Curriculum Vitae

Randall C. O'Reilly

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Employment

- Professor, Department of Psychology, Computer Science, and Center for Neuroscience, University of California Davis, 2019-present.
- Professor, Department of Psychology & Neuroscience, Institute of Cognitive Science, Center for Neuroscience, University of Colorado Boulder, 2008-2019.
- Associate Professor, Department of Psychology, Institute of Cognitive Science, Center for Neuroscience, University of Colorado Boulder, 2002-2008.
- Assistant Professor, Department of Psychology, Institute of Cognitive Science, Center for Neuroscience, University of Colorado Boulder, 1997-2002.
- Chief Scientist, eCortex Inc, http://e-cortex.com, 2006-present.

Degrees

- Ph.D., Psychology, Carnegie Mellon University, Aug 13, 1996. Thesis: *The Leabra Model of Neural Interactions and Learning in the Neocortex*. James L. McClelland advisor.
- M.S., Psychology, Carnegie Mellon University, 1992.
- A.B. Magna with Highest Honors in Psychology, Harvard University, 1989. Interdisciplinary Program in Cognitive Science.

Additional Education

- McDonnell-Pew Program in Cognitive Neuroscience Postdoctoral Fellow, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, 1996-1997.
- Interdisciplinary program in Neural Processes in Cognition, University of Pittsburgh and Carnegie Mellon University, 1990-1996.
- Connectionist Models Summer School, University of Colorado, Boulder, 1993.
- McDonnell Summer Institute in Cognitive Neuroscience, Dartmouth College, 1992.

Research Interests

- Specialization of function in and interactions between hippocampus, prefrontal cortex, and posterior neocortex in learning, memory, attention, and controlled processing.
- Visual object recognition in biological systems.
- Computational and formal models of the biological bases of cognition (computational cognitive neuroscience).

Honors and Awards

- Distinguished Visiting Professor, Kyoto University, Japan, 2017.
- Fellow of the Society of Experimental Psychologists, 2016–present.
- CU Psychology and Neuroscience Department Faculty Research Award, 2016.
- College Scholar Award, University of Colorado Boulder, 2009.
- D. G. Marquis Behavioral Neuroscience Award, APA Division 6, 2007.

- Provost Faculty Achievement Award, University of Colorado Boulder, 2007.
- Excellence in Teaching award, CU Neuroscience Club, 1999.
- Thomas T. Hoopes Prize for Outstanding Senior Thesis, Harvard College, 1989.
- John Harvard Scholarship, Harvard College, 1987-1989.
- Los Angeles Times National Merit Scholarship, 1985-1987.

Fellowships

- McDonnell-Pew Program in Cognitive Neuroscience Postdoctoral Fellowship, MIT, 1996-1997.
- Office of Naval Research Graduate Fellowship, 1990-1993.

Grants

- UC Davis Conte Center, NIH 2P50MH106438, 4/1/21 - 3/31/26, $16,308,892 total costs (Co-I, Cameron Carter and Kim McAllister, PIs)
- Using Population Vectors to Understand Visual Working Memory for Natural Stimuli, Pending (12/1/21 - 11/30/26), $1,962,500 total costs (Co-I, Steven Luck PI).
- Cognitive Maps for Goal-directed Decision Making, NIH 1R01MH123713, 6/1/21 - 3/31/26, $2,602,972 total costs (Co-I, Erie Boorman PI).
- Dynamic Cortico-Hippocampal Interactions for Flexible Goal-Driven Agents. ONR N00014-20-1-2578, 8/17/20 - 8/16/23, $2,250,000 total costs (PI, Co-PIs Charan Ranganath, Erie Boorman, and Ignacio Saez).
- Capturing the Power and Pitfalls of Human Decision-Making. ONR N00014-18-C-2067, 9/1/18 - 8/31/22, $2,000,000 total costs (PI, eCortex primary, CU subcontract to McKell Carter, Co-PI).
- Deep Predictive Learning in Vision, ONR N00014-19-1-2684 / N00014-18-1-2116, 3/1/18 - 8/31/22, $1,600,000 total costs. PI.

Previous Grants

- Bidirectional Vision, ONR N00014-14-1-0670 / N00014-16-1-2128, 5/14 - 3/20, $3,500,000 total costs, PI, including subcontract to David Sheinberg at Brown, and Tim Curran project as Co-PIs.
- A Neurobiologically-based Neural Network Model of Risky Decision-making. NIH R01GM109996. 10/15 - 9/19, $720,000 total costs for eCortex subcontract. Co-PI with Stephen Read and Lynn Miller at USC.
- Stability of Neuromorphic Motivational Systems. Future of Life Institute grant through Theiss Research. 10/15 - 9/18, $25,000 total costs. Co-PI (Seth Herd, PI).
- Neural Mechanisms of Adaptive Human Executive Control, ONR D00014-12-C-0638, 10/12 - 9/17, $2,000,000 total costs, awarded to eCortex with CMU subcontract. PI.
- GPU Cluster for Bidirectional, Biological Deep Networks, ONR DURIP N00014-15-1-2832, 10/2015, $275,027 total costs. PI.
- Neural Structured Representations for Human Activity Recognition, ONR N00014-13-1-0067, 1/1/13-12/31/15, $900,000 total costs. PI.
- Robotics Collaborative Technology Alliance, ARL, 7/10-6/15, approx $60,000 total costs per year. PI of this sub-project.
- ICArUS MINDS (Mirroring Intelligence in a Neural Description of Sensemaking), IARPA / HRL, 11/1/10-4/30/14, $1,508,984 total costs. PI.
- Embodied Biologically-Based Active Vision, ONR N00014-10-1-0177, 1/15/10-12/31/12, $600,000 total costs. PI.
- Determinants of Executive Function and Dysfunction, NIH IBSC center 1-P50-MH079485, 4/1/2008-3/31/2013, Marie Banich, PI, $7,237,015 total costs, PI of Project 2 and Computational Core.
- Embodied Common Sense in Vision and Language, IARPA/ARL W911NF-10-C-0064, 5/1/10 - 4/30/11, $350,000 total costs (eCortex Inc is prime contractor). PI.
- Integrated Cognitive Architectures for Robust Decision Making, AFOSR contract FA9550-08-1-0404, 7/1/2008-5/31/2010, $412,000 total costs, Co-PI with John R. Anderson and Christian Lebiere.
- An Adaptive, Biologically-Based Cognitive Architecture for Simulated Robots: Active Vision, ONR N00014-07-1-0651, 2/22/07-9/30/09, $415,981 total costs. PI.
- Biologically-Inspired Cognitive Architecture, DARPA/ONR N00014-05-1-0880, 9/1/05-3/1/07, $294,532 direct costs. PI.
- Toward a Unified Model of Cognitive Control, NIH R01 MH069597-01, 1/1/2004-12/31/2008, $787,500 direct costs. PI.

