences & Engineering Research Council graduate scholarship (Canada)

## Significant Publications (Full publication list at end)

- Pagnier, G., Asaad, W.F. & Frank, M.J. (2024). Double dissociation of dopamine and subthalamic nucleus stimulation on effortful cost/benefit decision making. *Current Biology* 34, 665-660.
- Jaskir, A. & Frank, M.J. (2023). On the normative advantages of dopamine and striatal opponency for learning and choice. *eLife* 12:e85107
- Liu, R.G. & Frank, M.J. (2022). Hierarchical clustering optimizes the tradeoff between compositionality and expressivity of task structures for flexible reinforcement learning. *Artificial Intelligence* 312, 103770
- Scott, D. & Frank, M.J. (2023). Adaptive control of synaptic plasticity integrates micro- and macroscopic network function. *Neuropsychopharmacology* **48**, 121–144
- Hamid, A., Frank, M.J.* & Moore, C.I.* (2021). Wave-like dopamine dynamics as a mechanism for spatiotemporal credit assignment. *Cell* 184, 2733-49 *co-senior authors; alphabetical order
- Fengler, A., Govindarajan, L., Chen, T. & Frank, M.J. (2021). Likelihood approximation networks (LANs) for fast inference of simulation models in cognitive neuroscience. *eLife* 10:e65074
- Westbrook, J.A, …, Cools, R.* & Frank, M.J.* (2020). Dopamine promotes cognitive effort by biasing the benefits versus costs of cognitive work. *Science, 367,* 1362-1366. *co-senior authors
- Collins, A.G.E. & Frank, M.J. (2018). Within and across-trial dynamics of human EEG reveal cooperative interplay between reinforcement learning and working memory. *Proceedings of the National Academy of Sciences 115, 2502-2507*
- Nassar, M.R., Helmers, J. & Frank, M.J. (2018). Chunking as a rational strategy for lossy data compression in visual working memory. *Psychological Review* 125, 486-511.
- Collins, A.G.E., Albrecht, M.A., Waltz, J.A., Gold, J.M., & Frank, M.J. (2017). Interactions between working memory, reinforcement learning and effort in value-based choice: a new paradigm and selective deficits in schizophrenia. *Biological Psychiatry* 82, 431-439.
- Maia, T.V. & Frank, M.J. (2017). An integrative perspective on the role of dopamine in schizophrenia. *Biological Psychiatry 81(1):52-66*
- Huys, Q., Maia, T.V., & Frank, M.J. (2016). Computational psychiatry as a bridge between neuroscience and clinical applications. *Nature Neuroscience* 19, 404-413.
- Doll, B., …, & Frank, M.J. (2016). Variability in dopamine genes dissociates model-based and model-free reinforcement learning. *Journal of Neuroscience 36,1211-1222.*
- Franklin, N.T. & Frank, M.J. (2015). A cholinergic feedback circuit to regulate striatal population uncertainty and optimize reinforcement learning. *eLife* 4:e12029.
- Frank, M.J., et al. (2015). fMRI and EEG predictors of dynamic decision parameters during human reinforcement learning. *Journal of Neuroscience,* 35, 485-494
- Cox, S.M.L., Frank, M.J., et al (2015). Striatal D1 and D2 signaling differentially predict learning from positive and negative outcomes, *NeuroImage* 109, 95-101
- Wiecki, T.V., Poland, J.S., & Frank, M.J. (2015). Model-based cognitive neuroscience approaches to computational psychiatry: clustering and classification. *Clinical Psychological Science* 3, 378-399.
- Cockburn, J., Collins, A.G.E. & Frank, M.J. (2014). A reinforcement learning mechanism responsible for the valuation of free choice. *Neuron* 83, 551-557
- Collins, A. & Frank, M.J. (2014). Opponent actor learning (OpAL): Modeling interactive effects of striatal dopamine on reinforcement learning and choice incentive. *Psychological Review* 121, 337-66
- Cavanagh, J.F. & Frank, M.J. (2014). Frontal theta as a mechanism for cognitive control. *Trends in Cognitive Sciences* 18, 414-421.
- Cavanagh, J.F., … & Frank, M.J. (2014). Eye tracking and pupillometry are indicators of dissociable latent decision processes. *J Exp Psych: General* 143, 1476-1488
- Wiecki TV, Sofer I & Frank MJ (2013). HDDM: Hierarchical Bayesian estimation of the Drift-Diffusion Model in Python. *Frontiers of Neuroinformatics* 7:14
- Collins, A.G.E & Frank, M.J. (2013). Cognitive control over learning: Creating, clustering and generalizing task-set structure. *Psychological Review*, 120, 190-229.
- Wiecki, T.V. & Frank, M.J. (2013). A computational model of inhibitory control in frontal cortex and basal ganglia. *Psychological Review*, 120, 329-355.
- Gold, J.M., …, & Frank, M.J. (2013). Negative symptoms in schizophrenia are associated with abnormal effort-cost computations. *Biological Psychiatry, 74, 130-136*

- Beeler, J. A*, Frank, M.J*, et al. (2012). A role for dopamine-mediated learning in the pathophysiology and treatment of Parkinson's disease. *Cell Reports 2, 1747-1761. *joint 1st*
- Badre, D., Doll, B.B., Long, N.M. & Frank, M.J. (2012). Rostrolateral prefrontal cortex and individual differences in uncertainty-driven exploration. *Neuron 73, 595-607.*
- Ratcliff, R. & Frank, M.J. (2012). Reinforcement-based decision-making in corticostriatal circuits: Mutual constraints by neurocomputational and diffusion models. *Neural Computation 24, 1186-1229.*
- Frank, M.J. & Badre. D. (2012). Mechanisms of hierarchical reinforcement learning in corticostriatal circuits I,II*. *Cerebral Cortex 22, 509-526. (companion computational and fMRI papers)*
- Gold, J.M., Waltz, J.A., …, & Frank, M.J. (2012). Negative symptoms and the failure to represent the expected reward value of actions: Behavioral and computational modeling evidence. *Archives of General Psychiatry* 69, 129-138.
- Cavanagh J.F., Wiecki, T.V., …, & Frank, M.J. (2011). Subthalamic stimulation reverses mediofrontal influence over decision threshold. *Nature Neuroscience* 14, 1462-67.
- Frank, M.J. (2011). Computational models of motivated action selection in corticostriatal circuits. *Current Opinion in Neurobiology* 21, 381-386.
- Doll, B.B., Hutchison, K.E. & Frank, M.J. (2011). Dopaminergic genes predict individual differences in susceptibility to confirmation bias. *Journal of Neuroscience* 31, 6188-6198.
- Maia, T.V. & Frank, M.J. (2011). From reinforcement learning models to psychiatric and neurological disorders. *Nature Neuroscience* 14, 154-162.
- Strauss, G.P.*, Frank, M.J.* et al. (2011). Deficits in positive reinforcement learning and uncertainty-driven exploration are associated with distinct aspects of negative symptoms in schizophrenia. *Biological Psychiatry 69,* 424-31 (*equal contribution)
- Frank, M.J. & Fossella, J.A. (2011). Neurogenetics and pharmacology of learning, motivation and cognition. *Neuropsychopharmacology Reviews 36, 133-152.*
- Frank, M.J., et al. (2009). Prefrontal and striatal dopaminergic genes predict individual differences in exploration and exploitation. *Nature Neuroscience 12:1062-1068.*
- Frank, M.J., Cohen, M.X. & Sanfey, A.G. (2009). Multiple systems in decision making: A neurocomputational perspective. *Current Directions in Psychological Science, 18, 73-77.*
- Frank, M.J. et al. (2007). Hold your horses: Impulsivity, deep brain stimulation and medication in Parkinsonism. *Science, 318*, 1309-1312.
- Frank, M.J., Moustafa, A.A., Haughey, H.C., Curran, T. And Hutchison, K. (2007). Genetic triple dissociation reveals multiple roles for dopamine in reinforcement learning. *Proceedings of the National Academy of Sciences, 104,* 16311-16316.
- Frank, M.J., Santamaria, A., O'Reilly, R.C. and Willcutt, E. G. (2007). Testing computational models of dopamine and noradrenaline dysfunction in attention-deficit/hyperactivity disorder. *Neuropsychopharmacology, 32*, 1583-99.
- Frank, M.J., Scheres, A. & Sherman, S.J. (2007). Understanding decision making deficits in neurological conditions: Insights from models of natural action selection. *Philosophical Transactions of the Royal Society-B, 362,* 1641-54.
- Frank, M.J. (2006). Hold your horses: A dynamic computational role for the subthalamic nucleus in decision making. *Neural Networks,* 19, 1120-1136
- Frank, M.J. and Claus, E. (2006). Anatomy of a Decision: Striato-Orbitofrontal Interactions in Reinforcement Learning, Decision Making and Reversal. *Psych. Review,* 113, 300-326.
- Frank, M.J. and O'Reilly, R.C. (2006). A mechanistic account of striatal dopamine function in cognition: Psychopharmacological studies with cabergoline and haloperidol. *Behav Neurosci*
- O'Reilly, R.C. & Frank, M.J. (2006). Making working memory work: A computational model of learning in the frontal cortex and basal ganglia. *Neural Computation,* 18, 283-328.
- Frank, M.J. (2005). Dynamic dopamine modulation in the basal ganglia: A neurocomputational account of cognitive deficits in medicated and nonmedicated Parkinsonism. *Journal of Cognitive Neuroscience*, 17, 51-72.
- Frank, M.J., Woroch, B.S. & Curran, T. (2005). Error related negativity predicts reinforcement learning and conflict biases. *Neuron,* 47, 495-501.
- Frank, M.J., Seeberger, L.C. & O'Reilly, R.C. (2004). By carrot or by stick: Cognitive reinforcement learning in Parkinsonism. *Science,* 306, 1940-3

