

Curriculum Vitae

1. Name, position, academic department(s)

Michael J. Frank

Professor

Primary appointment: Dept of Cognitive, Linguistic and Psychological Sciences

Secondary appointment: Dept of Psychiatry and Human Behavior

Director, Initiative for Computation in Brain and Mind, Brown Institute for Brain Science

Associate Chair of Graduate Studies, Cognitive, Linguistic & Psychological Sciences July 2017 – January 2018

Trainer, Graduate program in Neuroscience

2. Home address

114 Morris Ave

Providence RI

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3. Education

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

Pure and Applied Science, Marianopolis College, Montreal, Canada, 1996

4. Professional appointments

1996-97	<i>Biomedical Engineering Consultant</i> , Montreal Neurological Institute, Montreal QC
1997-98	<i>Staff Electrical Engineer</i> , Uniden San Diego R&D Center, San Diego CA
2001-03	<i>Artificial Intelligence Software Consultant</i> , Prediction Company, Santa Fe, NM
2000-04	<i>Interdisciplinary Neuroscience Program</i> , University of Colorado Boulder CO
2005	<i>Postdoctoral Fellow</i> , Department of Psychology, Center for Neuroscience, University of Colorado
2006-08	<i>Assistant Professor</i> , Department of Psychology, Program in Neuroscience, University of Arizona
2009-11	<i>Assistant Professor</i> , Department of Cognitive, Linguistic and Psychological Sciences, Dept of Psychiatry & Human Behavior, Brown Institute for Brain Science, Brown University
2011-13	Visiting Scholar, University of Amsterdam, The Netherlands
2011-16	<i>Associate Professor</i> , Department of Cognitive, Linguistic and Psychological Sciences, Dept of Psychiatry & Human Behavior, Brown Institute for Brain Science, Brown University
2016 -	<i>Professor</i> , Department of Cognitive, Linguistic and Psychological Sciences, Dept of Psychiatry & Human Behavior, Brown Institute for Brain Science, Brown University

5. Completed Publications

- *Citation indices (from Google Scholar <http://scholar.google.com/citations?user=f-xyFpUAAAAJ>):*
Total citations: 16,859; h-index: 67; i10-index: 121

a. Books

O'Reilly, R. C., Munakata, Y., Frank, M. J., Hazy, T. E., and Contributors (2012). *Computational Cognitive Neuroscience*. Wiki Book, 1st and 2nd Editions. URL:<http://ccnbook.colorado.edu>

b. Book chapters:

1. Doll, B.B. and Frank, M.J. (2009). The basal ganglia in reward and decision making: Computational models and empirical studies. Chapter in J.-C. Dreher and L. Tremblay, eds, *Handbook of Reward and Decision Making*, Oxford:Academic Press, pp. 399-425.
2. Cockburn, J. and Frank, M.J. (2011). Reinforcement learning, conflict monitoring and cognitive control: An integrative model of cingulate-striatal interactions and the ERN. Chapter in R. Mars, J. Sallet, M. Rushworth, and N. Yeung. (eds), *Neural Basis of Motivational and Cognitive Control*, MIT Press, pp. 311-331.
3. Frank, M.J., Scheres, A. & Sherman, S.J. (2012). Understanding decision making deficits in neurological conditions: Insights from models of natural action selection. Chapter in Seth, A., Prescott, T., & Bryson, J., eds, *Modeling Natural Action Selection*, Cambridge University Press, pp330-362.
4. Hazy, T., Frank, M.J., & O'Reilly, R.C. (2012). Towards an executive without a homunculus: Computational models of the prefrontal cortex/basal ganglia system. Chapter in Seth, A., Prescott, T., & Bryson, J., eds, *Modeling Natural Action Selection*, Cambridge University Press, pp239-263.
5. Frank, M.J. (2015). Linking across levels of computation in model-based cognitive neuroscience. In Forstmann, B. U. & Wagenmakers, E.-J., eds. *An introduction to model-based cognitive neuroscience*. Springer, pp 163-181.
6. Frank, M.J. (2016). Computational cognitive neuroscience approaches to deconstructing mental function and dysfunction. In: Computational Psychiatry: New Perspectives on Mental Illness, ed. A. D. Redish and J. A. Gordon. Strüngmann Forum Reports, vol. 20, J. Lupp series editor. Cambridge, MA: MIT Press.
7. Kurth-Nelson, Z., O'Doherty, J. P., Barch D. M., Denève, S., Durstewitz, D., Frank, M.J., Gordon, J.A., Mathew, S. J., Niv, Y., Ressler, K. & Tost, H. (2016). Computational Approaches for Studying Mechanisms of Psychiatric Disorders. In: Computational Psychiatry: New Perspectives on Mental Illness, ed. A. D. Redish and J. A. Gordon. Strüngmann Forum Reports, vol. 20, J. Lupp series editor. Cambridge, MA: MIT Press.
8. Bhandari, A., Badre, D. & Frank, M.J. (2017). Learning cognitive control. Chapter in Egner, T. ed. *The Wiley Handbook of Cognitive Control*, John Wiley & Sons Ltd. Chichester, West Sussex, UK pp 376-391
9. Albrecht, M.A., Waltz, J.A., Frank, M.J. & Gold, J.M. (2018). Modeling negative symptoms in schizophrenia. Chapter in Anticevic, A., Murray, J.D. Eds. *Computational Psychiatry: Mathematical Modeling of Mental Illness*, Elsevier, Academic Press, pp219-246.

c. Refereed journal articles:

1. Frank, M.J, Loughry, B. and O'Reilly, R.C. (2001). Interactions between the frontal cortex and basal ganglia in working memory: A computational model. *Cognitive, Affective, and Behavioral Neuroscience*, 1, 137-160.
2. Frank, M.J., Rudy, J.W., & O'Reilly, R.C. (2003). Transitivity, flexibility, conjunctive representations and the hippocampus: II: A computational analysis. *Hippocampus*, 13, 299-312.
3. Frank, M.J., Seeberger, L.C. and O'Reilly, R.C. (2004). By carrot or by stick: Cognitive reinforcement learning in Parkinsonism. *Science*, 306, 1940-3.
 ** Evaluated on *Faculty of 1000 Biology*, 12/23/04, <http://f1000biology.com/article/id/1006460/evaluation>
4. Atallah, H., Frank, M.J. & O'Reilly, R.C (2004). Hippocampus, cortex and basal ganglia: Insights from computational models of complementary learning systems. *Neurobiology of Learning and Memory*, 82/3, 253-67.

5. Frank, M.J. (2005). Dynamic dopamine modulation in the basal ganglia: A neurocomputational account of cognitive deficits in medicated and non-medicated Parkinsonism. *Journal of Cognitive Neuroscience*, *17*, 51-72.
6. Frank, M.J., Worocho, B.S. & Curran, T. (2005). Error related negativity predicts reinforcement learning and conflict biases. *Neuron*, *47*, 495-501.
7. Frank, M.J., Rudy, J.W., Levy, W.B. & O'Reilly, R.C. (2005). When logic fails: Implicit transitive inference in humans. *Memory & Cognition*, *33*, 742-750.
8. Frank, M.J. (2005). When and when not to use your subthalamic nucleus: Lessons from a computational model of the basal ganglia. *Modelling Natural Action Selection: Proceedings from an International Workshop*, 53-60.
9. Hazy, T., Frank, M.J. & O'Reilly, R.C. (2006). Banishing the homunculus: Making working memory work. *Neuroscience*, *139*, 105-118.
10. 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.
11. Frank, M.J. & Claus, E.D. (2006). Anatomy of a decision: Striato-orbitofrontal interactions in reinforcement learning, decision making and reversal. *Psychological Review*, *113*, 300-326.
12. Frank, M.J., O'Reilly, R.C. & Curran, T. (2006). When memory fails, intuition reigns: Midazolam enhances implicit inference in humans. *Psychological Science*, *17*, 700-707.
13. Frank, M.J. & O'Reilly, R.C. (2006). A mechanistic account of striatal dopamine function in human cognition: Psychopharmacological studies with cabergoline and haloperidol. *Behavioral Neuroscience*, *120*, 497-517.
14. Frank, M.J. (2006). Hold your horses: A dynamic computational role for the subthalamic nucleus in decision making. *Neural Networks*, *19*, 1120-1136
15. O'Reilly, R.C., Frank, M.J., Hazy, T.E. & Watz, B. (2007). PVLV: The Primary Value and Learned Value Pavlovian Learning Algorithm. *Behavioral Neuroscience*, *121*, 31-49.
16. 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*, 1641-1654.
17. Hazy, T., Frank, M.J. & O'Reilly, R.C. (2007). Toward an executive without a homunculus: Computational models of the prefrontal cortex/basal ganglia system. *Philosophical Transactions of the Royal Society-B*, *362*, 1601-1613.
18. Waltz, J.A., Frank, M.J., Robinson, B.M. & Gold, J.M. (2007). Selective reinforcement learning deficits in schizophrenia support predictions from computational models of striatal-cortical dysfunction. *Biological Psychiatry*, *62*, 756-764.
** Commentary by Carter, C. *Biological Psychiatry* *62*:709-710
19. Frank, M., Santamaria, A., O'Reilly, R. & Willcutt, E. (2007). Testing computational models of dopamine and noradrenaline dysfunction in Attention Deficit/Hyperactivity Disorder. *Neuropsychopharmacology*, *32*, 1583-1599
20. Aron, A.R., Behrens, T.E., Smith, S., Frank, M.J. & Poldrack, R.A. (2007). Triangulating a cognitive control

network using diffusion-weighted MRI and functional MRI. *Journal of Neuroscience*, 27, 3743-3752.