- Developing an Adaptive, Biologically-Based Cognitive Architecture, ONR N00014-03-1-0428, 3/1/2003-2/28/2006, $433,800 direct costs. PI.
- Toward a Neurobiologically Constrained Framework for Modeling Human Cognition, NIH IBSC center 1 P50 MH 64445, James L. McClelland PI, 9/30/2002-6/30/2007, 9,340,596 total award, approx $1,000,000 for components associated with (Co-PI on sub-project)
- Conjunctive Representations: In Cortex and Hippocampus. NIH R01 MH61316-01, 4/1/1999-3/31/2004. Co-PI with Jerry W. Rudy. $600,000 direct costs.
- Towards a Biological Basis of Systematic Controlled Processing: Activation- and Weight-Based Mechanisms. ONR N00014-00-1-0246, 1/1/2000-12/31/2003, $360,000 direct costs. PI.
- Discrete Representations in Working Memory: Developmental, Neuropsychological, and Computational Investigations. NSF KDI/LIS IBN-9873492. Awarded to M.C. Mozer, Y. Munakata, R.C. O'Reilly, and A. Miyake, 10/1/1998-9/30/2002, $800,000 direct costs.
- Toward a Model of Normal and Disordered Cognition, NIH Program Project MH47566, James L. McClelland PI, 3/15/1997-9/30/2002, 3,050,828 direct costs ($600,000 for components associated with, Co-PI on sub-project).
- How the hippocampus operates in memory. Human Frontier Science Program Grant, Edmund Rolls PI, 9/1/1992-8/31/1995 (Assistant Researcher).

Publications

- Google Scholar profile: https://scholar.google.com/citations?user=tZpKKm4AAAAJ
- ResearchGate Page: https://www.researchgate.net/profile/Randall_OReilly/?ev=hdr_xprf
- arXiv public author id: https://arxiv.org/a/oreilly_r_1
- ORCID ID: https://orcid.org/0000-0003-0322-4600
- NCBI NIH Biosketch: https://www.ncbi.nlm.nih.gov/myncbi/randy.oreilly@colorado.edu/cv/77981/ Bibliography: https://www.ncbi.nlm.nih.gov/myncbi/randall.o'reilly.1/bibliography/public/

Journal Papers

- O'Reilly, R. C., Russin, J. L., Zolfaghar, M., & Rohrlich, J. (2021). Deep predictive learning in neocortex and pulvinar. *Journal of Cognitive Neuroscience*, *33(6)*, 1158–1196. https://doi.org/10.1162/jocn_a_01708

- Smucny, J., Hanks, T., Lesh, T., O'Reilly, R., & Carter, C. (2021). Relationships Between Reward-Based Decision Making and Activation in a Frontal-Striatal Network in Schizophrenia vs. Bipolar Disorder. *Biological Psychiatry*, *89(9)*, S176–S177. https://doi.org/10.1016/j.biopsych.2021.02.450

- Mollick, J. A., Chang, L. J., Krishnan, A., Hazy, T. E., Krueger, K. A., Frank, G. K. W., Wager, T. D., & O'Reilly, R. C. (2021). The Neural Correlates of Cued Reward Omission. *Frontiers in Human Neuroscience*, *15*, 615313. https://doi.org/10.3389/fnhum.2021.615313

- Herd, S., Krueger, K., Nair, A., Mollick, J., & O'Reilly, R.C. (2021). Neural Mechanisms of Human Decision-Making. *Cognitive, Affective, & Behavioral Neuroscience*, *21(1)*, 35–57. https://doi.org/10.3758/s13415-020-00842-0

- Mollick, J., Hazy, T.E., Krueger, K.A., Nair, A., Mackie, P. Herd, S.A., & O'Reilly, R.C. (2020). A Systems-Neuroscience Model of Phasic Dopamine. *Psychological Review*, *127(6)*, 972-1021.

- O'Reilly, R.C., Nair, A., Russin, J.L, & Herd, S.A. (2020). How Sequential Interactive Processing Within Frontostriatal Loops Supports a Continuum of Habitual to Controlled Processing. *Frontiers in Psychology: Cognitive Science*, *11*, 380.

- O'Reilly, R.C. (2020). Unravelling the Mysteries of Motivation. *Trends in Cognitive Sciences*, *24*, 425-434. https://doi.org/10.1016/j.tics.2020.03.001

- Devillez, H., Guyader, N., Curran, T., & O'Reilly, R. C. (2020). The bimodality of saccade duration during the exploration of visual scenes. *Visual Cognition*, *28(9)*, 484–512. https://doi.org/10.1080/13506285.2020.1830325

- Dean, D. J., Bernard, J. A., Damme, K. S. F., O'Reilly, R.C., Orr, J. M., & Mittal, V. A. (2020). Longitudinal Assessment and Functional Neuroimaging of Movement Variability Reveal Novel Insights Into Motor Dysfunction in Clinical High Risk for Psychosis. *Schizophrenia Bulletin*, *46(6)*, 1567–1576. https://doi.org/10.1093/schbul/sbaa072

- Hazy, T., Paul, S., O'Reilly, R.C., & Jilk, D. J. (2019). Could Chronic Intelligent Agents Artificial Intelli