***Grants (Current)***

- *Computational Cognitive Neuroscience Framework for Attentional Control Traits and States*
  ONR MURI Award N00014-23-1-2792 PI: Braver (Washington U St Louis)
  8/1/2023 – 7/31/2028
  $2,496,839
  Role: Co-PI, Computational Modeling

- *Novel treatment targets for affective disorders through cross-species investigation of approach/avoidance decision making.*
  NIMH P50MH119467 PI: Pizzagalli (McLean Hospital)
  4/15/20 – 3/31/25
  $1,045,633
  Role: PI, Computational Core

- *Neurocircuitry of OCD: Effects of Modulation*
  NIMH P50MH106435-06A1 PI: Haber (U Rochester)
  4/2022 – 3/2027
  $1,130,312
  Role: PI, Computational Core

- *Cognitive Neurocomputational Task Reliability & Clinical Applications Consortium*
  NIMH R01 MH084840 PI: Barch (Washington University St Louis)
  7/01/2019 - 6/30/2024
  $1,081,384
  Role: Co-PI

- *HNDS-I:SweetPea: Automating the Implementation and Documentation of Unbiased Experimental Designs*
  NSF BCS-2318549
  09/2023-08/2026
  $361,441
  Role: Co-PI, with Sebastian Musslick

- *Neural and computational mechanisms of motivation and cognitive control*
  NIMH R01MH124849 PI: Shenhav
  03/2021 – 12/2025
  $1,991,667
  Role: Co-I

- *Brown Postdoctoral Training program in Computational Psychiatry*
  NIMH T32MH126388-01
  7/1/2021 - 6/30/2026
  $2,322,6732
  Role:PI

- *Training program for Interactionist Cognitive Neuroscience (ICoN)*
  NIMH T32MH115895
  9/01/2019 – 8/31/2024
  $1,118,284
  Role: Co-PI

- *Neurocognitive characteristics of short-term risk for suicidal behavior in adolescents*
  NIMH R01MH115905-01 PI: Liu (Massachusetts General Hospital)
  8/1/2018 – 7/31/2023
  $402,494
  Role: Co-Investigator

- *Temporal dynamics of stress, sleep, and arousal in short-term risk for adolescent suicidal behavior*
  NIMH RF1MH120830-01 PI: Liu (Massachusetts General Hospital)
  8/1/2019 - 7/31/2023
  $287,580
  Role: Co-Investigator

***Grants (Completed)***

- *Brain and Behavior Mechanisms of Irritability and Cognitive Flexibility in Children*
  NIMH R01MH111542 PI: Dickstein (McLean Hospital)
  1/12-17 – 11/30/21
  $162,241
  Role: Co-I

- *Adaptive DBS in Non-Motor Neuropsychiatric Disorders: Regulating Limbic Circuit Imbalance*
  NINDS UH3NS100549 PI: Goodman (Baylor College of Medicine)
  9/1/2016 – 8/31/2021
  $203,326
  Role: Co-Investigator

- *How Prefrontal Cortex Augments Reinforcement Learning*
  NSF Proposal # 1460604
  2/1/2015- 1/31/19
  $372,056 direct costs
  Role:PI

- *Clinical and computational studies of dopamine function in Schizophrenia*,
  NIMH R01 MH080066-01 PI: Gold (Maryland Psychiatric Research Center)
  06/07/13 – 05/31/19
  $568,724 direct costs
  Role: Co-Investigator

- *BIDS-Derivatives: A data standard for derived data and models in the BRAIN Initiative*
  NIMH R24 MH114705-01 PI: Poldrack (Stanford University)
  9/1/2017 – 8/31/2019
  $73,830 direct costs
  Role: Co-Investigator

- *The Cost of Cognitive Doping: From dopamine to coginitive control via dynamic neural coding*
  NWO PI: Cools (Radboud University)
  $61,924 direct costs
  9/1/16 – 8/31/17
  Role: Co-Investigator

- *Goal Directed Behavior and Uncertainty in Obsessive Compulsive Disorder*
  Brown Institute for Brain Science Norman Prince Neuroscience Institute, New Frontiers Award
  $39,741 direct costs
  7/1/2016 – 6/30/2017
  Role: co-PI

- *Integrated Computational Psychiatry: Behavioral, Neurophysiological and Optogenetic Testing of Antipsychotic-Driven Aberrant Learning in the Cortico-Striatal D2 Pathway*
  Brown Institute for Brain Science Innovation Award
  $100,000
  7/1/14-6/30/15
  Role: Co-PI

- *Electropysiological and computational studies on action monitoring*.
  National Science Foundation
  $424,695 direct costs
  9/1/11 – 8/31/15
  Role: PI

- *The influence of stimulant therapy and co-morbidity on decisions in ADHD*
  Norwegian Research Council PI: Endestand (University of Oslo)
  01/07/12 – 06/30/14
  Role: Co-Investigator

- *BL-OG: A Novel Minimally-Invasive and Homeostatic Method for Selective Regulation of Neural Dynamics in the Subthalamic Nucleus*
  Michael J Fox Foundation PI: Moore
  9/1/13-8/31/14
  $75,000
  Role: Co-PI

- *Clinical and computational studies of dopamine function in Schizophrenia*
  NIMH R01 MH080066-01 PI: Gold (Maryland Psychiatric Research Center)
  1/01/08 – 12/31/12
  $409,521 direct costs
  Role: Co-Investigator

- *Orbitofrontal and striatal mechanisms in stress and addiction*
  NIDA R21 DA022630 PI: Fellows (McGill University)
  9/1/06-12/31/10
  $210,000 direct costs
  Role: Co-PI