21. Frank, M.J., D'Lauro, C. & Curran, T. (2007). Cross-task individual differences in error processing: Neural, electrophysiological and genetic components. *Cognitive, Affective and Behavioral Neuroscience* 7, 297-308.
22. Frank, M.J., Moustafa, A.A., Haughey, H., Curran, T. & Hutchison, K. (2007). Genetic triple dissociation reveals multiple roles for dopamine in reinforcement learning. *Proceedings of the National Academy of Sciences* 104, 16311-16316.
** Evaluated on *Faculty of 1000 Biology*, 12/13/07 <http://f1000biology.com/article/id/1097278/evaluation>
23. Pizzagalli D.A., Evins A.E., Schetter E.C., Frank M.J., Pajtas P.E., Santesso D.L., & Culhane M. (2008) Single dose of a dopamine agonist impairs reinforcement learning in humans: Behavioral evidence from A laboratory-based measure of reward responsiveness. *Psychopharmacology*, 196, 221-232.
24. Frank, M.J., Samanta, J., Moustafa, A.A. & Sherman, S.J. (2007). Hold your horses: Impulsivity, deep brain stimulation and medication in Parkinsonism. *Science*, 318, 1309-1312.
** Science news of the week: "Two Therapies Release Different Brakes on Impulsive Behavior", *Science*, 318:553
** Evaluated on *Faculty of 1000 Medicine*, 1/25/08 & 1/22/08 <http://f1000medicine.com/article/id/1097828/evaluation>
** "Impulsivity Reported in PD Patients with Deep Brain Stimulators", *Neurology Today* 1/17/08 p10.
25. Frank, M.J., O'Reilly, R.C. and Curran, T. (2008). Midazolam, hippocampal function, and transitive inference: Reply to Greene. *Behavioral and Brain Functions*, 4:5.
26. Frank, M.K. & Kong, L. (2008). Learning to avoid in older age. *Psychology and Aging*, 23:392.
27. Moustafa, A.A., Sherman, S.J. and Frank, M.J.(2008). A dopaminergic basis for working memory, learning, and attentional shifting in Parkinsonism. *Neuropsychologia* 46:3144.
28. Moustafa, A. A., Cohen, M. X., Sherman, S. and Frank, M.J.*(2008). A role for dopamine in temporal Decision making and reward maximization in Parkinsonism. *Journal of Neuroscience*, 28:12294.
29. Frank, M.J. (2008). Schizophrenia: A computational reinforcement learning perspective. *Schizophrenia Bulletin*, 34:1008
30. Santesso, D.L., Evins., A.E., Frank, M.J., Cowman Schetter, E.M., Bogdan, R. and Pizzagalli, D.A. (2009). Single dose of a dopamine agonist impairs reinforcement learning in humans: Evidence from event-related potentials and computational modeling of striatal-cortical function. *Human Brain Mapping* 30:1963-76.
31. Cools, R., Frank, M.J., Gibbs, S.E., Miyakawa, A., Jagust, W. & D'Esposito, M. (2009). Striatal dopamine predicts outcome-specific reversal learning and its sensitivity to dopaminergic drug administration. *Journal of Neuroscience*, 29:1538.
32. Cohen, M.X. and Frank, M.J.(2009). Neurocomputational models of basal ganglia function in learning, memory and choice. *Behavioural Brain Research*, 199, 141-156.
33. 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.
34. Doll, B.B., Jacobs, W.J, Sanfey, A.G. & Frank, M.J.(2009). Instructional control of reinforcement learning: A behavioural and neurocomputational investigation. *Brain Research* 1299:74-94.
** Journal cover.

35. Wiecki, T.V., Riedinger, K., Meyerhofer, A., Schmidt, W.J. & Frank, M.J.(2009). A neurocomputational account of catalepsy sensitization induced by D2-receptor-blockade in rats: Context-dependency, extinction, and renewal. *Psychopharmacology* 204, 265-77.
36. Frank, M.J. and Hutchison, K. (2009). Genetic contributions to avoidance- based decisions: Striatal D2 receptor polymorphisms. *Neuroscience* 164:131-140.
37. Gründler, T.O.J., Cavanagh, J.F., Frank, M.J. and Allen, J.J.B. (2009). Task related dissociation in ERN amplitude as a function of obsessive compulsive symptoms. *Neuropsychologia* 47:1978.
38. Ragland, JD, Cools, R., Frank, M.J., Pizzagalli, D.A., Preston, A., Ranganath, C. and Wagner, A.D (2009). Cognitive neuroscience treatment research to improve cognition in schizophrenia (CNTRICS) final task selection: Longterm memory. *Schizophrenia Bulletin*,35, 197-212
39. Chatham, C.H., Frank, M.J. & Munakata, Y. (2009). Pupillometric and behavioral markers of a developmental shift in the temporal dynamics of cognitive control. *Proceedings of the National Academy of Sciences*, 106, 5529-33.
40. Frank, M.J., Doll, B.B, Oas-Terpstra, J. and Moreno, F. (2009). Prefrontal and striatal dopaminergic genes predict individual differences in exploration and exploitation. *Nature Neuroscience* 12:1062-1068.
** *News and views commentary by Sallet & Rushworth, Nature Neuroscience* 12:963-965
41. Hazy, T.E., Frank, M.J. and O'Reilly, R.C. (2010). Neural mechanisms of acquired phasic dopamine responses in learning. *Neuroscience & Biobehavioral Reviews* 34, 701-720
42. Cavanagh, J., Frank, M.J., Klein, T.J., & Allen, J.J.B. (2010). Frontal theta links prediction errors to behavioral adaptation in reinforcement learning. *NeuroImage* 49, 3198-3209
43. Chase, H.W., Frank, M.J., Albert, M., Bullmore, E.T., Sahakian, B.J. & Robbins, T.W. (2010). Approach and avoidance learning in patients with major depression and healthy controls: Relation to anhedonia. *Psychological Medicine* 40, 433-440
44. Strauss, G.P., Robinson, B.M., Waltz, J.A., Frank, M.J., Kasanova, Z., Herbener, E.S., Gold, J.M. (2011). Patients with schizophrenia demonstrate inconsistent preference judgments for affective stimuli. *Schizophrenia Bulletin* 37, 1295-1304.
45. Samson, R.D., Frank, M.J., and Fellous, J.-M. (2010). Computational models of reinforcement learning: Dopamine from synapses to systems. *Cognitive Neurodynamics* 4, 91-105.
46. Cavanagh, J.F., Gruendler, T.O., Frank, M.J., & Allen, J.J.B. (2010). Altered cingulate sub-region activation accounts for task-related dissociation in ERN amplitude as a function of obsessive-compulsive symptoms. *Neuropsychologia* 48, 2098-2109..
47. Wiecki, T.V. and Frank, M.J.(2010). Neurocomputational models of motor and cognitive deficits in Parkinson's disease. *Progress in Brain Research* 183, 275-297.
48. Chang, L.J., Doll, B.B., van 't Wout, M., Frank, M.J. and Sanfey, A.G. (2010). Seeing is Believing: Trustworthiness as a dynamic belief. *Cognitive Psychology* 61, 87-105.
49. Robinson, O.J., Frank, M.J., Sahakian, B.J. and Cools, R. (2010). Dissociable responses to punishment in distinct striatal regions during reversal learning. *NeuroImage* 51, 1459-1467.
50. Cavanagh, J.F., Frank, M.J., & Allen, J.J.B. (2011). Social stress reactivity alters reward and punishment learning. *Social, Cognitive and Affective Neuroscience* 6, 311-320.