- Herd, S., Read, S. J., O'Reilly, R.C., & Jilk, D.J. (2018). Goal Changes in Intelligent Agents. *Artificial Intelligence Safety and Security*, 217-224. Chapman and Hall/CRC.
- Jilk, D. J., Herd, S. J., Read, S. J., & O'Reilly, R.C. (2017). Anthropomorphic reasoning about neuromorphic AGI safety. *Journal of Experimental & Theoretical Artificial Intelligence*, *0(0)*, 1–15.
- Pauli, W. M., O'Reilly, R.C., Yarkoni, T., & Wager, T.D. (2016). Regional specialization within the human striatum for diverse psychological functions. *Proceedings of the National Academy of Sciences (USA)*, *113(7)*, 1907-1912. doi:10.1073/pnas.1507610113
- Frank, G. K. W., Collier, S., Shott, M. E., & O'Reilly, R.C. (2016). Prediction error and somatosensory insula activation in women recovered from anorexia nervosa. *Journal of Psychiatry and Neuroscience*, *41(5)*, 304-311. doi:10.1503/jpn.150103
- Devillez, H., O'Reilly, R.C., & Curran, T. (2016). Eye-Fixation Related Potentials evidence for incongruent object processing during scene exploration. *Perception*, *45*, 335-336.
- Verduzco-Flores, S. O. and O'Reilly, R.C. (2015). How the credit assignment problems in motor control could be solved after the cerebellum predicts increases in error. *Frontiers in Computational Neuroscience*, *9*, 39.
- Sun, Y., O'Reilly, R.C., Smith, J. W., and Wang, H. (2015). Reply to Aksentijevic: It is a matter of what is countable and how neurons learn. *Proceedings of the National Academy of Science (USA)*, *112*, E3160.
- Sun, Y., O'Reilly, R.C., Bhattacharyya, R., Smith, J. W., Liu, X., and Wang, H. (2015). Latent structure in random sequences drives neural learning toward a rational bias. *Proceedings of the National Academy of Science (USA)*, *112*, 3788-92.
- Ketz, N. A., Jensen, O., and O'Reilly, R.C. (2015). Thalamic pathways underlying prefrontal cortex–medial temporal lobe oscillatory interactions. *Trends in Neurosciences*, *38*, 3-12.
- Ziegler, M. D., Chelian, S. E., Benvenuto, J., Krichmar, J. L., O'Reilly, R.C., Bhattacharyya, R. (2014). A model of proactive and reactive cognitive control with anterior cingulate cortex and the neuromodulatory system. *Biologically Inspired Cognitive Architectures*, *10*, 61-67.
- Kachergis, G., Wyatte, D., O'Reilly, R.C., de Kleijn, R., Hommel, B. (2014). A continuous-time neural model for sequential action. *Philosophical Transactions of The Royal Society B Biological Sciences*, *369* 20130623.
- Herd, S. A., Szabados, A., Vinokurov, Y., Lebiere, C., Cline, A., and O'Reilly, R.C. (2014). Integrating theories of motor sequencing in the SAL hybrid architecture. *Biologically Inspired Cognitive Architectures*, *8*, 100-108.
- Wyatte, D., Jilk, D.J., & O'Reilly, R.C. (2014). Early recurrent feedback facilitates visual object recognition under challenging conditions. *Frontiers in Psychology*, *5*, 674.
- Herd, S.A., O'Reilly, R.C., Hazy, T.E., Chatham, C.H, Brant, A.M., and Friedman, N.P. (2014). A neural network model of individual differences in task switching abilities. *Neuropsychologia*, *62*, 375–389.
- O'Reilly, R.C., Bhattacharyya, R., Howard, M. D., & Ketz, N. (2014). Complementary learning systems. *Cognitive Science*, *38*, 1229-1248.
- Ketz, N., O'Reilly, R.C. & Curran, T. (2014). Classification aided analysis of oscillatory signatures in controlled retrieval. *NeuroImage*, *85*, 749-760.
- Kriete T., Noelle, D.C., Cohen, J.D., & O'Reilly, R.C. (2013). Indirection and symbol-like processing in the prefrontal cortex and basal ganglia. *Proceedings of the National Academy of Science (USA)*, *110*, 16390-16395.
- Vinokurov, Y. Lebiere, C., Szabados, A., Herd, S., and O'Reilly, R.C. (2013). Integrating top-down expectations with bottom-up perceptual processing in a hybrid neural-symbolic architecture. *Biologically Inspired Cognitive Architectures*, *6*, 140-146.
- O'Reilly, R.C. (2013). Commentary: Individual differences in cognitive flexibility. *Biological Psychiatry*, *74*, 78-79.
- Herd, S.A., Krueger, K.A., Kriete, T.E., Huang, T. & O'Reilly, R.C. (2013). Strategic Cognitive Sequencing: A Computational Cognitive Neuroscience Approach. *Computational Intelligence and Neuroscience*, *2013*, 149329.
- O'Reilly, R.C., Wyatte, D., Herd, S. A., Mingus, B., and Jilk, D. J. (2013). Recurrent processing during object recognition. *Frontiers in Psychology: Perception Science*, *4* (124).