- *Neurocognitive Computations in Parkinson's Disease*
  Michael J Fox Foundation for Parkinson's Research
  1/1/09 – 12/31/11
  $366,848 direct costs
  Role: PI

## ***Scholarly Presentations*:**
## ***Colloquia (Invited)***

- MindRL Hub, virtual talk https://rldmjc.github.io/ 12/14/23
- Institute for Computational & Experimental Research on Mathematics (ICERM), Providence, 11/30/23
- Bernstein Center for Computational Neuroscience colloquium, Berlin, Germany (virtual), 6/7/23
- Precision Convergence Webinar Series, The McGill Centre for the Convergence of Health and Economics and The Pittsburgh Supercomputing Center, 11/9/22
- University College London Brain Meeting, London England (virtual), 10/14/22
- Max Planck Institute for Biological Cybernetics, Tübingen Germany (virtual), 9/30/2022
- Dresden University of Technology, Dresden Germany (virtual), 6/15/2022
- Dartmouth College Biomedical Data Sciences seminar, Lebanon NH, 5/26/2022
- University of Pennsylvania colloquium, Philadelphia PA, 11/8/2021
- Neuroeconomics Seminar series, University of Zurich, virtual, 11/4/2021
- Johns Hopkins Psychological & Brain Science colloquium, virtual, 11/3/2021
- Center for Neuroscience Studies series, Queen's University, Kingston Canada, 6/23/21
- Brain & Mind Webinar, Sharif University of Technology, Iran, 6/2/21
- Computational neuroscience seminar, UC Davis (virtual), 4/29/21
- Psychiatry seminar series, University of Cambridge (virtual), 4/29/21
- Lundbeck pharmaceuticals, Experimental Medicine seminar (virtual), 4/12/21
- Quantitative Psychology Brownbag seminar, University of Illinois (virtual), 3/10/21

- Neural Dynamics Forum seminar series, University of Bristol (UK, virtual), 10/30/20
- Rutgers-Princeton Center for Computational Cognitive Neuropsychiatry (virtual), 10/14/20
- National Institutes of Health (NIH) Neuroscience seminar, Bethesda, MD, 12/16/19
- University of Maryland, College Park, MD, 10/10/19
- NIDA/NIAAA Cutting Edge Seminar, Rockville MD, 9/27/19
- Helmholtz lecture, Utrecht University, Utrecht Netherlands, 8/30/19
- University of Amsterdam, Amsterdam Netherlands, 8/29/19
- University of Oxford, Oxford Neurotheory forum, Oxford UK, 5/8/19
- University of Surrey, Psychology department, Guildford UK, 5/7/19
- University of Colorado at Boulder, Dept of Psychology and Neuroscience, Boulder C0, 4/11/19
- University of California at Berkeley, Neuroscience seminar series, Berkeley CA 3/21/19
- University of Chicago Grossman Institute for Neuroscience, Chicago IL, 3/14/19
- Harvard University, Center for Brain Science seminar, Cambridge MA, 10/9/18
- *Van Biervliet* lecture, Center for Cognitive Neuroscience, Ghent University, Belgium, 6/21/18
- UCLA Computational Neuroscience group (webinar), 5/23/18
- Indiana University, Cognitive Science Seminar Series, Bloomington IN, 2/19/18
- University of Houston, Department of Psychology, Houston TX, 12/5/17
- Columbia University, Center for Theoretical Neuroscience seminar series, New York 11/17/17
- Columbia University Systems, Cognitive and Computational Neuroscience series 11/16/17
- Pioneers in Biomedical Research Seminar, Virginia Tech, Roanoke VA 11/3/17
- University of Massachusetts Amherst, Neuroscience & Behavior series, Amherst MA 10/25/17
- Maryland Psychiatric Research Center, Baltimore MD, 6/28/17
- Neuroeconomics Colloquium, New York University, New York NY 4/25/17
- Cognitive Science colloquium, Princeton University, Princeton NJ 3/30/17
- Bridge Webinar series: McGill U, Johns Hopkins U, Pittsburgh Supercomputing Center, 1/17/17
- University of California at San Francisco Neuroscience seminar series, San Francisco CA 3/31/16
- Johns Hopkins University Biomedical Engineering seminar series, Baltimore MD 3/28/16
- IBM TJ Watson Research Center, Computational Biology seminar, Yorktown NY 1/12/16
- Université de Montréal, Neuroscience series, Montreal Quebec Canada, 1/8/16
- American University, Special Lectures on Cognitive Neurosciences, Washington DC, 11/13/15
- University of Maryland Neuroscience and Cognitive Science series, 10/23/15
- Harvard University, Department of Psychology colloquium, Cambridge MA, 10/7/15
- University of Western Ontario, Neuroscience speaker series, London ON 9/29/15
- Yale University, Behavior, Genetics & Neuroscience seminar series, New Haven CT 9/17/15
- Donders Institute for Brain, Cognition and Behaviour, Nijmegen, the Netherlands, 6/18/15
- Google DeepMind, London UK, 5/28/15
- UCL Wellcome Trust Center for Neuroimaging “Brain Meeting”, London UK, 4/17/15
- University of British Columbia, Brain Research Centre, Vancouver, Canada, 1/9/15
- University of Pennsylvania Psychology Dept, Philadelphia PA, 10/27/14
- Washington University in St. Louis: Cognitive, Computational, and Systems Neuroscience
- Invited Lecturer, St Louis, MO 10/6/14
- Carnegie Mellon University, Dept of Psychology Colloquium, Pittsburgh, PA 9/22/14
- Carnegie Mellon University, Cognitive Brown Bag, Pittsburgh, PA 9/22/14
- Columbia University Dept of Pharmacology, New York NY 5/20/14
- UCL, Affective Brain Lab Online Talk Series, London UK, 5/15/14
- Duke University, Duke Institute for Brain Science, Durham NC, 1/31/14
- Harvard University, Maclean Hospital, Boston, MA, 12/17/13
- University of Amsterdam, special seminar, Amsterdam, the Netherlands, 6/14/13
- University of Amsterdam, Brain and Cognition series, Amsterdam, the Netherlands, 6/6/13
- Harvard University, Decision-Making workshop series, Cambridge MA, 11/16/11
- New York University, Neuroeconomics seminar series, New York NY. 9/27/11
- National Institute of Neurological Disorders and Stroke (NINDS), Bethesda MD, 8/16/11
- University of Amsterdam, Cognitive Science Center Amsterdam, The Netherlands, 6/16/11
- Columbia University, Center for Theoretical Neuroscience, New York NY 5/27/11
- University of California at Davis, Perspectives in Neuroscience series, Davis CA 5/12/11
- University of Massachusetts at Amherst, Dept of Psychology, Amherst MA 4/6/11
- University of Colorado Boulder, Center for Determinants of Executive Function & Dysfunction 1/20/11