51. Waltz, J. A., Frank, M.J., Wiecki, T.V. & Gold, J.M. (2011). Altered probabilistic learning and response biases in schizophrenia: Behavioral evidence and neurocomputational modeling. *Neuropsychology* 25, 86-97.
52. Solomon, M., Frank, M.J., Smith, A.C., Ly, S. and Carter, C.S. (2011). Transitive inference in adults with autism spectrum disorders. *Cognitive, Affective and Behavioral Neuroscience* 11, 437-449.
53. Solomon, M., Smith, A.C., Frank, M.J., Ly, S. and Carter, C.S. (2011). Probabilistic reinforcement learning in adults with autism spectrum disorders. *Autism Research* 4, 109-120.
54. Frank, M.J. and Fossella, J.A. (2011). Neurogenetics and pharmacology of learning, motivation and cognition. *Neuropsychopharmacology Reviews* 36, 133-152.
55. Strauss, G.P.**, Frank, M.J.**, Waltz, J.A., Kasanova, Z., Herbener, E.S., Gold, J.M. (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 (**authors contributed equally to this work).
56. Maia, T.V. and Frank, M.J.(2011). From reinforcement learning models to psychiatric and neurological disorders. *Nature Neuroscience* 14, 154-162.
57. Kasanova Z, Waltz J.A., Strauss G.P., Frank M.J., Gold J.M. (2011). Optimizing vs. matching: Response strategy in a probabilistic learning task is associated with negative symptoms of schizophrenia. *Schizophrenia Research* 127, 215-222.
58. Frank, M.J. (2011). Computational models of motivated action selection in corticostriatal circuits. *Current Opinion in Neurobiology* 21, 381-386.
59. 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.
- ** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
60. Cavanagh J.F., Wiecki, T.V., Cohen, M.X., Figueroa, C., Samanta, J., Sherman, S.J., and Frank, M.J (2011). Subthalamic stimulation reverses mediofrontal influence over decision threshold. *Nature Neuroscience* 14, 1462-67.
- ** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
61. Cavanagh, J.F., Bismark, A., Frank, M.J. and Allen, J.J.B. (2011). Larger error signals in major depression are associated with better avoidance learning. *Frontiers in Cognition* 2, 1-6.
62. Frank, M.J. & Badre, D. (2012). Mechanisms of hierarchical reinforcement in corticostriatal circuits I: Computational analysis. *Cerebral Cortex* 22, 509-526.
63. Badre, D. and Frank, M.J. (2012). Mechanisms of hierarchical reinforcement learning in corticostriatal circuits II: Evidence from fMRI. *Cerebral Cortex* 22, 527-536.
64. Wietzikoski, E.C., Boschen, S.L., Miyoshi, E., Bortolanza, L.M, Frank, M.J., Brandao, M.L., Winn, P., Da Cunha, C. (2012). Roles of D1-like dopamine receptors in the nucleus accumbens and dorsolateral striatum in conditioned avoidance responses. *Psychopharmacology* 219, 159-169.
65. Gold, J.M., Waltz, J.A., Matveeva, T.M., Kasanova, Z., Strauss, G.P., Herbener, E.S., Collins, 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.

66. Ragland, J.D., Cohen, N.J., Cools, R., Frank, M.J., Hannula, D.E., Ranganath, C. (2012). CNTRICS Imaging Biomarkers Final Task Selection: Long-term Memory and Reinforcement Learning. *Schizophrenia Bulletin* 38, 62-72.
67. Cavanagh, J.F., Figueroa, C. M., Cohen, M.X., and Frank, M.J.(2012). Frontal theta reflects uncertainty and unexpectedness during exploration and exploitation. *Cerebral Cortex* 22, 2575-86.
68. Ratcliff, R. and Frank, M.J. (2012). Reinforcement-based decision-making in corticostriatal circuits: Mutual constraints by neurocomputational and diffusion models. *Neural Computation* 24, 1186-1229.
69. Badre, D., Doll, B.B., Long, N.M. and Frank, M.J.(2012). Rostrolateral prefrontal cortex and individual differences in uncertainty-driven exploration. *Neuron* 73, 595-607.
- ** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
70. Collins, A.G.E. and Frank, M.J.(2012). How much of reinforcement learning is working memory, not reinforcement learning? A behavioral, computational, and neurogenetic analysis. *European Journal of Neuroscience* 35, 1024-1035.
71. Whitmer, A., Frank, M.J. and Gotlib, I.H. (2012). Sensitivity to reward and punishment in major depressive disorder: The effect of rumination. *Cognition and Emotion* 26, 1475-85.
72. Jahfari, S., Verbruggen, F., Frank, M.J, Waldorp, L., Colzato, L., Ridderinkhof, K.R., and Forstmann, B. (2012). How preparation changes the need for top-down control of the basal ganglia when inhibiting premature actions. *Journal of Neuroscience*, 32, 10870-8.
73. Lighthall, N., Gorlick, M. A., Schoeke, A., Frank, M. J. and Mather, M. (2013). Stress modulates reinforcement learning in younger and older adults. *Psychology & Aging* 28, 35-46
74. Collins, A.G.E & Frank, M.J.(2013). Cognitive control over learning: Creating, clustering and generalizing task-set structure. *Psychological Review*, 120, 190-229.
75. Wiecki, T.V. and Frank, M.J.(2013). A computational model of inhibitory control in frontal cortex and basal ganglia. *Psychological Review*, 120, 329-355.
76. Beeler, J.A+, Frank, M.J+, McDaid, J+, Alexander, E., Turkson, S., Bernandez, M.S., McGehee, D.S., & Zhuang, X. (2012) A role for dopamine-mediated learning in the pathophysiology and treatment of Parkinson's disease. *Cell Reports* 2, 1747-61.
+Joint first author
77. Gold, J.M., Strauss, G.P., Waltz, J.M., Robinson, B.M., Brown, J.K., and Frank, M.J.(2013). Negative symptoms in schizophrenia are associated with abnormal effort-cost computations. *Biological Psychiatry*, 74, 130-136.
78. Cavanagh, J.F. and Frank, M.J. (2013). Stop! Stay tuned for more information. Commentary on Alegre et al. *Experimental Neurology* 247, 289-91.
79. Brown, J., Waltz, J.A., Strauss, G.P., McMahon, R.P., Frank, M.J. & Gold, J.M. (2013). Hypothetical decision making in schizophrenia: The role of expected value computation and "irrational" biases". *Psychiatry Research* 209, 142-149
80. Berghorst, L. H., Bogdan, R., Frank, M. J. & Pizzagalli, D. A. (2013). Acute stress selectively reduces reward sensitivity. *Frontiers in Neuroscience*, 7,1-15.
81. Cavanagh, J.F., Eisenberg, I., Guitart-Masip, M., Huys, Q., and Frank, M.J.(2013). Frontal theta overrides Pavlovian learning biases. *Journal of Neuroscience*, 33, 8541-8548.
- ** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)