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- Ketz, N., Morkonda, S. G., & O'Reilly, R.C. (2013). Theta Coordinated Error-driven Learning in the Hippocampus. *PLOS Computational Biology, 9*, e1003067.
- Huang, T. R., Hazy, T. E., Herd, S. A., & O'Reilly, R.C. (2013). Assembling old tricks for new tasks: A neural model of instructional learning and control. *Journal of Cognitive Neuroscience, 25*, 843-851.
- Stocco, A., Lebiere, C., O'Reilly, R.C., & Anderson, J. R. (2012). Distinct contributions of the caudate nucleus, rostral prefrontal cortex, and parietal cortex to the execution of instructed tasks. *Cognitive, Affective, and Behavioral Neuroscience, 12*, 611-628.
- Frank, G. K., Reynolds, J. R., Shott, M. E., Jappe, L., Yang, T. T., Tregellas, J. R., & O'Reilly, R.C. (2012). Anorexia Nervosa and Obesity are Associated with Opposite Brain Reward Response. *Neuropsychopharmacology, 37*, 2031-2046.
- Pauli, W. M., Hazy, T. E., & O'Reilly, R.C. (2012). Expectancy, ambiguity and behavioral flexibility: Separable and complementary roles of the orbital frontal cortex and amygdala in processing reward expectancies. *Journal of Cognitive Neuroscience, 24*, 351-66.
- Pauli, W. M., Clark, A. D., Guenther, H. J., O'Reilly, R.C., & Rudy, J. W. (2012) Inhibiting PKM-zeta reveals dorsal lateral and dorsal medial striatum store the different memories needed to support adaptive behavior. *Learning & Memory, 19 (7)*, 307-314.
- Wyatte, D., Herd, S., Mingus, B., & O'Reilly, R.C. (2012). The role of competitive inhibition and top-down feedback in binding during object recognition. *Frontiers in Cognitive Science, 3(182)*, 1-10.
- Wyatte, D., Curran, T., O'Reilly, R. (2012). The limits of feedforward vision: Recurrent processing promotes robust object recognition when objects are degraded. *Journal of Cognitive Neuroscience, 24*, 2248-2261.
- Reynolds, J. R., O'Reilly, R.C., Cohen, J. D., & Braver, T. S. (2012). The function and organization of lateral prefrontal cortex: a test of competing hypotheses. *PloS One 7 (2)*, e30284.
- Chatham, C. H., Herd, S. A., Brant, A. M., Hazy, T. E., Miyake, A., O'Reilly, R.C., and Friedman, N. P. (2011). From an Executive Network to Executive Control: A Computational Model of the n-back Task. *Journal of Cognitive Neuroscience, 23*, 3598-3619.
- Munakata, Y., Herd, S. A., Chatham, C. H., Depue, B. E., Banich, M. T., & O'Reilly, R.C. (2011). A unified framework for inhibitory control. *Trends in Cognitive Sciences. 15*, 453-459.
- Frank, G. K., Reynolds, J. R., Shott, M. E., & O'Reilly, R.C. (2011). Altered temporal difference learning in bulimia nervosa. *Biological Psychiatry, 70*, 728-735.
- Snyder H.R., Hutchison N., Nyhus E., Curran T., Banich M.T., O'Reilly R.C., & Munakata Y. (2010). Neural inhibition enables selection during language processing. *Proceedings of the National Academy of Sciences, USA, 107*, 16483-16488.
- O'Reilly, R.C. (2010). The What and How of prefrontal cortical organization. *Trends in Neurosciences, 33*, 355-361.
- O'Reilly, R.C., Herd, S.A., & Pauli, W.M. (2010). Computational Models of Cognitive Control. *Current Opinion in Neurobiology, 20*, 257-261.
- Hazy, T.E., Frank, M.J, & O'Reilly, R.C. (2010). Neural mechanisms of acquired phasic dopamine responses in learning. *Neuroscience and Biobehavioral Reviews, 34*, 701-720.
- Reynolds, J.R. & O'Reilly, R.C. (2009). Developing PFC representations using reinforcement learning. *Cognition, 113*, 281-292.
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- Jilk, D.J., Lebiere, C., O'Reilly, R.C., & Anderson, J.R. (2008). SAL: An explicitly pluralistic cognitive architecture. *Journal of Experimental and Theoretical Artificial Intelligence, 20*, 197-218.
- Aisa, B., Mingus, B., & O'Reilly, R.C. (2008). The emergent neural modeling system. *Neural Networks, 21*, 1045-1212.

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- Bayley, P.J., O'Reilly, R.C., Curran, T. & Squire, L.R. (2008). New Semantic Learning in Patients with Large Medial Temporal Lobe Lesions. *Hippocampus*, *18*, 575-583.
- Atallah, H.E., Rudy, J.W., & O'Reilly, R.C. (2008). The Competitive Roles of the Dorsal Striatum and Dorsal Hippocampus in Odor Discrimination Tasks. *Learning and Memory*, *15*, 294-298.
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- Frank, M.J., Santamaria, A., O'Reilly, R.C., & Willcutt, E. 2007). Testing Computational Models of Dopamine and Noradrenaline Dysfunction in Attention Deficit/Hyperactivity Disorder. *Neuropsychopharmacology*, *32*, 1583-99.
- Hazy, T.E., Frank, M.J., and 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, Series B*, *362*, 1601-1613.
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- O'Reilly, R.C. (2006). Biologically-Based Computational Models of High-Level Cognition. *Science*, *314*, 91-94.
- 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.
- 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.
- Hazy, T.E., Frank, M.J. & O'Reilly, R.C. (2006). Banishing the homunculus: making working memory work. *Neuroscience*, *139*, 105-118.
- Herd, S.A., Banich, M.T., & O'Reilly, R.C. (2006). Neural Mechanisms of Cognitive Control: An Integrative Model of Stroop Task Performance and fMRI data. *Journal of Cognitive Neuroscience*, *18*, 22-32.
- O'Reilly, R.C. & Frank, M.J. (2006). Making Working Memory Work: A Computational Model of Learning in the Prefrontal Cortex and Basal Ganglia. *Neural Computation*, *18*, 283-328.
- 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.
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Peer Reviewed Conference Proceedings