- University of Pennsylvania, Institute for Research in Cognitive Science, Philadelphia, PA 12/10/10
- New York University Center for Neural Science, Memory in Brain series, New York NY 11/5/10
- CELEST Science of Learning seminar series, Boston University, Boston MA 10/29/10
- Grand rounds, Dept of Neurology, Brown University, Providence RI 5/19/10
- National Institute on Drug Abuse (NIDA) seminar series, Baltimore MD 5/11/10
- UCLA, Center for Neurobehavioral Genetics, Los Angeles CA 5/6/10
- Yale University, Cognitive Science seminar series, New Haven CT 4/6/10
- John B Pierce Laboratory, Yale University School of Medicine, New Haven CT 4/5/10
- University College London, "Brain meeting", London UK 2/5/10
- University of Chicago, Center for Integrative Neuroscience and Neuroengineering, 1/19/10
- Donders Institute for Brain, Cognition & Behaviour, Nijmegen, The Netherlands, 7/29/09
- University of Zurich, Institute for Empirical Economics, Zurich, Switzerland, 6/4/09
- Queen's University, Centre for Neursocience, Kingston Canada, 4/8/09
- Northwestern University, Dept of Physiology Feinberg School of Medicine, Chicago IL, 3/13/09
- Johns Hopkins University, Dept of Psychological & Brain Sciences, Baltimore Maryland, 2/11/09
- University of Waterloo, Centre for Theoretical Neuroscience, Waterloo, Canada, 12/12/08
- Tamagawa University, Tokyo, Japan, 10/15/08
- University of Colorado, Institute for Cognitive Science, Boulder, CO, 7/30/08
- Max Planck Institute, Neurocognition of Decision Making Group, Berlin Germany, 7/18/08
- Laboratoire de la Neurobiologie de la Cognition, Université de Provence, Marseille,France, 7/15/08
- Gatsby Computational Neuroscience Unit, University College London, London, UK, 6/4/08
- University of Cambridge Behavioral Neuroscience seminar series, Cambridge, UK, 6/3/08
- University of Michigan, Neurons, Brains and Models seminar series, Ann Arbor, MI, 4/10/08
- Max Planck Institute, Cologne, Germany, 3/17/08
- University of California at Davis Medical Center, MIND Institute, Davis CA, 2/28/08
- Arizona Research Laboratories Division of Neurobiology seminar, Tucson AZ, 2/25/08
- Brown University, Brain Sciences Program, Providence RI, 2/21/08
- University of Delaware, Cognition and the Brain series, 10/5/2007.
- Yale University, Swartz Initiative in Theoretical Neurobiology, New Haven, CT, 5/25/07
- UCSD Temporal Dynamics of Learning Center, San Diego, CA, 5/18/07
- Princeton University Neuroscience Institute, Princeton, NJ, 4/26/07
- Mathematics Awareness Month, 'Mathematics and the Brain', U of Arizona, 4/17/07
- Workshop on Computational Neuroscience, department of mathematics, Uof Arizona, 2/23/07
- California Institute of Technology, Neuroeconomics seminar series, Pasadena CA 01/25/07
- Ohio State University, dept of Psychology, Columbus OH 11/19/07
- UCLA Dept of Psychology, Los Angeles, CA, 7/26/06
- University of Bonn, Center for Life and Brain, Bonn Germany, 6/6/06
- Institute for Cognitive Science Science of Learning series, University of Colorado, 9/30/05
- Center for Neuroscience Supergroup, University of Colorado, 9/23/04
- Colorado State University behavioral & cognitive neuroscience brown bag, 9/24/04

### *Symposia and Workshops, Invited Talks*

- "Adaptive chunking of working memory in frontostriatal neural networks", Annual Interdisciplinary Conference, Jackson Hole WY, 1/25/24
- "Tuning striatal dopamine signals to optimize reinforcement learning across tasks", Metaplasticity and Metalearning in Brains and Machines, Center for Mind, Brain, Computation and Technology Annual Symposium, Wu Tsai Neuroscience Institute, Stanford University, CA, 5/24/23.
- "Neural interactions between working memory and reinforcement learning", Cortical and Brain Modeling To Understand EEG and fMRI, Cognitive Fatigue MURI Research Forum, University of Michigan (virtual), 12/13/22
- "Beyond scalar dopamine hypotheses: Computational psychiatry", 5th Workshop on Integrating System Neuroscience, James S McDonell Foundation, Tarrytown NY, 11/3/22
- Computational Psychiatry Course, ETH Zurich, Zurich Switzerland (virtual), 9/16/22

- "Tuning striatal dopamine signals to optimize reinforcement learning across tasks", Nobel Mini-symposium: Dopamine as a neural substrate of reward prediction and psychopathology, Nobel Forum, Stockholm Sweden, 9/8/22
- "Clustering and generalization of abstract structures in reinforcement learning", 5th Symposium and Advanced Course on Computational Psychiatry and Ageing Research, Marbach Castle, Germany, 8/30/22
- "Clustering and generalization of abstract structures in reinforcement learning", Brains, Minds and Machines Summer Course, Marine Biology Lab, Woods Hole MA, 8/12/22
- "Clustering and generalization of abstract structures in reinforcement learning", Kavli Summer Institute in Cognitive Neuroscience, Santa Barbara, CA, 6/23/22
- "Striatal dopamine computations in learning about agency", Baltic-Nordic Summer School on Neuroscience and Neuroinformatics, Stockholm (virtual), 9/24/21
- "Computational models of abstraction, composition and transfer in reinforcement learning", Computational & Cognitive Neuroscience Summer School, Suzhou, China (virtual) 7/30/21
- "Linking across levels of analysis from brain to behavior in models of decision making", Computational & Cognitive Neuroscience Summer School, Suzhou, China (virtual) 7/29/21
- "Drift diffusion model and beyond for linking brain to behavior in patient populations", Methods and Primers for Computational Psychiatry and Neuroeconomics, Yale University, 3/4/21.
- "Striatal dopamine computations in learning about agency", workshop, Terra Incognita: Diving into the Subcortex, Amsterdam (virtual presentation), 3/3/21
- "Clustering and generalization of abstract structures in reinforcement learning", **keynote speaker**, Winter School of Mathematical Psychology, Institute for Cognitive and Brain Sciences, Shahid Beheshti University, Tehran, Iran (virtual presentation), 2/24/21.
- "Computational modeling of frontal cortex and basal ganglia during inhibitory control and decision making", The 43rd Annual Meeting of the Japan Neuroscience Society, Kyoto Japan (virtual presentation), 7/30/20
- "Striatal dopamine computations in learning about agency", Virtual Dopamine Conference, http://vidaconference.com 5/22/20
- "Corticostriatal dopamine computations in learning about agency", Cognitive Neuroscience Society Annual Meeting, Symposium on Integrating Theory and Data: Using Computational Models to Understand Neuroimaging Data, 5/4/20
- "Spatiotemporal dynamics of corticostriatal dopamine in learning about agency", Annual Interdisciplinary Conference, Teton Village, WY 2/9/20
- "Computational models of inhibitory control in cortical basal ganglia circuits", Winter Conference on Brain Research, Big Sky MT, 1/28/20
- "Corticostriatal computations in learning and decision making", Plenary lecture, Alpine Brain Imaging Meeting, Champéry Switzerland, 1/13/20
- "Beyond scalar reward prediction errors: spatiotemporal dynamics of striatal dopamine in structure learning", International Conference on Motivation and Cognitive Control, Berlin, Germany, 9/16/19
- "Introduction to Computational Psychiatry", Crash course in computational psychiatry, National Institute of Mental Health, Bethesda MD, 9/9/19
- "Clustering and generalization of abstract structures in human reinforcement learning", **keynote**, 9th Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics, Oslo Norway, 8/22/19
- "Dynamic dopaminergic signals underlying task state inference", Gordon Research Conference on Catecholamines, Sunday River ME, 8/14/19
- "Corticostriatal dopamine computations in reinforcement learning and decision making", Plenary lecture, 4th International Conference on Applications of Neuroimaging to Alcoholism (ICANA-4), Yale University, New Haven CT, 7/20/19
- "Quantifying dynamic decision processes with neural regressors", Workshop on Integrating Neural and Behavioral Data, Midwest Cognitive Science Conference, The Ohio State University, Columbus OH, 5/24/19
- "Beyond reward prediction errors: corticostriatal mechanisms of structure learning", symposium on the Computational and Neural Basis of Bayesian models of Reinforcement Learning, Winter Conference for Brain Research, Snowmass CO, 1/30/19
- "Methods of computational model-based analysis of brain/behavior relationships". Computational Psychiatry: from theory to practice. San Diego CA, 11/3/18