82. Wiecki, T.V., Sofer, I. and Frank M.J.(2013). HDDM: Hierarchical Bayesian estimation of the Drift-Diffusion Model in Python. *Frontiers of Neuroinformatics* 7:14
83. Gold, B., Frank, M.J., Bogert, B. and Brattico, E. (2013). Pleasurable music affects reinforcement learning according to the listener. *Frontiers in Auditory Cognitive Neuroscience* 4, 1-19.
84. Shine, J., Matar, E., Ward, P., Frank, M.J., Moustafa, A., Pearson, M., Naismith, S. and Lewis, S. (2013). Freezing of gait in Parkinson's disease is associated with functional de-coupling between the Cognitive Control Network and the basal ganglia. *Brain* 136, 3671-3681.
85. Narayanan, N.S., Cavanagh, J.F., Frank, M.J. and Laubach, M. (2013). Common medial frontal mechanisms of adaptive control in humans and rodents. *Nature Neuroscience*, 16, 1888-95.
** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
86. Shine, J., Moustafa, A. A., Matar, E., Frank, M.J., and Lewis, S. (2013). The role of frontostriatal impairment in freezing of gait in Parkinson's disease. *Frontiers in Systems Neuroscience* 7:61, 1-7
87. Guitart-Masip, M., Economides, M., Huys, Q., Frank, M.J., Chowdhury, R., Duzel, E., Dayan, P., and Dolan, R. (2014). Differential, but not opponent, effects of L-DOPA and citalopram on action learning with reward and punishment. *Psychopharmacology* 231, 955-966
88. Chatham, C.H., Frank, M.J. and Badre, D. (2014). Corticostriatal output gating during selection from working memory. *Neuron* 81, 930-942
** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
89. Moustafa, A.A., Krishna, R., Frank, M.J., Eissa, A., Hewedi, D. (2014). Cognitive correlates of psychosis in patients with Parkinson's disease. *Cognitive Neuropsychiatry* 19, 381-398
90. Cavanagh, J.F., Wiecki, T.V., Kochar, A., and Frank, M.J. (2014). Eye tracking and pupillometry are indicators of dissociable latent decision processes. *Journal of Experimental Psychology: General* 143, 1476-1488.
91. Doll, B.B., Waltz, J.A., Cockburn, J., Brown, J.K., Frank, M.J. & Gold, J.M. (2014). Reduced susceptibility to confirmation bias in schizophrenia. *Cognitive, Affective & Behavioral Neuroscience*, 14, 715-728
92. Collins, A.G.E. and Frank, M.J.(2014). Opponent actor learning (OpAL): Modeling interactive effects of striatal dopamine on reinforcement learning and choice incentive. *Psychological Review*, 121, 337-366
93. Collins, A.G.E., Cavanagh, J.F. and Frank, M.J.(2014). Human EEG uncovers latent generalizable rule structure during learning. *Journal of Neuroscience* 34, 4677-4685
** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
94. Cavanagh, J.F., Sanguinetti, J. L., Allen, J.J.B., Sherman, S.J. and Frank, M.J.(2014). The subthalamic nucleus contributes to post-error slowing. *Journal of Cognitive Neuroscience* 26, 2637-2644
95. Cavanagh, J.F. and Frank, M.J.(2014). Frontal theta as a mechanism for cognitive control. *Trends in Cognitive Sciences* 18, 414-421
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97. Cockburn, J., Collins, A.G.E. and Frank, M.J.(2014). A reinforcement learning mechanism responsible for the valuation of free choice. *Neuron* 83, 551-557
** media coverage (see <http://ski.clps.brown.edu/inthenews.html>)
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119. Collins, A.G.E. & Frank, M.J. (2016). Motor demands constrain cognitive rule structures. *PloS Computational Biology* 12: e1004785.
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124. Albrecht, M.A., Waltz, J.A., Frank, M.J. & Gold, J.M. (2016). Probability and magnitude evaluation in schizophrenia. *Schizophrenia Research: Cognition* 5, 41-46.
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126. Moustafa, A.A., Chakravarthy, S., Phillips, J. Gupta, A., Keri S, Polner, B., Frank, M. J. & Jahanshahi, M. (2016). Motor symptoms in Parkinson's disease: A unified framework. *Neuroscience & Biobehavioral Reviews* 68:727-40.
127. Werchan, D., Collins, A.G.E., Frank, M.J. & Amso, D. (2016). Role of prefrontal cortex in learning and

- generalizing hierarchical rules in 8-month-old infants. *Journal of Neuroscience* 36, 10314-10322
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 130. Collins, A.G.E., Ciullo, B., Frank, M.J. & Badre, D. (2017). Working memory load strengthens reward prediction errors. *Journal of Neuroscience* 37, 4332-4342.
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 133. Kasanova, Z., Ceccarini, J., Frank, M.J., van Amelsvoort, T., Booij, J., Heinzl, A., Mottaghy, F., & Myin-Germeys, I. (2017). Striatal Dopaminergic Modulation of Reinforcement Learning Predicts Reward-Oriented Behavior in Daily Life. *Biological Psychology* 127, 1-9.
 134. 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
 135. Kasanova, Z., Ceccarini, J., van Amelsvoort, T., Frank, M.J., Booij, J., Vaessen, T., Steinhart, H., Duin, E., Heinzl, A., & Mottaghy, F. (in press). Intact striatal dopaminergic modulation of reward learning and daily-life reward-oriented behavior in first-degree relatives of individuals with psychotic disorder. *Psychological Medicine*.
 136. Westbrook, J.A. & Frank, M.J. (2018). Dopamine and proximity in motivation and cognitive control. *Current Opinion in Behavioral Sciences* 22, 28-34.
 137. Nassar, M.R., Helmers, J. & Frank, M.J. (in press). Chunking as a rational strategy for lossy data compression in visual working memory. *Psychological Review*
 138. Collins, A.G.E. & Frank, M.J. (in press). Within and across-trial dynamics of human EEG reveal cooperative interplay between reinforcement learning and working memory. *Proceedings of the National Academy of Sciences*

d. Non-refereed journal articles:

1. Frank, M.J. and O'Reilly, R.C. (2005). Cognitive processes in Parkinson's disease: From dopamine to behavior. *Colorado Neurological Institute Review*, Fall 2005, pp. 3-9.
2. Frank, M.J. (2007). "Go" and "NoGo" Learning and the Basal Ganglia. *Cerebrum* (<http://www.dana.org/news/cerebrum/detail.aspx?id=10376>)
3. Daw, N.D. and Frank, M.J. (2009) Reinforcement learning and higher level cognition: Introduction to special issue. *Cognition*, 113, 259-261

4. Frank, M.J. and Surmeier, D.J. (2009). Do substantia nigra dopaminergic neurons differentiate between reward and punishment? *Journal of Molecular Cell Biology (JM CB)*, 1 15-16.
5. Frank, M.J. (2009). Slave to the striatal habit: Commentary on Tricomi et al. *European Journal of Neuroscience*, 29, 2223-4.
6. Badre, D., Frank, M.J., & Moore, C.I. (2015). Interactionist Neuroscience. *Neuron*, 88, 855-860.
7. Collins, A.G.E. & Frank, M.J. (2016). Surprise! Dopamine signals mix action, value and error. *News & Views, Nature Neuroscience* 19, 3-5
8. Maia, T.V, Huys, Q.J.M., & Frank, M.J. (2017). Theory-based computational psychiatry. *Biological Psychiatry* 82, 382-384.

e. Invited lectures:

Colloquia

1. Colorado State University behavioral & cognitive neuroscience brown bag, 9/24/04
2. Center for Neuroscience Supergroup, University of Colorado, 9/23/04
3. Maryland Psychiatric Research Center, University of Maryland Medical School, 9/16/05
4. Institute for Cognitive Science Science of Learning series, University of Colorado, 9/30/05
5. University of Bonn, Center for Life and Brain, Bonn Germany, 6/6/06
6. UCLA Dept of Psychology, Los Angeles, CA, 7/26/06
7. Ohio State University, dept of Psychology, Columbus OH 11/19/07
8. California Institute of Technology, Neuroeconomics seminar series, Pasadena CA 01/25/07
9. Mathematics Awareness Month, 'Mathematics and the Brain', University of Arizona, 4/17/07
10. Princeton University Neuroscience Institute, Princeton, NJ, 4/26/07
11. UCSD Temporal Dynamics of Learning Center, San Diego, CA, 5/18/07
12. Yale University, Swartz Initiative in Theoretical Neurobiology, New Haven, CT, 5/25/07
13. University of Delaware, Cognition and the Brain series, 10/5/2007
14. Brown University, Brain Sciences Program, Providence RI, 2/21/08
15. Arizona Research Laboratories Division of Neurobiology seminar, Tucson AZ, 2/25/08
16. University of California at Davis Medical Center, MIND Institute, Davis CA, 2/28/08
17. Max Planck Institute, Cologne, Germany, 3/17/08
18. University of Michigan, Neurons, Brains and Models seminar series, Ann Arbor, MI, 4/10/08
19. University of Cambridge Behavioral Neuroscience seminar series, Cambridge, UK, 6/3/08
20. Gatsby Computational Neuroscience Unit, University College London, London, UK, 6/4/08
21. Laboratoire de la Neurobiologie de la Cognition, Université de Provence, Marseille, France, 7/15/08
22. Max Planck Institute, Neurocognition of Decision Making Group, Berlin Germany, 7/18/08