- Russin, J. L., Zolfaghar, M., Park, S. A., Boorman, E., & O'Reilly, R. C. (2021). Complementary Structure-Learning Neural Networks for Relational Reasoning. *Proceedings for the 43nd Annual Meeting of the Cognitive Science Society, 7*.
- Webb, T., Dulberg, Z., Frankland, S., Petrov, A., O'Reilly, R.C., & Cohen, J. (2020). Learning representations that support extrapolation. International Conference on Machine Learning, 10136–10146. http://proceedings.mlr.press/v119/webb20a.html
- Russin, J., Jo, J., O'Reilly, R.C., & Bengio, Y. (2020). Compositional Generalization by Factorizing Alignment and Translation. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics: Student Research Workshop*, 313–327. https://doi.org/10.18653/v1/2020.acl-srw.42
- Russin, J. L., Jo, J., O'Reilly, R. C., & Bengio, Y. (2020). Systematicity in a Recurrent Neural Network by Factorizing Syntax and Semantics. Proceedings for the 42nd Annual Meeting of the Cognitive Science Society, 7.
- Vinokurov, Y., Lebiere, C., Herd, S. A., O'Reilly, R.C. (2011). A Metacognitive Classifier Using a Hybrid ACT-R/Leabra Architecture. Lifelong Learning: Papers from the 2011 AAAI Workshop (WS-11-15).
- O'Reilly, R.C. & Busby, R.S. (2002). Generalizable Relational Binding from Coarse-coded Distributed Representations. *Advances in Neural Information processing Systems (NIPS) 14*, T. G. Dietterich, S. Becker, and Z. Ghahramani, Eds, Cambridge, MA: MIT Press.
- O'Reilly, R.C. & Soto, R. (2002). A Model of the Phonological Loop: Generalization and Binding. *Advances in Neural Information processing Systems (NIPS) 14*, T. G. Dietterich, S. Becker, and Z. Ghahramani, Eds, Cambridge, MA: MIT Press.
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Books

- O'Reilly, R.C. (2021). Principles of Psychology and Neuroscience (1st Ed). https://github.com/PsychNeuro/ed1
- O'Reilly, R.C., Munakata, Y., Frank, M. J., Hazy, T. E., and Contributors (2020). Computational Cognitive Neuroscience. eBook, 4st Edition. URL: https://github.com/CompCogNeuro/ed4
- O'Reilly, R.C., Munakata, Y., Frank, M. J., Hazy, T. E., and Contributors (2012). Computational Cognitive Neuroscience. Wiki Book, 1st Edition. URL: http://ccnbook.colorado.edu

- O'Reilly, R.C. & Munakata, Y. (2000). *Computational Explorations in Cognitive Neuroscience: Understanding the Mind by Simulating the Brain*. Cambridge, MA: MIT Press.

Book Chapters

- Liu, X., O'Reilly, R. C., & Ranganath, C. (in press). Effects of retrieval practice on tested and untested information: Cortico-hippocampal interactions and error-driving learning. In The Context of Cognition: Emerging Perspectives. Elsevier.
- O'Reilly, R.C., Russin, J., & Herd, S. A. (2019). Computational Models of Motivated Frontal Function. In D'Esposito, M. and Grafman, J. (Eds) *Handbook of Clinical Neurology: The Frontal Lobes, Vol. 163*, 317-332. Elsevier.
- O'Reilly, R.C., Hazy, T. E., & Herd, S. A. (2016). The Leabra Cognitive Architecture: How to Play 20 Principles with Nature and Win!. In Chipman, S. *Handbook of Cognitive Science*. Oxford University Press.
- O'Reilly, R.C., Petrov, A. A., Cohen, J. D., Lebiere, C. J., Herd, S. A., & Kriete, T. (2014). How Limited Systematicity Emerges: A Computational Cognitive Neuroscience Approach. Calvo, P. and Symons, J., Eds. *The architecture of cognition: Rethinking Fodor and Pylyshyn¹s Systematicity Challenge*. MIT Press.
- Hazy, T. E., Frank, M. J., & O'Reilly, R.C. (2011). Toward an executive without a homunculus: computational models of the prefrontal cortex/basal ganglia system. In Seth, A, Prescott, T. & Bryson, J. *Modeling Natural Action Selection*, 239-263. Cambridge University Press.
- Pauli, W. M. and Atallah, H. E. and O'Reilly, R.C. (2010). Integrating what & how/where with instrumental and Pavlovian learning: A biologically based computational model, Frensch, P. A. and Schwarzer, R. (Eds) *Cognition and Neuropsychology - International Perspectives on Psychological Science*. East Sussex, UK: Psychology Press.
- Munakata, Y., O'Reilly, R.C., & Morton, J. B. (2007). Developmental and computational approaches to variation in working memory. In A. Conway, C. Jarrold, M. Kane, A. Miyake, & J. Towse (Eds.) *Variation in Working Memory*, Oxford University Press.
- O'Reilly, R.C. (2006). Modeling Integration and Dissociation in Brain and Cognitive Development. Y. Munakata & M.H. Johnson (Eds) *Processes of Change in Brain and Cognitive Development: Attention and Performance XXI*..Oxford University Press.
- Cer, D.M. & O'Reilly, R.C. (2006). Neural mechanisms of binding in the hippocampus and neocortex: Insights from computational models. In H.D. Zimmer & A. Mecklinger & U. Lindenberger (Eds) *Binding in Memory*, Oxford: Oxford University Press.
- O'Reilly, R.C. (2005). The Division of Labor Between the Neocortex and Hippocampus. In G. Houghton, (Ed) *Connectionist Models in Cognitive Science*, New York: Psychology Press.
- O'Reilly, R.C. & Munakata, Y. (2003). Computational Neuroscience and Cognitive Modeling. In L. Nadel (Ed) *Encyclopedia of Cognitive Sciences*, London: Macmillan.
- O'Reilly, R.C., Busby, R. S. and Soto, R. (2003). Three Forms of Binding and their Neural Substrates: Alternatives to Temporal Synchrony. In A. Cleeremans (Ed) *The Unity of Consciousness: Binding, Integration, and Dissociation*, 168-192, Oxford: Oxford University Press.
- O'Reilly, R.C. & Munakata, Y. (2002). Psychological Function in Computational Models of Neural Networks. In M. Gallagher & R. Nelson (Eds) *Handbook of Psychology, Vol. 3, Biological Psychology*. New York: Wiley.
- O'Reilly, R.C. (2001). Cognitive Neuroscience of Learning and Memory. In W.E. Craighead & C.B. Nemeroff Eds) *The Corsini Encyclopedia of Psychology and Behavioral Science, Third Edition*, New York: John Wiley & Sons.
- O'Reilly, R.C., Braver, T.S., & Cohen, J.D. (1999). A biologically-based computational model of working memory. In A. Miyake & P. Shah (Eds) *Models of Working Memory: Mechanisms of Active Maintenance and Executive Control*, 375-411. New York: Cambridge University Press.
- Farah, M.J., O'Reilly, R.C., & Vecera, S.J. (1997). The neural correlates of perceptual awareness: Evidence from covert recognition in prosopagnosia. In J.D. Cohen & J.W. Schooler (Eds) *Scientific Approaches to the Question of Consciousness*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Cohen, J.D. & O'Reilly, R.C. (1996). A preliminary theory of the interactions between prefrontal cortex and