- "Model-based EEG reveals disrupted interplay between working memory and reinforcement learning in schizophrenia". Computational Psychiatry: from theory to practice. San Diego CA, 11/3/18
- "Computational Models and Analysis of Subthalamic function across species". Workshop on Translational Aspects of Stopping Behavior and Cognition. San Diego CA, 11/2/18
- "Corticostriatal interactions in working memory and reinforcement learning", workshop on Computational Properties of the Prefrontal Cortex, Nashville TN 10/13/18
- "Corticostriatal interactions in working memory and reinforcement learning", Flexible Learning Under Stress symposium, Hamburg University, Hamburg Germany 9/20/18
- "Computational cognitive neuroscience approaches to adaptive & maladaptive learning and choice", Translational Neuroscience and Neural Engineering Workshop for Graduate Students, Salve Regina University, Newport, RI, 6/6/18
- "Methods of computational model-based analysis of brain-behavior relationships in RL", Computational Psychiatry Satellite Workshop @ Society for Biological Psychiatry, New York, NY, 5/9/18
- "Model-based cognitive neuroscience approaches to computational psychiatry", American Psychiatric Association Annual Meeting, New York, NY, 5/8/18
- "Computational explorations of corticobasal ganglia function and dysfunction", meeting on From synaptic structure to neuronal circuit dysfunction, in memory of Dominique Muller, Geneva Switzerland, 4/19/18
- "Working memory contributions to reinforcement learning", Computational Neuroscience of Prediction, FENS BRAIN Spring meeting, Rungstedgaard, Denmark, 4/17/18
- "Computational Psychiatry", Montreal Artificial Intelligence and Neuroscience conference, **keynote,** Montreal Que, 11/18/17
- "Optimizing working memory strategies via reinforcement learning", Computational Psychiatry: a didactic introduction, Washington DC, 11/10/17
- "Chunking as an optimized strategy for lossy data compression in visual working memory", Control Processes meeting, Amsterdam, The Netherlands, 10/12/17
- Computational Psychiatry Course, ETH Zurich, Zurich Switzerland, 9/1/17
- Computational Psychiatry: Opportunities and Challenges, National Institute for Mental Health, Bethesda, MD 6/26-27/17
- "Chunking as an optimized strategy for lossy data compression in visual working memory", Reinforcement Learning and Decision Making Multidisplinary Conference, Ann Arbor MI 6/13/17
- "Deconstructing neural mechanisms of impulsive choice", Japanese-American Kavli Frontier of Science Symposium, National Academy of Sciences, Irvine CA, 12/2/16
- "Gating Mechanisms for Cognitive Control", chaired symposium at Control Processes workshop, San Diego, CA 11/10/16
- "Opponency mechanisms of striatal dopamine on learning and choice", Gatsby Computational Neuroscience Institute, workshop on dopamine. London UK, 9/30/16
- "Cognitive control over learning and action in frontostriatal circuits", The Brain Conferences, New Insights into Psychiatric Disorders through Computational, Biological and Developmental Approaches. Copenhagen, Denmark, 9/25/16
- "Adaptive regulation of decision thresholds by basal ganglia", Workshop on Sequential Sampling Models of Decision Making, Emmetten Switzerland, 5/10/16
- "Frontostriatal interactions at the interface between choice and learning", The Neuroscience of Decision Making, 38th Symposium International du GRSNC, Université de Montréal, 5/3/16
- "Computational Psychiatry", chair invited symposium, Cognitive Neuroscience Society Annual Meeting, New York NY, 4/3/16
- "Basal ganglia dynamics during active learning and choice", Gordon Research Conference on Basal Ganglia, Ventura CA, 03/02/16
- "Frontostriatal gating mechanisms in motivated action and cognition", Workshop on Multiregional Models of Population Coding, Simons Collaboration on the Global Brain, New York NY, 1/19/16
- "Probing for informativeness on latent states in value-based decision making", Computational Psychiatry Course, Zurich, Switzerland, 12/12/15
- "The drift diffusion model as a tool for Computational Psychiatry and Neurology", Computational Psychiatry Course, Zurich, Switzerland, 12/10/15
- "Probing for informativeness on latent states in value-based decision making", International symposium on Prediction and Decision Making, Tokyo Japan, 11/1/15

- “Linking levels of analysis in computational models of corticostriatal function”, Methods in Computational Neuroscience summer school, Marine Biology Lab, Woodshole MA, 8/19/15
- “Interactive effects of striatal dopamine on\\ reinforcement learning and choice incentive”, Gordon Research Conference on Catecholamines, Sunday River Maine, 8/10/15
- Strungmann Forum on Computational Psychiatry, Frankfurt Germany, 6/28/15-7/3/15
- “Dopamine, reward prediction error and action selection: Is there a connection?” workshop on Computational Properties of Prefrontal Cortex, Bethesda, MD, 5/15/15
- “Probing for information about latent states during reinforcement learning”, Neurocuriosity workshop, INRIA, Bordeaux, France, 11/7/14
- “Generalization and transfer during latent structure learning”, Computational Properties of Prefrontal Cortex Workshop, Whistler, BC, Canada, 10/4/14
- “Frontal control over striatal learning and choice”, workshop on basal ganglia structure and function, Organization for Computational Neurosciences, Quebec City, Canada, 7/31/14
- “Generalization and transfer in structure learning”, workshop on Engineering and Reverse Engineering Reinforcement Learning, Massachusetts Institute of Technology, 7/18/14
- “Cognitive control over learning and action in frontostriatal circuits”, Dresden Spring School on Cognitive-Affective Neuroscience, Technical University of Dresden, Dresden Germany, 3/14/14
- “Model-based cognitive neuroscience approaches to computational psychiatry: clustering and classification”, Computational and Systems Neuroscience (CoSyne) meeting, Snowbird UT, 3/4/14
- “Interactive dynamics of corticostriatal circuits in reinforcement and motor learning”, Sackler Winter Conference on Developmental Psychobiology, Cozumel Mexico, 1/7/14
- “EEG and fMRI correlates of dynamic decision parameters during reinforcement learning”, Society for Neuroscience Annual Meeting, San Diego CA, 11/9/13
- “Computational models of aberrant learning and decision making in disease states”, Computational Psychiatry conference, Miami ,FL, 10/2/13
- “Control over learning and action in corticostriatal circuits”, Sackler Summer Institute for Developmental Psychobiology, New York, NY, 7/24/13
- “Linking levels of analysis in computational models of corticostriatal function”, The Third International Symposium on "The Biology of Decision Making”, Paris France 5/29/13
- “Computational models of dopamine in learning and choice incentive”, Dopamine 2013, Alghero Italy, 5/24/13
- “Opponent processes for learning and action in frontostriatal circuits”, Meeting on dissection of direct and indirect pathways in Huntington’s Disease, CHDI Foundation, Princeton NJ, 5/9/13
- “Cognitive control over learning and action in corticostriatal circuits”, Mechanisms of Motivation, Cognition and Aging Interactions, Washington DC, 5/3/13
- “Linking levels of analysis in neurocomputational models of reinforcement learning”, Swartz symposium on Neural Circuits for Decision Making and Reinforcement Learning, Yale University, New Haven CT, 4/12/13
- “Prefrontal and striatal contributions to reinforcement learning”, 3rd International Conference on Applications of Neuroimaging to Alcoholism, Yale University, New Haven CT, 2/18/13
- “Linking levels of analysis in computational models of corticostriatal function”, Mathematical Biosciences Institute, workshop on Cognitive Neuroscience, Columbus OH, 12/11/12
- “Neurogenetic modulators of reinforcement and motor learning parameters”, Plenary Lecture, Translational Computational Motor Control meeting, New Orleans LA, 10/12/12
- “Neurogenocomputomics”, Special Symposium on Neural Foundations of Reinforcement Learning, Society for Neuroeconomics annual meeting, Key Biscayne Florida, 9/29/12
- “Interactive dynamics in corticostriatal circuits: Linking levels of computation and implications for psychiatry”, **keynote lecture**, MPS-UCL Symposium and Advanced Course on Computational Psychiatry and Ageing Research, Ringberg Castle, Bavaria, Germany 9/21/12
- "Striatal contributions to learning and choice in rodents, humans and computational models", in workshop on the Striatum, Gatsby Computational Neuroscience Unit and Sainsbury Wellcome Centre for Neural Circuits and Behaviour, London England, 5/24/12
- "Modeling decision-making deficits in fronto-striatal disorders", symposium on Computational Psychiatry, Neuroinformatics world congress, Boston MA, 9/4/11
- "Frontal control over basal ganglia in reinforcement learning and decision-making",
- Summer Institute on Cognitive Neuroscience, Santa Barbara CA, 6/29/11