23. University of Colorado, Institute for Cognitive Science, Boulder, CO, 7/30/08
24. Tamagawa University, Tokyo, Japan, 10/15/08
25. University of Waterloo, Centre for Theoretical Neuroscience, Waterloo, Canada, 12/12/08
26. Johns Hopkins University, Dept of Psychological & Brain Sciences, Baltimore Maryland, 2/11/09
27. Northwestern University, Dept of Physiology Feinberg School of Medicine, Chicago IL, 3/13/09
28. Queen's University, Centre for Neurosciences, Kingston Canada, 4/8/09
29. University of Zurich, Institute for Empirical Economics, Zurich, Switzerland, 6/4/09
30. Donders Institute for Brain, Cognition & Behaviour, Nijmegen, The Netherlands, 7/29/09
31. University of Chicago, Center for Integrative Neuroscience and Neuroengineering, 1/19/10
32. University College London, London UK, "Brain meeting", 2/5/10
33. John B Pierce Laboratory, Yale University School of Medicine, 4/5/10
34. Yale University, Cognitive Science seminar series, 4/6/10
35. UCLA, Center for Neurobehavioral Genetics, Los Angeles CA 5/6/10
36. National Institute on Drug Abuse (NIDA) seminar series, Baltimore MD, 5/11/10
37. Grand rounds, Dept of Neurology, Brown University, Providence RI 5/19/10
38. CELEST Science of Learning seminar series, Boston University, Boston MA, 10/29/10
39. New York University Center for Neural Science, Memory in Brain series, New York NY, 11/5/10
40. University of Pennsylvania, Institute for Research in Cognitive Science, Philadelphia PA, 12/10/10
41. University of Colorado, Center for Determinants of Executive Function and Dysfunction, Boulder CO, 1/20/11
42. University of Massachusetts at Amherst, Dept of Psychology, Amherst MA, 4/6/11
43. University of California at Davis, Perspectives in Neuroscience series, Davis CA, 5/12/11
44. Columbia University, Center for Theoretical Neuroscience, New York NY, 5/27/11
45. University of Amsterdam, Cognitive Science Center Amsterdam, The Netherlands, 6/16/11
46. National Institute of Neurological Disorders and Stroke (NINDS), Bethesda MD, 8/16/11
47. New York University, Neuroeconomics seminar series, New York NY. 9/27/11
48. Harvard University, Decision-Making workshop series, Cambridge MA, 11/16/11
49. University of Amsterdam, Brain and Cognition series, Amsterdam, the Netherlands, 6/6/13
50. University of Amsterdam, special seminar, Amsterdam, the Netherlands, 6/14/13
51. Harvard University, Maclean Hospital, Boston, MA, 12/17/13
52. Duke University, Duke Institute for Brain Science, Durham NC, 1/31/14
53. UCL, Affective Brain Lab Online Talk Series, London UK, 5/15/14
54. Columbia University Dept of Pharmacology, New York NY 5/20/14
55. Carnegie Mellon University, Dept of Psychology Colloquium, Pittsburgh, PA 9/22/14

56. Carnegie Mellon University, Cognitive Brown Bag, Pittsburgh, PA 9/22/14
57. Washington University in St. Louis: Cognitive, Computational, and Systems Neuroscience Invited Lecturer, St Louis, MO 10/6/14
58. University of Pennsylvania Psychology Dept, Philadelphia PA, 10/27/14
59. University of British Columbia, Brain Research Centre, Vancouver, Canada, 1/9/15
60. UCL Wellcome Trust Center for Neuroimaging “Brain Meeting”, London UK, 4/17/15
61. Google DeepMind, London UK, 5/28/15
62. Vrije University, Cognitive Psychology Dept, Amsterdam, The Netherlands, 6/12/15
63. Donders Institute for Brain, Cognition and Behavior, Radboud University, Nijmegen, the Netherlands, 6/18/15
64. Yale University, Behavior, Genetics & Neuroscience seminar series, New Haven CT 9/17/15
65. University of Western Ontario, Neuroscience speaker series, London ON Canada, 9/29/15
66. Harvard University, Department of Psychology colloquium, Cambridge MA, 10/7/15
67. University of Maryland Neuroscience and Cognitive Science series, 10/23/15
68. American University, Special Lectures on Cognitive Neurosciences, Washington DC, 11/13/15
69. Université de Montréal, Neuroscience series, Montreal Quebec Canada, 1/8/16
70. IBM TJ Watson Research Center, Computational Biology seminar, Yorktown NY 1/12/16
71. Johns Hopkins University Biomedical Engineering seminar series, Baltimore MD 3/28/16
72. University of California at San Francisco Neuroscience seminar series, San Francisco CA 3/31/16
73. Bridge Webinar series: McGill U, Johns Hopkins U, Pittsburgh Supercomputing Center, 1/17/17
74. Cognitive Science colloquium, Princeton University, Princeton NJ 3/30/17
75. Neuroeconomics Colloquium, New York University, New York NY 4/25/17
76. Maryland Psychiatric Research Center, Baltimore MD, 6/28/17
77. University of Massachusetts Amherst, Neuroscience & Behavior series, Amherst MA 10/25/17
78. ***Pioneers in Biomedical Research Seminar***, Virginia Tech, Roanoke VA 11/3/17
79. Columbia University, Systems, Cognitive and Computational Neuroscience seminar series, NY 11/16/17
80. Columbia University, Center for Theoretical Neuroscience seminar series, New York 11/17/17
81. University of Houston, Department of Psychology, Houston TX, 12/5/17

Symposia and Workshops, Invited Talks

1. "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.
2. "Modeling Cognitive Deficits in Medicated and Non-medicated Parkinson's Disease." Cognitive Neuroscience of Category Learning conference, New York, NY, 10/10/2004.
3. "Computational Models of Striato-Cortical Circuits in Cognition: Recent Advances and Converging Empirical Evidence." workshop on Basal Ganglia, Dopamine and Learning: Integrating Computational and Clinical Perspectives in Jerusalem, Israel, 6/29/2005.
4. "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.
5. "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.
6. "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.
7. "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
8. "Evidence for a dynamic computational role of the subthalamic nucleus in decision making", in B. Knutson (Chair) "**Motivation and Emotion: Decision-Making**" Symposium conducted at the Society for Neuroscience Annual Meeting, Atlanta Georgia, 10/15/06.
9. "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
10. "Interactive dynamics of striato-cortical circuits in reinforcement learning and decision making", Perceptual Expertise Network meeting, Yale University, 4/20/07
11. "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 conducted at the Canadian Society for Brain, Behaviour and Cognitive Science, University of Victoria, Victoria, BC, 6/16/2007
12. "Dopamine and reward calculation", Charité conference on Emotional Neuroscience, Berlin, Germany, 9/1/2007
13. "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, 9/6/07
14. "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.

15. "Neurocomputational models of frontostriatal function and dysfunction", Symposium on Computational Models of Biological Psychiatry, Computational Cognitive Neuroscience Conference, San Diego, CA, 11/1/2007
16. "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, 11/2/07
17. "Interactive dynamics of corticostriatal circuits in reinforcement learning and decision making", Sustaining Performancs Under Stress Symposium, University of Texas at Austin, Austin TX, 12/6/07.
18. "Interactive dynamics of corticostriatal circuits in behavioral adjustment", Workshop on Action monitoring and behaviour adjustment, RWTH Aachen University, Aachen Germany, 3/15/08
19. "Neurogenocomputomics", symposium on Computational Psychiatry, Lisbon, Portugal, 5/30/08
20. "Neurogenocomputomics", symposium on Neuromodulation of Lifespan Cognition, International Congress of Psychology, Berlin, Germany, 7/21/08
21. "Temporal Integration of Expected Utility: Neurocomputational and Genetic Components", Open Problems in Neuroscience of Decision Making, Okinawa, Japan, 10/16/08
22. "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
23. "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
24. "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
25. "Computational neuroscience and empirical studies of reinforcement learning", 1st Annual NIMH-Sponsored Brain Camp, Cold-Spring Harbor, NY, 5/2/09
26. "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
27. "Neurocomputational models of learning and decision making: Mutiple levels of analysis", *keynote address*, Mathematical Psychology annual meeting, Amsterdam, The Netherlands, 8/2/09
28. "Neurocomputational models of reinforcement learning: Implications for Parkinson's disease, pharmacology and genetics". Gordon Research Conference on Catecholamines, Biddeford ME 8/12/09
29. "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
30. "Dopamine, reward processing, and decision making in aging", Aging, Motivation and Addiction meeting sponsored by NIDA and NIA, Washington DC, 10/5/09

31. "Neurogenetic influences on learning from experience and executive control over learning", Genetic and Experiential Influences on Executive Function meeting, Boulder CO, 1/16/10
32. "Corticostriatal interactions in reinforcement-based decision making: Multiple levels of modeling", UK Neuroinformatics Node Congress, **plenary address**, Edinburgh, UK, 2/2/10
33. "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
34. "Pharmacological and genetic modulation of decision making in corticostriatal circuits", **plenary address**, Society for Biological Psychiatry, New Orleans, LA, 5/21/10
35. "Hierarchical reinforcement learning in corticostriatal circuits", Motivation and Cognitive Control workshop, Oxford, UK, 6/4/10
36. "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
37. "Frontal-Subthalamic Regulation of Decision Processes in Parkinson's Disease", Gordon Research Conference on the Neurobiology of Cognition, Waterville Valley NH 8/5/10
38. "Frontal-Subthalamic Regulation of Decision Threshold in Parkinson's Disease", Swartz Symposium on Computational Psychiatry, Yale University, 9/23/10
39. "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
40. "Mechanisms of Hierarchical Reinforcement Learning in Corticostriatal Circuits", in symposium "Two brains are better than one: Multiple learning systems for economic decision making" (P. Phillips, chair), Winter Conference for Brain Research, Keystone CO, 1/26/2011
41. "Fronto-subthalamic regulation of decision threshold", in workshop on Neural Circuits of Decision-Making (P. Dayan, A. Karpova, J. Dudman, chairs), Janelia Farm Research Campus, Ashburn VA, 3/8/2011
42. "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
43. "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
44. "Frontal control over basal ganglia in reinforcement learning and decision-making", Summer Institute on Cognitive Neuroscience, Santa Barbara CA, 6/29/11
45. "Modeling decision-making deficits in fronto-striatal disorders", symposium on Computational Psychiatry, Neuroinformatics world congress, Boston MA, 9/4/11
46. "Interactive dynamics of corticostriatal circuits in learning and action selection", Brown-NIH Neuroscience Graduate Retreat, Marine Biology Lab, Woods Hole, 4/17/12