Cohen, J.D. & O'Reilly, R.C. (1996). A preliminary theory of the interactions between prefrontal cortex and hippocampus that contribute to planning and prospective memory. in M. Brandimonte, G. Epstein & M. McDaniel (Eds) *Prospective Memory: Theory and Applications*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

- O'Reilly, R.C. (1994). Temporally local unsupervised learning: The MaxIn algorithm for maximizing input information. In M.C. Mozer, P. Smolensky, & A.S. Weigend (Eds) *Proceedings of the 1993 Connectionist Summer School*, Hove, England: Lawrence Erlbaum Associates.

Preprints, Technical Reports

- Rohrlich, J., Huang, T.R., Hazy, T.E., O'Reilly, R.C. (2020). Object Recognition's Garden Path: Low Spatial Frequencies. *PsyArXiv*. https://psyarxiv.com/j45fb/
- Russin, J. L., Jo, J., O'Reilly, R.C. & Bengio, Y. (2019). Compositional generalization in a deep seq2seq model by separating syntax and semantics. https://arxiv.org/abs/1904.09708
- O'Reilly, R. C., Hazy, T. E., Mollick, J., Mackie, P., & Herd, S. A. (2014). Goal-driven cognition in the brain: A computational framework. ArXiv:1404.7591 *q-Bio*. http://arxiv.org/abs/1404.7591
- O'Reilly, R. C. (2011). Surely You Must All be Joking: An Outsider's Critique of Quantum Physics. ArXiv:1109.0880 *Physics*, *Physics:Quant-Ph*. http://arxiv.org/abs/1109.0880
- O'Reilly, R.C. & Beck, J.M. (2006). A Family of Large-Stencil Discrete Laplacian Approximations in Three Dimensions.
- O'Reilly, R.C. & McClelland, J.L. (1992). The self-organization of spatially invariant representations. Technical Report PDP.CNS.92.5, Carnegie Mellon University, Department of Psychology.

Software

- The **new** emergent neural modeling system: https://github.com/emer/emergent – complete rewrite in Go / Python.
- The emergent neural modeling system. https://github.com/emer/cemer
- O'Reilly, R.C., Dawson, C.K., & McClelland, J.L. (1995–2007). The PDP++ Neural Network Simulation System. Carnegie Mellon University and the Center for the Neural Basis of Cognition.

Presentations

Conference Presentations: Invited

- O'Reilly, R.C. (2021): Plenary panel discussion on neural network models of cognition at Cognitive Science Conference.
- O'Reilly, R.C. (2021): The central role of the parietal lobe in the neural cognitive architecture. Virtual International Symposium on Cognitive Architecture (VISCA 2021).
- O'Reilly, R.C. (2021): Predictive Error-driven Learning in the Brain. Keynote at the International Conferenceon Error-Driven Learning in Language (EDLL 2021)
- O'Reilly, R.C. (2019): Deep predictive learning in the neocortex and pulvinar, Invited talk at Flux Congress, 2019, New York, NY.
- O'Reilly, R.C. (2019): Computational Models of Motivated and Risky Decision Making. Invited Talk at Daiwa Foundation Workshop on Multi-person perspectives in Psychological Science, Kyoto University, Kyoto, Japan.
- O'Reilly, R.C. (2016): Learning and Gating in the Deep Thalamocortical Layers. Invited Talk at Control Processes, San Diego, CA.
- O'Reilly, R.C. (2016): A Computational Framework for Goal-Driven Learning in the Brain. Invited Talk at Fifth International Symposium on Biology of Decision-Making, Paris, France.
- O'Reilly, R.C. (2016): The Emergence of Symbolic Cognition from Sensory-Motor Dynamics. Invited Talk at Theoretical & Computational Neuroscience Conference, Houston, TX.
- O'Reilly, R.C. (2015): The Emergence of Symbolic Cognition from Sensory-Motor Dynamics. Invited Keynote