- "Mechanisms of motivated action selection and inhibition in frontal cortex and basal ganglia". Cognitive Science Center Amsterdam, Summer Institute on Cross-Disciplinary Approaches to Impulsivity and the Inhibition of Thought and Action, Amsterdam, 6/20/11
- "Interactions Between Frontal Cortex and Basal Ganglia in Volitional Control", young investigator award lecture, Cognitive Neuroscience Society annual meeting, San Francisco CA, 4/4/2011
- "Frontal-subthalamic regulation of decision threshold", workshop on Neural Circuits of Decision-Making, Janelia Farm Research Campus, Ashburn VA, 3/8/11
- "The Role of Dopamine in Learning and Decision Making", invited address, 'Neuroscience for Social Scientists' workshop on the Foundations of Neuroeconomics, Society for Neuroeconomics annual meeting, Evanston IL, 10/15/10
- "Frontal-Subthalamic Regulation of Decision Threshold in Parkinson's Disease", Swartz Symposium on Computational Psychiatry, Yale University, 9/23/10
- "Frontal-Subthalamic Regulation of Decision Processes in Parkinson's Disease", Gordon Research Conference on the Neurobiology of Cognition, Waterville Valley NH 8/5/10
- "Neurogenetic and pharmacology of learning and executive control over learning", Symposium on dopamine and human decision making (R. Cools and M. Ullsperger, chairs), Federation of European Neurosciences annual meeting, Amsterdam, the Netherlands, 7/7/10
- "Hierarchical reinforcement learning in corticostriatal circuits", Motivation and Cognitive Control workshop, Oxford, UK, 6/4/10
- "Pharmacological and genetic modulation of decision making in corticostriatal circuits", plenary symposium, Society for Biological Psychiatry, New Orleans, LA, 5/21/10
- "Neurogenetic influences on learning and executive control over learning", symposium on dopamine and adaptive memory (D. Shohamy chair), Cognitive Neuroscience Society annual meeting, Montreal Canada, 4/20/10
- "Corticostriatal interactions in reinforcement-based decision making: Multiple levels of modeling", UK Neuroinformatics Node Congress, Edinburgh, UK, 2/2/10
- "Neurogenetic influences on learning from experience and executive control over learning", Genetic and Experiential Influences on Executive Function meeting, Boulder CO, 1/16/10
- "Dopamine, reward processing, and decision making in aging", Aging, Motivation and Addiction meeting sponsored by NIDA and NIA, Washington DC, 10/5/09
- "Hierarchical cognitive control in prefrontal-basal ganglia circuits", symposium on computational modeling (K Norman chair), Memory Disorders Research Society, Chapel Hill NC, 9/25/09
- "Neurocomputational models of reinforcement learning: Implications for Parkinson's disease, pharmacology and genetic". Gordon Research Conference on Catecholamines, Biddeford ME 8/12/09
- "Neurocomputational models of learning and decision making: Mutiple levels of analysis". **keynote address,** Mathematical Psychology annual meeting, Amsterdam, The Netherlands, 8/2/09
- "Fronto-subthalamic interactions in high conflict decisions and response inhibition: Computational and empirical studies", Symposium on neurocomputational models of speeded decision making (R Bogacz chair), Mathematical Psychology annual meeting, Amsterdam, The Netherlands, 8/2/09
- "Computational neuroscience and empirical studies of reinforcement learning", *1st* Annual NIMH-Sponsored Brain Camp, Cold-Spring Harbor, NY, 5/2/09
- "The neurogenetics of exploration vs exploitation: Prefrontal and striatal dopaminergic components", workshop on Computational Role of Dopamine, (B Averbeck and M Frank, chairs) Computational and Systems Neuroscience (COSYNE) meeting, Snowbird UT, 3/2/09
- "Neurocomputational and Genetic Components to Exploration vs Exploitation", symposium on mesocorticolimbic interactions in health and disease (A Gruber chair), Winter Conference on Brain Research, Copper Mountain Colorado, 1/29/09
- "Fronto-subthalamic interactions in high conflict decisions and response inhibition: Computational and empirical studies", Symposium on the subthalamic nucleus (C Baunez chair), Winter Conference on Brain Research, Copper Mountain Colorado, 1/27/09
- "Temporal Integration of Expected Utility: Neurocomputational and Genetic Components", Open Problems in Neuroscience of Decision Making, Okinawa, Japan, 10/16/08
- "Neurogenocomputomics", symposium on Neuromodulation of Lifespan Cognition, International Congress of Psychology, Berlin, Germany, 7/21/08
- "Neurogenocomputomics", symposium on Computational Psychiatry, Lisbon, Portugal, 5/30/08
- Interactive dynamics of corticostriatal circuits in behavioral adjustment", Workshop on "Action monitoring and behaviour adjustment", RWTH Aachen University, Aachen Germany, 3/15/08
- "Interactive dynamics of corticostriatal circuits in reinforcement learning and decision making",

- Sustaining Performancs Under Stress Symposium, University of Texas at Austin, Austin TX, 12/6/2007.
- "Simulating dynamics between frontal cortex and subthalamic nucleus in high-conflict decisions and response inhibition", workshop on Translational Aspects of Stopping Movement and Action, UCSD, San Diego CA, 11/2/2007
- "Neurocomputational models of frontostriatal function and dysfunction", Symposium on Computational Models of Biological Psychiatry, Computational Cognitive Neuroscience Conference, San Diego, CA, 11/1/2007
- "Dynamics of frontal cortex and subthalamic nucleus in high-conflict decisions and response inhibition", workshop on neural mechanisms of stochastic decision making, Ohio State University, Columbus, OH, 9/11/2007.
- "Interactive dynamics of corticostriatal circuits in reinforcement learning and decision making", in K. Gurney (Chair), "*Computational Models of the Basal Ganglia: From Molecules and Membranes to Behaviour and Cognition*". Symposium conducted at the 9th Triennial Meeting of the International Basal Ganglia Society, 9/6/2007
- "Dopamine and reward calculation", Charité conference on Emotional Neuroscience, Berlin, Germany, 9/1/2007
- "Interactive dynamics of striato-cortical circuits in reinforcement learning and decision making", in C. Holroyd (Chair) *"The Cognitive Neuroscience of Decision Making".* **President's Symposium,** Canadian Society for Brain, Behaviour and Cognitive Science, Victoria, BC, 6/16/2007
- "Interactive dynamics of striato-cortical circuits in reinforcement learning and decision making", Perceptual Expertise Network meeting, Yale University, 4/20/07
- "The computational roles of dopamine in reinforcement learning and decision making". in J. Cohen (Chair) *"Has Reinforcement Learning Come of Age?"* Symposium conducted at the Psychonomic Society Annual Meeting, Houston TX, 11/17/06
- "Evidence for a dynamic computational role of the subthalamic nucleus in decision making", in B. Knutson (Chair) "*Motivation and Emotion: Decision-Making*" Symposium, Society for Neuroscience Annual Meeting, Atlanta Georgia, 10/15/06.
- "Interactive dynamics of striato-cortical circuits in reinforcement learning", workshop on the Role of Medial Frontal Cortex in Cognitive Control and Performance Monitoring, Amsterdam, the Netherlands, 6/10/2006
- "Dynamic Dopamine Modulation of Striato-cortical Circuits in Reinforcement learning and Decision Making", Betty Behrens Symposium on Neural Mechanisms for Regulating Behaviour, University of Cambridge, Cambridge, UK, 8/4/2005.
- "When and When Not to Use Your Subthalamic Nucleus: Lessons from a Computational Model of the Basal Ganglia", International workshop on Models of Natural Action Selection, Edinburgh, Scotland, 7/30/2005.
- "Computational Perspectives on Schizophrenia: Dysfunctional Dopamine Modulation of Striato-Cortical Circuits", Cold Spring Harbor Laboratory workshop on schizophrenia and related disorders, Cold Spring Harbor, New York, 7/16/2005.
- "Computational Models of Striato-Cortical Circuits in Cognition: Recent Advances and Converging Emprical Evidence." workshop on Basal Ganglia, Dopamine and Learning: Integrating Computational and Clinical Perspectives in Jerusalem, Israel, 6/29/2005.
- "Modeling Cognitive Deficits in Medicated and Non-medicated Parkinson's Disease." Cognitive Neuroscience of Category Learning conference, New York, NY, 10/10/2004.
- "Basal Ganglia and Dopamine in Cognition: Network Models and Behavioral Studies." John Merck Fund Summer Institute for the Biology of Developmental Disabilities, Princeton University, 7/22/2004.