47. "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
48. "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
49. "Neurogenocomputomics", Special Symposium on Neural Foundations of Reinforcement Learning, Society for Neuroeconomics annual meeting, Key Biscayne Florida, 9/29/12
50. "Neurogenetic modulators of reinforcement and motor learning parameters", Plenary Lecture, Translational Computational Motor Control meeting, New Orleans LA, 10/12/12
51. "Linking levels of analysis in computational models of corticostriatal function", Mathematical Biosciences Institute, workshop on Cognitive Neuroscience, Columbus OH, 12/11/12
52. "Prefrontal and striatal contributions to reinforcement learning", 3rd International Conference on Applications of Neuroimaging to Alcoholism, Yale University, New Haven CT, 2/18/13
53. "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
54. "Cognitive control over learning and action in corticostriatal circuits", Mechanisms of Motivation, Cognition and Aging Interactions, Washington DC, 5/3/13
55. "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
56. "Computational models of dopamine in learning and choice incentive", Dopamine 2013, Alghero Italy, 5/24/13
57. "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
58. "Control over learning and action in corticostriatal circuits", Sackler Summer Institute for Developmental Psychobiology, New York, NY, 7/24/13
59. "Computational models of aberrant learning and decision making in disease states", Computational Psychiatry conference, Miami ,FL, 10/22/13
60. "EEG and fMRI correlates of dynamic decision parameters during reinforcement learning", Society for Neuroscience Annual Meeting, San Diego CA, 11/9/13
61. "Interactive dynamics of corticostriatal circuits in reinforcement and motor learning", Sackler Winter Conference on Developmental Psychobiology, Cozumel Mexico, 1/7/14
62. "Model-based cognitive neuroscience approaches to computational psychiatry: clustering and classification", Computational and Systems Neuroscience (CoSyne) meeting, Snowbird UT, 3/4/14
63. "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

64. “Generalization and transfer in structure learning”, workshop on Engineering and Reverse Engineering Reinforcement Learning, Massachusetts Institute of Technology, 7/18/14
65. “Frontal control over striatal learning and choice”, workshop on basal ganglia structure and function, Organization for Computational Neurosciences, Quebec City, Canada, 7/31/14
66. “Generalization and transfer during latent structure learning”, Computational Properties of Prefrontal Cortex Workshop, Whistler, BC, Canada, 10/4/14
67. “Probing for information about latent states during reinforcement learning”, Neurocuriosity workshop, INRIA, Bordeaux France, 11/7/14
68. “Dopamine, reward prediction error and action selection: Is there a connection?” workshop on Computational Properties of Prefrontal Cortex, Bethesda, MD, 5/15/15
69. Strungmann Forum on Computational Psychiatry, Frankfurt Germany, 6/28/15-7/3/15
70. “Interactive effects of striatal dopamine on reinforcement learning and choice incentive”, Gordon Research Conference on Catecholamines, Sunday River Maine, 8/10/15
71. “Linking levels of analysis in computational models of corticostriatal function”, Methods in Computational Neuroscience summer school, Marine Biology Lab, Woodshole MA, 8/19/15
72. “Probing for informativeness on latent states in value-based decision making”, International symposium on Prediction and Decision Making, Tokyo, Japan, 11/1/15
73. “Probing for informativeness on latent states in value-based decision making”, Computational Psychiatry Course, Zurich, Switzerland, 12/12/15
74. “The drift diffusion model as a tool for Computational Psychiatry and Neurology”, Computational Psychiatry Course, Zurich, Switzerland, 12/10/15
75. “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
76. “Basal ganglia dynamics during active learning and choice”, Gordon Research Conference on Basal Ganglia, Ventura CA, 03/02/16
77. “Computational Psychiatry”, chair invited symposium, Cognitive Neuroscience Society Annual Meeting, New York NY, 4/3/16
78. “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
79. “Adaptive regulation of decision thresholds by basal ganglia”, Workshop on Sequential Sampling Models of Decision Making, Emmetten Switzerland, 5/10/16
80. “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

81. “Opponency mechanisms of striatal dopamine on learning and choice”, Gatsby Institute workshop on dopamine. London UK, 9/30/16
82. “Gating Mechanisms for Cognitive Control”, chaired symposium at Control Processes workshop, San Diego, CA 11/10/16
83. “Deconstructing neural mechanisms of impulsive choice”, Japanese-American Kavli Frontier of Science Symposium, National Academy of Sciences, Irvine CA, 12/2/16
84. “Chunking as an optimized strategy for lossy data compression in visual working memory”, Reinforcement Learning and Decision Making Multidisciplinary Conference, Ann Arbor MI, 6/13/17
85. “Chunking as an optimized strategy for lossy data compression in visual working memory”, Computational Psychiatry Summer School, ETH Zurich, Zurich Switzerland, 9/1/17
86. “Chunking as an optimized strategy for lossy data compression in visual working memory”, Control Processes meeting, Amsterdam, The Netherlands, 10/12/17
87. “Optimizing working memory strategies via reinforcement learning”, Computational Psychiatry: a didactic introduction, Washington DC, 11/10/17
88. Montreal Artificial Intelligence and Neuroscience conference, **keynote**, Montreal Que, 11/18/17

f. work in review:

1. Franklin, N.T. & Frank, M.J. (in review). Compositional clustering in task structure learning. *PIOS Computational Biology*
2. Swart, J.C., Frank, M.J., Määttä, J.I., Jensen, O., Cools, R., den Ouden, H.E.M. (in review). Frontal network dynamics reflect neurocomputational mechanisms for reducing maladaptive biases in motivated action. *Nature Human Behaviour*
3. Albrecht, M.A., Waltz, J.A., Cavanagh, J.F., Frank, M.J., & Gold, J.M. (in revision). Exaggerated conflict-induced slowing, but no differences in conflict-induced reward/punishment learning in patients with schizophrenia. *Neuropsychologia*
4. Hernaus, D., Gold, J.M., Waltz, J.W. & Frank, M.J. (in review). Motivational deficits in schizophrenia selectively relate to abnormalities in cortical learning rate. *Biological Psychiatry*
5. Hernaus, D., Xu, Z., Brown, E.C., Ruiz, R., Frank, M.J., Gold, J.M., & Waltz, J.W. (in revision) Learning rate modulation deficits in medicated schizophrenia *Cognitive, Affective & Behavioral Neuroscience*

g. work in progress:

(Here I consider work in progress to refer to works for which we are currently preparing or submitting manuscripts, excluding ongoing studies)

1. Cockburn, J. Kimchi, E., Frank, M.J., Laubach, M. (in progress). Neuronal basis of context-dependent updating of action values in the striatum
2. Senatore, R., Marcelli, A., & Frank, M.J. (in progress). On the role of basal ganglia and cerebellum in motor learning:

A computational investigation.

3. Cockburn, J. and Frank, M.J. (in preparation). Probing for informative latent states during reinforcement learning.

6. Research

a. current grants

1. *Clinical and computational studies of dopamine function in Schizophrenia*
NIMH R01 MH080066-06A1
06/07/13 – 5/31/18
Role: co-investigator with Jim Gold (PI, U of Maryland)
\$531,724 direct costs (Brown subcontract)
2. *How Prefrontal Cortex Augments Reinforcement Learning*
2/1/2015- 1/31/19
National Science Foundation #1460604
Role:PI \$372,056 direct costs
3. *Goal Directed Behavior and Uncertainty in Obsessive Compulsive Disorder*
7/1/2016 – 6/30/2017
Brown Institute for Brain Science Norman Prince Neuroscience Institute, New Frontiers Award
Role: co-PI, \$39,741 direct costs
4. *Brain and behavior mechanisms of irritability and cognitive flexibility in children*
1/12-17 – 11/30/21
R01MH111542
Role: co-investigator, Daniel Dickstein (PI)
5. *Adaptive DBS in Non-Motor Neuropsychiatric Disorders: Regulating Limbic Circuit Imbalance*
9/1/2016 – 8/31/2021
NINDS UH3NS100549
Role: co-investigator, Wayne Goodman (PI, Baylor College of Medicine)
6. *BIDS-Derivatives: A data standard for derived data and models in the BRAIN Initiative*
9/1/2017 – 8/31/2019
NIMH R24 MH114705-01
Role: Co-Investigator, Russ Poldrack (PI, Stanford U)

b. grants in progress

1. *Cognitive characteristics of short-term risk for suicidal behavior in adolescents*
R01MH115905-01
National Institutes of Health – NIMH \$607,822
PI: Liu 04/1/18 – 03/31/23 1.0 AY
Role: Co-Investigator
2. *CRCNS Data Sharing Proposal: Collaborative Research. An Integrated Software Environment for the Construction, Analysis and Sharing of Computational Models in Cognitive Neuroscience.*
NSF 7854778 National Science Foundation
Collaborative Research in Computational Neuroscience
7/1/18 – 6/30/21
\$297,000 direct