- O'Reilly, R.C. (2015): The Emergence of Symbolic Cognition from Sensory-Motor Dynamics. Invited Keynote at Cognitive Science Beijing Symposium, 2015, Beijing, China.
- O'Reilly, R.C. (2015): Biologically-based Error Driven Learning in Thalamocortical Circuits. Invited Keynote at the CVPR-2015 Workshop on DeepVision, Boston, MA.
- O'Reilly, R.C. (2015): Biologically-inspired error driven learning in thalamocortical circuits. Invited Talk at the Neuro-Inspired Computational Elements Workshop, Sandia Labs, Albequerque, NM.
- O'Reilly, R.C. (2014): The Neuroscience of Good Decision Making. Invited Talk at the Allen L. Edwards Psychology Lecture Series, University of Washington, Seattle.
- O'Reilly, R.C. (2014): Goal-Driven Cognition in the Brain: A Computational Framework. Invited Talk at Waterloo Brain Day, University of Waterloo, Canada.
- O'Reilly, R.C. (2014): A Biologically-based Cognitive Architecture for Intelligent Autonomous Systems. Invited Talk at Karles Invitational Conference (ONR), Washington Harbor, DC.
- O'Reilly, R.C. (2013): Neurons Support a Remarkable Range of Computation. Invited Talk at AAAI Fall Symposium, Arlington, VA.
- O'Reilly, R.C. (2013): A goals-first reframing of the biology of reinforcement learning systems. Invited Talk at Reinforcement Learning and Decision Making (RLDM), Princeton, NJ.
- O'Reilly, R.C. (2013): Balancing Biology, Computation, and Cognition in Integrative Architectures. Invited Talk at Cognitive Science Society Workshop on Motivations and Goals in Developing Integrative Models of Human Cognition, Berlin, Germany.
- O'Reilly, R.C. (2013): How Adaptive Control Emerges from Multiple Interacting Brain Systems. Invited Talk at TU Dresden Spring School, Dresden, Germany.
- O'Reilly, R.C. (2012): How Adaptive Control Emerges from Multiple Interacting Brain Systems. Plenary Talk, 13th Neural Computation and Psychology Workshop, San Sebastian, Spain.
- O'Reilly, R.C. (2012): Cortical Learning Mechanisms: From STDP to Error-Driven Learning. Invited Talk at Experimental Psychology Society Meeting, Bristol, UK.
- O'Reilly, R.C. (2012): Biologically Based Computational Models of Working Memory and Executive Function. Invited Talk for Graham Hitch Festschrift, Bristol, UK.
- O'Reilly, R.C. (2012): Computational Insights into Reward-Based Learning. Plenary Talk, Society for Biological Psychiatry, Philadelphia, PA.
- O'Reilly, R.C. (2011): Biologically Based Models of Executive Function. Invited Tutorial, Summer Institute of Cognitive Neuroscience, Santa Barbara, CA.
- O'Reilly, R.C. (2011): Embodied Object Recognition and Metacognition. Keynote Talk, Human Robot Interaction Conference, Lausanne, Switzerland.
- O'Reilly, R. & Wyatte, D. (2011). Embodied object recognition and metacognition. Talk given at the 2011 workshop on Biologically-Consistent Vision, Colorado Springs, CO.
- O'Reilly, R.C. (2009): From Spikes to Object Recognition and Beyond: Building an Embodied Brain. Plenary Talk, Cognitive Science Conference, Amsterdam.
- O'Reilly, R.C. (2007): Abstract Representations and Embodied Agents: Prefrontal Cortex and Basal Ganglia Contributions. Invited talk at CoSy Meeting of the Minds Workshop, Paris, France.
- O'Reilly, R.C. (2005): Interactions between the prefrontal cortex and basal ganglia in the dopamine-based learning of cognitive control. Invited talk at Betty Behrens Symposium, Cambridge, UK.
- O'Reilly, R.C. (2005): Toward an Executive without a Homunculus: Computational Models of the Prefrontal Cortex/Basal Ganglia System. Invited talk at Modelling Natural Action Selection Workshop, Edinburgh, Scotland.
- O'Reilly, R.C. (2005): Primary Value and Learned Value: A computational model of dopamine-based learning in the amygdala and basal ganglia. Invited talk at Motivational Neuroscience Conference, New York, NY.
- O'Reilly, R.C. (2005): Biologically Based Cognitive Architectures: Posterior Cortex, Hippocampus and

- O'Reilly, R.C. (2005): Biologically-Based Cognitive Architecture: Posterior Cortex, Hippocampus, and Prefrontal Cortex/Basal Ganglia. Invited talk at Cortical Memory Storage Symposium, UCLA, Los Angeles, CA.
- O'Reilly, R.C. (2004). Modeling Integration and Dissociation in Brain and Cognitive Development. Invited talk for Processes of Change in Brain and Cognitive Development: Attention and Performance XXI, Winter Park, CO.
- O'Reilly, R.C. (2003): Reinforcement Learning of Dynamic Gating Signals in the Prefrontal Cortex/Basal Ganglia Working Memory System. Invited talk at A Multidisciplinary Approach to the Study of the Frontal Cortex, Nancy, France.
- O'Reilly, R.C. (2003): Prefrontal-Hippocampal Interactions: A Computational Perspective. Invited talk at Memory Disorders Research Society Conference, Chicago, IL.
- O'Reilly, R.C. (2002): Learning and Memory in the Hippocampus and Neocortex: Principles and Models. Invited talk at Sixth International Conference on Cognitive and Neural Systems, Boston University, Boston, MA.
- O'Reilly, R.C. (2001): Models of Hippocampal and Neocortical Contributions to Memory, and Neural Network Modeling Tutorial. Invited talks at EPOS Workshop: Computational Models of Memory, Amsterdam, Netherlands.
- O'Reilly, R.C. (2001): Interactions Between Frontal Cortex and Basal Ganglia in Working Memory: A Computational Model. Invited talk at International Society for Behavioural Neuroscience Conference, Marrakech, Morocco.
- O'Reilly, R.C. (2001): Recent developments of the rapid-incidental-conjunctive model of hippocampal function. Invited talk at 25th Annual Neurobiology of Learning and Memory Conference, Park City, Utah.
- O'Reilly, R.C. (2000): How the Hippocampus and Prefrontal Cortex can Contribute to the Unity of Consciousness: A Computational Perspective. Plenary talk presented at the Association for the Scientific Study of Consciousness Conference: The Unity of Consciousness: Binding, Integration, and Dissociation, Brussels, Belgium.
- O'Reilly, R.C. (2000). Computational Principles of Learning in the Neocortex and Hippocampus. Invited talk presented at: The Nature of Hippocampal-Cortical Interaction: Theoretical and Experimental Perspectives," Dublin, Ireland.
- O'Reilly, R.C. (1999). Conjunctive Representations in Learning and Memory: Principles of Cortical and Hippocampal Function. Invited talk at the American Psychological Society Annual Meeting, Denver, CO.

Conference Presentations: Contributed

- Musslick, S., Hoskin, A. N., Webb, T. W., Frankland, S., Cohen, J. D., Jackson, R. L., Ralph, MA., Chen L., Rogers, T.T., O'Reilly, R.C., & Petrov, A. A. (2019). Understanding interactions amongst cognitive control, learning and representation. In *CogSci*, *2019* (pp. 35-36).
- Webb, T., Frankland, S., Segert, S., Petrov, A., O'Reilly, R.C., & Cohen, J.D. A tradeoff between generalization and perceptual capacity in recurrent neural networks. In *CogSci*, *2019*.
- Frankland, S., Webb, T. W., Petrov, A. A., O'Reilly, R. C., & Cohen, J. (2019). Extracting and Utilizing Abstract, Structured Representations for Analogy. In *CogSci*, *2019* (pp. 1766-1772).
- Rohrlich, J. A. and O'Reilly, R.C. (2018). Deep Predictive Learning in Vision. 2018 Conference on Cognitive Computational Neuroscience. Philadelphia, PA.
- Krueger, K.A., Herd, S.A., Nair, A., Mollick, J. & O'Reilly, R.C. (2018). Neural Mechanisms of Human Decision-Making. 2018 Conference on Cognitive Computational Neuroscience. Philadelphia, PA.
- Krueger, K.A., Nair, A., Mollick, J., Herd, S.A., & O'Reilly, R.C. (2018). A biologically inspired neural network model of integration and arbitration of decision making. Computational and Systems Neuroscience (Cosyne) 2018. Denver, CO.
- Mollick, J., Pauli, W.M., Chang, L.J, O'Reilly, R.C., Wager, T. (2017). The Neural Mechanisms of Worse than Expected Prediction Errors. The 3rd Multidisciplinary Conference on Reinforcement Learning and Decision Making

Making.