***Media Coverage*:**

- For various news articles see http://ski.clps.brown.edu/inthenews.html
- Guest on Science Magazine Podcast, 10/26/07 http://podcasts.aaas.org/science_podcast/SciencePodcast_071026.mp3
- Guest on National Public Radio (NPR) "Science Friday" 7/24/09 http://www.sciencefriday.com/program/archives/200907244
- Guest on BBC Radio 5 live Drive, 4/20/11
- Guest on New Hampshire Public Radio (NHPR) "Word of Mouth" 10/3/11 http://www.nhpr.org/your-brain-pause
- Guest on *National Public Radio (NPR) "All Things Considered", 8/5/13*

- Guest on podcasts (2019-21): "*Computing Up", "CogNation", "Watercooler Neuroscience"*

## ***Professional Activities*:**

### ***Editorial***
- Senior Editor, *eLife,* 2017 - present
- Review Editor, *eLife,* 2015 – 2017
- Associate Editor, *Journal of Neuroscience,* 2015 – 2018
- Associate Editor, *Behavioral Neuroscience,* 2014 – 2020
- Consulting Editor, *Psychological Review,* 2015-2020
- Contributing Editor, *European Journal of Neuroscience*, 2008-2018
- Consulting Editor, *Journal of Mathematical Psychology*, 2010-2014
- Guest editor, *Cognition* special issue on Reinforcement Learning, 2009
- Guest editor, *Biological Psychiatry,* special issue on Computational Psychiatry, 2017
- External action editor, *PLoS Biology* 2016; JExp Psych 2013

### ***Reviewing (Grants)***
- NIDA Board of Scientific Counselors, 2020-present
- NIMH Reviewer Interventions/Biomarkers panel, 2016, 2017
- NIH Reviewer Integrative, Functional and Cognitive Neuroscience panel 2012, 2013
- NSF Review Panel, 2016
- NSF Proposal Reviewer, ad-hoc
- Agence National de la Recherche (French National Agency)
- Biotechnology and Biological Sciences Research Council
- NWO (Netherlands Organisation for Scientific Research)
- Neurological Foundation of New Zealand
- NSERC Discovery Grants (Canada)
- Parkinson's Disease Society of the UK
- Swiss National Science Foundation
- The Wellcome Trust
- UK Economic and Social Research Council

### ***Reviewing (Publications; ad-hoc)***
*American Journal of Psychiatry, Behavioral and Brain Sciences, Behavioural Brain Research, Behavioural Processes, Biological Psychiatry, Brain, Brain and Cognition, Brain and Language, Brain Research, Cerebral Cortex, Cognition, Cognitive Affective and Behavioral Neuroscience, Cambridge Handbook on Communications Physics, Computational Cognitive Modeling, Clinical Psychological Science, Current Biology, eLife, European Journal of Neuroscience, Handbook of Basal Ganglia Structure and Function, Hippocampus, International Journal of Neuropsychopharmacology, International Journal of Psychophysiology, JAMA Psychiatry, Journal of Cognitive Neuroscience, Journal of Computational Neuroscience, Journal of Experimental Psychology: General, Journal of Neurology, Journal of Neurophysiology, Journal of Neuroscience, Learning & Memory, Memory & Cognition, Movement Disorders, Nature, Nature Communications, Nature Human Behaviour, Nature Neuroscience, Neural Computation, Neural Networks, Neurobiology of Aging, NeuroImage, Neuron, Neuropsychologia, Neuroscience & Biobehavioral Reviews, Perception & Psychophysics, Proceedings of the National Academy of Sciences (PNAS), Psychological Review, Psychological Science, Psychonomic Bulletin & Review, Psychopharmacology, PLoS Biology, PLoS Computational Biology, PloS ONE, Science, Science Advances, Topics in Cognitive Science, Translational Psychiatry, Trends in Cognitive Sciences*

### ***Professional Service***
- Director, Carney Center for Computational Brain Science, Brown U, 2020 – present
- Director, Initiative for Computation in Brain and Mind, Brown U, 2012-2019
- Local co-chair, Multidisciplinary Conference on Reinforcement Learning and Decision Making Brown University 2021/22
- Diversity and Inclusion Subcommittee on community engagement in public schools, 2020-
- Associate Chair of Graduate Studies, Cognitive, Linguistic & Psychological Sciences 2017

- Organized and lectured at week-long summer workshops on Methods of Computational Modeling for Brain and Behavior, Brown University, 2017 – present
- Program Committee, International Convention of Psychological Science, 2013-15
- Program committee, Multidisciplinary Conference on Reinforcement Learning and Decision Making: Princeton 2013, Alberta 2015, Ann Arbor 2017, Montreal 2019
- Program Committee, Collaborative Research on Computational Neuroscience (CRCNS) conference, Brown University 2017
- Cognitive Neuroscience Society Young Investigator Award Committee, 2015-present
- Co-organized first Computational Psychiatry Conference, Miami FL. 10/22–23, 2013
- Co-organized computational psychiatry workshop satellite to Biological Psychiatry conference, San Diego CA 5/17/17
- Co-organized workshop "Towards an objective function for computational psychiatry", The Banbury Center, Cold Spring Harbor Lab, Feb3-6, 2019
- Organized symposium on "Computational models of basal ganglia physiology and function", International Basal Ganglia Society, Eilat Israel, 3/5/2013
- Co-chair in symposium on "Individual Differences in Dopamine Signaling: Role in Learning, Risk Taking, and Impulsivity", Dopamine 2013, Alghero Italy, 5/24/13
- Co-organized workshop on "The computational role of dopamine", Computational and Systems Neuroscience (Cosyne 2009), Snow Bird Utah, 3/2/2009
- Organized symposium on "Computational models of biological psychiatry" at the Computational Cognitive Neuroscience Conference, San Diego, 11/2/2008
- Provide assistance to researchers using neural modeling software for simulating basal ganglia interactions in learning and associated neurological dysfunction (2005 – present)
- Panel member, Cognitive Neuroscience Treatment Research for Improving Cognition in Schizophrenia (CNTRICS)
- Participated in Deep Brain Stimulation (DBS) Consensus Conference to provide recommendations for patients with medically intractable Parkinson disease to patients and physicians. Advised on cognitive disturbances of medication and DBS. 4/2 – 4/3, 2009, New York, NY.
- Academic Advisor for freshman students, Brown University, 2010-2012