Role: Co-PI

c. completed grants

Clinical and computational studies of dopamine function in Schizophrenia,
NIMH R01 MH080066-01, 01/01/08 – 12/31/12,
Role: co-investigator with Jim Gold (PI, U of Maryland)
\$409,521 direct costs (subcontract)

Electropysiological and computational studies on action monitoring.
National Science Foundation #1125788
9/1/11 – 8/31/15
Role: PI
\$424,695 direct costs, \$218,632 indirect costs

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

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

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

Neurocognitive Computations in Parkinson's Disease
Michael J Fox Foundation for Parkinson's Research
1/1/2009 – 12/31/2011
Role: PI
\$371,948 direct costs, \$92,948 indirect costs

Impact of GPR6 on striatum-based learning in humans and mice
Mahoney Pilot Research Award, Brown Institute for Brain Science
06/01/12 – 06/01/13
Role: co-PI with Kevin Bath
\$14,000 direct costs

The influence of stimulant therapy and co-morbidity on decisions in ADHD
Norwegian Research Council
01/07/12 – 06/30/14, Tor Endestad (PI, U of Oslo)

The Cost of Cognitive Doping: From dopamine to cognitive control via dynamic neural coding
9/1/16 – 8/31/17
NWO / Radboud University Cools (PI)
\$61,924 direct costs current year
Role: co-investigator

7. Service

i. to the University

University of Arizona (until 12/2008):

- Dissertation committee: Nathan Insel, James Cavanagh
- Comprehensive exam committee: James Cavanagh, Lan Hoang
- Master's committee: Bradley Doll, Shikhar Kumar
- Faculty Executive Advisory Committee (elected junior faculty representative), 2007-2008
- Neuroscience graduate program training grant steering committee (2007, 2008)
- K01 training committee: Thomas Christenson

Brown University (1/2009 – present)

- Director, Initiative for Computation in Brain and Mind at Brown, 2012-present
- BIBS Executive Committee, 2014-present
- Graduate advisor, Cognitive Science program, 2015-present
- Associate Chair of Graduate Studies, CLPS, July 2017 – Jan 2018
- Collaborative Research in Computational Neuroscience (CRCNS) Program Committee for conference at Brown 2017
- Chaired committee for David Badre's promotion to Associate Professor, 2013-14
- Committee for Thomas Serre's promotion to Associate Professor, 2016-17
- Faculty mentor for junior faculty mentoring program, 2016 – present
- Search committees:
 - for new BIBS director (committee under Provost), 2015-16
 - Molecular Neuroscience (department of Neuroscience), 2009
 - Cognition search, 2010-11
 - Computational Neuroscience (BIBS / dept of Neuroscience), 2012
 - Cognition search, 2012-13
 - Cognitive Neuroscience / BIBS search, 2014-15
- Co-ordinated Whalen award for undergraduate research excellence in biological basis of behavior, 2011
- Committee to evaluate BIBS/NPNI New Frontiers Initiative grant applications, 2012
- Committee to evaluate BIBS / Robin Neustein Graduate Fellowships, 2014
- Cognitive Science Undergraduate concentration curriculum committee, 2013
- COBRE mentor for Dr. Wael Asaad, 2014 - present
- Dissertation committees (defense date):
Bradley Doll (July 2011), Naveen Rao (dept of Neuroscience, July 2011), Jeffrey Cockburn (January 2015), Thomas Wiecki (2014), Fang-Chi Yang (June 2016), Jason Scimeca (Aug 2015), Neal Fox (Dec 2015) Nicholas Franklin, Nicholas Mei (Neuroscience), Yuanbo Wang, Ceyda Sayali, Mark Ho
- First year project committees:
Gideon Goldin, Jeffrey Cockburn, Mike Ferrier, Ali Arslan, Jason Scimeca, Fang-Chi Yang, Brendon Kent, Thomas Wiecki, Imri Sofer, Nicholas Franklin, Lisa Dukovna, Justin Martin, Ceyda Sayali, Denise Werchan, Daniel Bryant, Alexander Fengler, Emily Levin, Daniel Scott, Harrison Ritz, Zhiyan Wang, Pachaya Sailamul
- Preliminary exam committees:
Bradley Doll, Naveen Rao (Neuroscience), Jessica Feldman (Neuroscience), Jeffrey Cockburn, Fang-Chi Yang, Thomas Wiecki, Imri Sofer, Neal Fox, Jason Scimeca, Nicholas Franklin, Nicholas Mei (Neuroscience), Haley Goodwill (Neuroscience)
- Academic advisor to Brown freshman and sophomore students, 2010-2012
- CLS/CLPS departmental computer/IT committee (2009 - 2013)

ii. to the profession

- Provide assistance to researchers using neural modeling software for simulating basal ganglia interactions in learning and associated neurological dysfunction (2005 – present)
- Provide computerized behavioral experiments to, and consulted with, several non-collaborators for their own use (2005 – present).
- Provide computational models to be freely available for others, including user-friendly instructions to replicate and extend published findings, on personal website (http://ski.clps.brown.edu/BG_Projects/) and on the ModelDB computational neuroscience database (2006 - present) (<http://senselab.med.yale.edu/senselab/modeldb/>)
- External examiner, PhD dissertation *Tillman Klein*, Department of Bioscience, Pharmacology and Psychology, University of Leipzig, Germany 3/2008
- External examiner, PhD dissertation *Bryan Tripp*, University of Waterloo Center for Theoretical Neuroscience, 11, 2008
- Organized symposium on "Computational models of biological psychiatry" at the Computational Cognitive Neuroscience Conference, San Diego, 11/2/2008
- Co-organized workshop on "The computational role of dopamine", Computational and Systems Neuroscience (Cosyne 2009), Snowbird Utah, 3/2/2009
- Performed comparative evaluation of candidates for "cognitive modeling" faculty position at the Institute for Cognitive Science of the University Osnabrück, 10/2009
- External examiner, diploma thesis *Thomas Wiecki*, University of Tübingen, Wilhelm-Schickard-Institut für Informatik, Germany, 2009
- Co-organized workshop on "How do multiple cortico-basal ganglia loops support learning across a wide range of functional domains?", Computational and Systems Neuroscience (Cosyne), Snowbird Utah, 3/1/2011
- External examiner, PhD dissertation, Travis Baker, University of Victoria (Canada), Sept 5, 2012
- External examiner, PhD dissertation, Peter Smittenaar, University College London (UK), 4/17/15
- Tenure and full professor reviews for Princeton University, Carnegie Mellon University, University of California Merced, University of Massachusetts Amherst, 2012-present
- Organized and chaired 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
- Program committee, Multidisciplinary Conference on Reinforcement Learning and Decision Making: Princeton 2013, Alberta 2015, and Ann Arbor 2017
- Co-organized first Computational Psychiatry Conference, Miami FL. 10/22–23, 2013
- Program Committee, International Convention of Psychological Science, 2013-15

- Co-organized workshop on computational psychiatry, satellite to Biological Psychiatry conference, San Diego CA 5/17/17
- Cognitive Neuroscience Society Young Investigator Award Committee, 2015-present
- “Computational Psychiatry”, organized/ chaired invited symposium, Cognitive Neuroscience Society Annual Meeting, New York NY, 4/3/16

Editorial

- Senior Editor, *eLife*, July 2017-Present
- Review Editor, *eLife*, 2015 – 2017
- Associate Editor, *Journal of Neuroscience*, 2015 – present
- Associate Editor, *Behavioral Neuroscience*, 2014 – present
- Consulting Editor, *Psychological Review*, 2015-Present
- Contributing Editor, *European Journal of Neuroscience*, 2008 – present
- Contributing Member, Faculty of 1000 <http://f1000.com/thefaculty/member/9842743885807454>, Theoretical Neuroscience section. Regular contributions, 2008-present
- Guest editor, special issue of *Cognition*, "Reinforcement learning and higher cognition", 12/ 2009.
- Consulting Editor, *Journal of Mathematical Psychology*, Jan 2010 – 2014
- Review Editor, *Frontiers in Decision Neuroscience*, June 2010 – present
- Review Editor, *Frontiers in Behavioral and Psychiatric Genetics*, July 2011 – present
- External action editor, *Journal of Experimental Psychology: General*, 2013
- Perform pre-screening evaluations of significance for the following journals: *Current Biology*, *Nature Neuroscience*
- Editorial Board, *Connection Science*, 2014 – present
- Editorial Board, *Motivational Science*, 2014-Present

Reviewing (Grants)

- NIMH Reviewer Interventions/Biomarkers panel, 2016, 2017
- NIH Panel reviewer: Integrative, Functional and Cognitive Neuroscience panel 2012, 2013
- NSF Review Panel, Spring 2016
- NSF Proposal Reviewer, ad-hoc
- NSERC Discovery Grants (Canada)
- NWO (Netherlands Organisation for Scientific Research)

- Neurological Foundation of New Zealand
- Parkinson's Disease Society of the UK
- The Wellcome Trust
- Biotechnology and Biological Sciences Research Council
- UK Economic and Social Research Council
- Swiss National Science Foundation
- Agence National de la Recherche (French National Agency)

Reviewing (*Publications; ad-hoc*):

I perform regular reviews (approximately 50 per year) for the following journals, across multiple disciplines:

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, Cognitive Science Society Annual Meeting, Cambridge Handbook on Computational Cognitive Modeling, Clinical Psychological Science, Current Biology, Depression & Anxiety, eLife, European Journal of Neuroscience, Frontiers in Behavioral Neuroscience, Frontiers in Computational 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 Neuroscience, Neural Computation, Neural Networks, Neurobiology of Aging, NeuroImage, Neuron, Neuropsychologia, Neuroscience & Biobehavioral Reviews, Perception & Psychophysics, Proceedings of the National Academy of Sciences, Psychological Review, Psychological Science, Psychonomic Bulletin & Review, Psychopharmacology, PLoS Biology, PloS ONE, Science, Topics in Cognitive Science, Translational Psychiatry, Trends in Cognitive Sciences

iii. to the community

- Panel member, Cognitive Neuroscience Treatment Research for Improving Cognition in Schizophrenia (CNTRICS), 2006 – present
- 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.
- Contribute to PD Online Research, a web-based forum for discussion about research on Parkinson's disease and implications.
- Advised multiple community members who approached me about concerns regarding family members with Parkinson's disease showing significant cognitive deficits and impulsive decision making. (Explained nature of basic science research as it may or may not relate to everyday lives; referred to clinical practitioners).

8. Academic Honors

- Dean's Scholar, Queen's University, 1994/95/96/97
- Dean's Award, Queen's University, 1996
- Senator Frank Carrel Upper Year Scholarship, Queen's University, 1994/95/96
- Natural Sciences & Engineering Research Council graduate scholarship (Canada, 1997)
- University of Colorado Graduate Fellowship (1999)
- Dozier Award for outstanding scholarly record, University of Colorado, 2004
- D.G. Marquis Behavioral Neuroscience Award, best paper in Behavioral Neuroscience, 2006

- Janet T Spence Award for Transformative Early Career Contributions, APS, 2010
- Cognitive Neuroscience Society Young Investigator Award, 2011
- Neural Networks journal award for most cited article between 2006-2010
- Fellow, Association for Psychological Science, 2012
- Radboud Excellence Professorship, 2015, for “eminent researchers who have had a significant impact in their discipline and beyond” to conduct research in Nijmegen for six months, Radboud University, The Netherlands
- Kavli Science Fellow, 2016

Media Coverage:

- Several interviews for news articles in major news outlets covering my lab's research (for detailed list and links, 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

Memberships

- Association for Psychological Science
- Cognitive Neuroscience Society
- International Basal Ganglia Society (elected)
- Society for Neuroscience
- Society for Neuroeconomics

9. Teaching

University of Arizona

- Computational Cognitive Functions of the Prefrontal Cortex, graduate seminar, Spring 2006
- Seminar on Computational Approaches to Cognitive Neuroscience, Fall 2006
- Reinforcement Learning, graduate seminar, Fall 2007
- Computational Cognitive Neuroscience, Spring 2007,2008

Guest Lecturer:

- Foundations in Cognitive Psychology, Spring 2006, 2007, 2008

Independent study:

- Mary Kim, Spring 2006, Parkinson's behavioral testing
- Evan Carter, Spring 2007, basal ganglia modeling
- Ariel Skalina, Spring 2007, behavioral experiments
- Daniel Butler, Spring 2007, immunocytochemistry, striatum
- Sarah Williamson, Fall 2007, decision making and genetic correlates.
- Andrew Florez , Spring 2008, reward and decision making
- Christina McGrory, Spring 2008, reward and decision making.

Brown University

- Laboratory in Computational Cognitive Neuroscience (COGS 1460, CLPS 1492), Fall 2009, 2010, 2011, 2012, 2013, 2014, 2015
- Doing Bayesian Data Analysis (CLPS 2910), Spring 2013
- Cognitive Control Functions of the Prefrontal Cortex (COGS 1861A), Spring 2010
- Mechanisms of Motivated Decision Making (CLPS 1470), Spring 2011

Guest Lecturer:

- Systems Neuroscience, Fall 2009, 2011
- Advanced Cognitive Neuroscience, Spring 2009
- Learning and Conditioning, Spring 2011
- Neural Dynamics, Fall 2013
- Neuroscience Graduate Training Program Neuropracticum, 2016
- Cognitive Science Core CLPS 2001, 2016, 2017
- Affective Neuroscience, 2017

Independent study:

- Bradley Doll, graduate student Spring, Fall 2009
- Jeff Cockburn, graduate student Fall 2009
- Sarah Hersman, 2009-2010 **honors thesis** (Neuroscience), hierarchical reinforcement learning and PFC
- Sara Slama, 2009-2010 research assistant, and 2010-11 **honors thesis**: decision making in Parkinson's disease
- Emily Nguyen, 2010 UTRA, 2010-2011 indep study: EEG, decision making in OCD
- Benjamin Gold, 2010-11 honors thesis, music as a potentiator of reinforcement-based decision making
- Robert St-Louis, 2011 UTRA and fall indep study on conflict-based decision making
- Ian Eisenberg, 2011 UTRA and 2012 **honor's thesis** on EEG correlates of learning and decision making
- Carissa Aboubakare, 2011-2012 estrogen effects on working memory and executive function
- Angad Kochar, 2011-2012 pupillometry and cognitive control, **honor's thesis**
- Jacklyn Babowitch, 2011 working memory and instructional control over learning
- Anuj Patel, 2012 Role of GPR6 in antipsychotic-induced alterations in motor skill learning
- Anthony Jang, 2014, Factors influencing changing learning rates in reversals
- Giovanna Moraes, 2014 Model-based vs model-free learning mechanisms in mind and brain

Supervision

- Ahmed Moustafa (Postdoctoral 2006-2007, now Asst Prof at Univ Sydney Australia)
- Mike Cohen (Postdoctoral 2008-2009, now Asst Prof at Univ Amsterdam)
- Anne Collins (Postdoctoral 2010 – 2015; now Asst Prof at U C Berkeley)
- Jim Cavanagh (Postdoctoral, 2010 – 2013, now Asst Prof at U New Mexico)
- Matthew Nassar (Postdoctoral, 2013 – present)
- Bradley Doll, PhD advisor, Spring 2007 – 7/2011
- Minryung Song, graduate lab rotation, Fall 2008
- Shikhar Kumar, graduate student, Fall 2007 – Fall 2009
- Jeff Cockburn, graduate student Fall 2009 – 2015
- Jim Cavanagh, shared graduate student (U of Arizona), Spring 2007 – 2010
- Thomas Wiecki, researcher, Spring 2009 – 2010, graduate student Fall 2010 – 2014
- Nicholas Franklin, graduate student Fall 2011 – present
- Catherine Hegarty, graduate student 2011-2012 (NIH-Brown Graduate Partnership Program)
- Daniel Dillon co-mentor for K99/R00 award, 2012- present
- Christina Figueroa, research assistant 9/07 – 7/11

- Sean Masters, research assistant, 7/11 – 6/14
- Julie Helmers, research assistant 6/14- 6/16
- Andrea Mueller, research assistant 6/16 – present
- Rosa Senatore, visiting graduate student, 1/11 – 9/11
- Denise Werchan, graduate student (co-mentor), 2013-present
- Neal Fox, graduate student (co-mentor for computational component)
- Harrison Ritz, graduate student (co-mentor), 2016- present
- Daniel Scott, graduate student, 2016-present
- Alexander Fengler, graduate student, 2018-present

Master's Theses directed:

- Bradley Doll
- Shikhar Kumar (U of Arizona)

Doctoral Theses directed:

- Bradley Doll (2011)
- Rosa Senatore (2012)
- Thomas Wiecki (2014)
- Jeffrey Cockburn (2015)
- Nicholas Franklin (2017)