### *Teaching*

- Computational Cognitive Neuroscience, 2007- present
- Doing Bayesian Data Analysis 2013
- Mechanisms of Motivated Decision making, Spring 2011, 2017, 2022
- Cognitive Control Functions of the Prefrontal Cortex, Spring 2010
- Reinforcement Learning, graduate seminar, Fall 2007
- Seminar on Computational Approaches to Cognitive Neuroscience, Fall 2006
- Computational Cognitive Functions of the Prefrontal Cortex, graduate seminar, Spring 2006

*Guest Lecturer* (recurring)

- Systems Neuroscience
- Advanced Cognitive Neuroscience
- Foundations in Cognitive Psychology
- Neural Dynamics
- Cognition core graduate course

### *Supervision (current)*

*Postdoctoral advisor*

- Rachel Ratz-Lubachevsky, 2018 – present
- Rex Liu, 2019 – present
- Alexander Fengler, 2023 – present
- Nadja Ging-Jehli, 2022 – present
- Jake Russin, 2023 – present
- Amin Zand Vakili, co-mentor, Advance-CTR award, 2018-present
- Sarah Thomas, co-mentor, Advance-CTR award, 2019-present

*PhD advisor*

- Krishn Bera, 2021 – present
- Alana Jaskir, 2018 – present
- Guillaume Pagnier (co-mentor) 2018 – present
- Aneri Soni, 2019 – present

**Supervision (completed)**

*Postdoctoral advisor*

- Andrew Westbrook, 2016 – 2023, now Asst Prof, Rutger's University
- Peter Hitchcock, 2019 – 2023, now Asst Prof, Emory University
- Andra Geana, 2016 – 2023, now Asst Prof, Providence College
- Cristian Buc Calderon, 2019 – 2021, now PI at National Center for AI, Santiago Chile
- Arif Hamid, 2016 – 2021, now Asst Prof University of Minnesota
- Matthew Nassar, 2013 – 2018, mentor for K99/R00, now Asst Prof Brown U
- Mads Pedersen, postdoctoral 2017 – 2019, now postdoc U Oslo
- Anne Collins, 2010 – 2015, now Assoc Prof UC Berkeley
- Daniel Dillon, co-mentor for K99/R00, 2012- 2014 now Assoc Prof McLean Hospital, Harvard
- Nathan Vierling-Claasen, 2013 – 2016, now data scientist Wayfair
- Jim Cavanagh, 2010 – 2014, now Assoc Prof U New Mexico
- Michael X. Cohen, 2008-2009, now Assoc Prof, Donders Center for Neuroscience (Netherlands)
- Ahmed Moustafa, 2006-2007, now Assoc Prof Univ W Sydney Australia

*PhD advisor*

- Alexander Fengler, 2018-2022, now postdoc at Brown U
- Daniel Scott, 2016 – 2022, now postdoc at Brown U
- Harrison Ritz (co-mentor), graduate student, 2016 – 2022 , now postdoc at Princeton
- Amrita Lamba (co-mentor), 2016 – 2023, now postdoc at MIT
- Lucas Lehnert (co-mentor with Michael Littman), 2018 – 2021, now Asst Prof at U Saskatchewan
- Nicholas Franklin, 2011 – 2017, now data scientist HyperScience
- Prannath Moolchand (co-mentor with Dr. Stephanie Jones), 2012 – 2019, now postdoc U Sydney
- Jeff Cockburn, 2009 – 2015, now postdoc CalTech
- Thomas Wiecki, 2010 – 2014, VP of data science at Quantopian Inc; Founder, PyMC labs
- Bradley Doll, 2006-2011, now senior data scientist, Spotify
- Jim Cavanagh, Ph.D. co-advisor, 1/07 – 8/10, now Assoc Prof U. New Mexico

## *Other Work Experience:*

**Prediction Company** Santa Fe, New Mexico
June 2001 - June 2003 (consultant office in Boulder, CO)
Software Developer and Research Consultant

- Designed and developed neural network software for detecting stock market patterns

**Uniden San Diego R&D Center** San Diego, CA
October 1997- August 1998
Staff engineer

- Systems Integration and Test Engineer, hardware and software design for cellular phone.

**Montreal Neurological Institute** Montreal, Quebec
May 1996 - August 1996
Biomedical engineering research assistant

- Developed software to manipulate magnetic resonance images (MRI) for analysis of epileptic brain anatomy and to map electroencephalogram (EEG) activity on the MR images.

***Personal Information*:**

Born: November 22, 1974 in Montreal, Quebec, Canada

## *Full Publication List*

Ging Jehli, N.R.[*], Kuhn, M.[*] , Blank, J.M., Chanthrakumar, P., Steinberger, D.C., Yu, Z., Herrington, T.M., Dillon, D.G., Pizzagalli, D.A.[**] & Frank, M.J.[**] (in press). Cognitive signatures of depressive and anhedonic symptoms, and affective states, using computational modeling and neurocognitive testing. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*. [*]co-first authors; [**]co-senior authors.

Pagnier, G., Asaad, W.F. & Frank, M.J. (2024). Double dissociation of dopamine and subthalamic nucleus stimulation on effortful cost/benefit decision making. *Current Biology* 34, 665-660

Hitchock, P.F. & Frank, M.J. (in press). From Tripping and Falling to Ruminating and Worrying: A Meta-Control Account of Repetitive Negative Thinking. *Current Opinion in Behavioral Sciences*

Culbreth, A.J., Moran E.K., Mahaphanit, W., Erickson M.A., Boudewyn, M.A., Frank M.J., Barch, D.M., MacDonald III, A.W., Ragland , J.D., Luck, S.J., Silverstein S.M., Carter C.S., Gold, J.M. (in press). A Transdiagnostic Study of Effort-Cost Decision-Making in Psychotic and Mood Disorders. *Schizophrenia Bulletin*

Jaskir, A. & Frank, M.J. (2023). On the normative advantages of dopamine and striatal opponency for learning and choice. *eLife 12:e*85107

Rac-Lubashevksy, R., Cremer, A., Collins, A.G.E., Frank, M.J.* & Schwabe, L* (2023). Neural index of reinforcement learning predicts improved stimulus-response retention under high working memory load. *Journal of Neuroscience* 43(17):3131–3143 *co-senior authors

Rouhani, N., Niv, Y., Frank, M.J. & Schwabe, L. (2023). Multiple routes to enhanced memory for emotionally relevant events. *Trends in Cognitive Sciences*

Liu, R.G. & Frank, M.J. (2022). Hierarchical clustering optimizes the tradeoff between compositionality and expressivity of task structures for flexible reinforcement learning. *Artificial Intelligence* 312, 103770

Scott, D. & Frank, M.J. (2023). Adaptive control of synaptic plasticity integrates micro- and macroscopic network function. *Neuropsychopharmacology* **48**, 121–144

Culbreth, A.J., Schwartz, E.K., Frank, M.J., Brown, E.C., Xu., Z., Chen, S., Gold, J.M. & Waltz, J.A. (2023). A computational neuroimaging study of reinforcement learning and goal-directed exploration in schizophrenia spectrum disorders. *Psychological Medicine.*

Hitchcock, P., Britton,W., Mehta, K. & Frank, M.J. (2022) Self-judgment Dissected: A Computational Modeling Analysis of Self-Referential Processing and its Relationship to Trait Mindfulness Facets and Depression Symptoms. *Cognitive, Affective and Behavioral Neuroscience*

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