- O'Reilly, R.C. (2015): Roles of the Basal Ganglia, OFC, and ACC in Goal-driven Cognition. Talk at first annual International Convention of Psychological Science (ICPS), Amsterdam, Netherlands.
- Szabados, A., Herd, S., Vinokurov, Y., Lebiere, C. & O'Reilly, R.C. (2013): Integrating Systems and Theories in the SAL Hybrid Architecture. Talk at the AAAI Fall Symposium, Arlington, VA.
- Ketz, Nick, O'Reilly, Randall, Curran, Tim. (2013). Classification Aided Analysis of Oscillatory Signatures in Controlled Retrieval. Poster session presented at national conference for the Cognitive Neuroscience Society. San Francisco, CA.
- Mollick, J., Brant, A., Friedman, N., O'Reilly, R.C. (2013) Working memory: Looking at gating and maintenance with the keep-track task. Poster presented at Annual Meeting of Society for Neuroscience. San Diego, CA
- Mollick, J., Krishnan, A., Chang, L.J., Reynolds, J., Wager, T. and Frank, G., O'Reilly, R.C., (2013). Conditioned inhibition and the learning of negative values. Poster presented at Social and Affective Neuroscience. San Francisco, CA
- Schapiro, A., Herd, S., Trippe, A., O'Reilly, R.C., Rogers, T., & Norman, K.A. (2012). The computational mechanisms underlying learning during sleep. Poster presented at the 13th Neural Computation and Psychology Workshop (NCPW13). San Sebastian, Spain.
- Ketz, Nick, Gnanasekaran, Srinimish, O'Reilly, Randall. (2012). Error-driven learning within the Hippocampus; theta rhythm, and novelty based learning signals. NCPW Abstracts 2012, San Sebastian, Spain.
- Vinokurov, Y., Wyatte, D., Lebiere, C., O'Reilly, R.C., & Herd, S. (2012). Unsupervised Learning in Hybrid Cognitive Architectures. AAAI-12 Workshop on Neural-Symbolic Learning and Reasoning.
- Ketz, N., Morkonda, S., O'Reilly, R. (2012). Error-driven learning within the Hippocampus; theta rhythm, and novelty based learning signals. Poster presented at the 2012 meeting of Computational and Systems Neuroscience. Salt Lake City, UT.
- Wyatte, D., Tang, H., Buia, C., Madsen, J., O'Reilly, R., & Kreiman, G. (2012). Object completion along the ventral visual stream: neural signatures and computational mechanisms. Poster presented at the 2012 meeting of Computational and Systems Neuroscience, Salt Lake City, UT.
- Wyatte, D. & O'Reilly, R. (2011). Recurrent processing during object recognition. Poster presented at the 2011 meeting of the Vision Sciences Society, Naples, FL.
- Mingus, B., Kriete, T., Herd, S., Wyatte, D., Latimer, K., & OReilly, R. (2011). Generalization of Figure- Ground Segmentation from Monocular to Binocular Vision in an Embodied Biological Brain Model. In Schmidhuber, J., Thorisson, K.R., Looks, M. (Eds.). Artificial General Intelligence. 351-356.
- Stocco, A., Lebiere, C., O'Reilly, R.C., & Anderson, J. R. (2010). The Role of the Basal Ganglia-Anterior Prefrontal Circuit as a Biological Instruction Interpreter. In A. V. Samsonovich, K. R. Johannsdotir, A. Chella and B. Goertzel (Eds.), Proceedings of the First Annual Meeting of the Biologically Inspired Cognitive Architectures (BICA) Society, pp. 153-162. Amsterdam, NL: IOS Press.
- Wyatte, D.R. & O'Reilly, R.C. (2010). The role of feedback projections in a biologically realistic, high performance model of object recognition. Poster presented at the 2010 annual meeting of the Vision Sciences Society, Naples, FL.
- Pauli, W.M., Hazy, T.E. & O'Reilly, R.C. (2010). Division of labor among multiple parallel cortico - basal ganglia - thalamic loops in Pavlovian and instrumental tasks: A biologically-based computational model. Poster at Determinants of Executive Function and Dysfunction Conference, Boulder, CO.
- Pauli, W.M., Clark, A.D., O'Reilly, R.C., & Rudy, J.W. (2010). Distinct striatal areas support goal-directed and stimulus-driven behavior. 7th Forum of European Neuroscience, Amsterdam.
- Herd, S.A., Mingus, B. & O'Reilly, R.C. (2010). Dopamine and self-directed learning. Talk at Biologically Inspired Cognitive Architectures conference, Washington, DC.
- Herd, S.A., Mingus, B. & O'Reilly, R.C. (2010). Artificial Boredom: toward human-like self-directed learning. Poster at Biologically Inspired Cognitive Architectures conference, Washington, DC.

- Pauli, W.M., Hazy, T.E., & O'Reilly, R.C. (2009). Division of labor among multiple parallel cortico – basal ganglia – thalamic loops in Pavlovian and instrumental tasks: A biologically-based computational model. Poster at the Computational Cognitive Neuroscience Conference, Boston, MA.
- Reynolds, J. R., O'Reilly, R.C., & Braver, T. S. (2008). Computational, behavioral, and neuroimaging approaches to understanding the hierarchical organization of prefrontal cortex and goal-oriented behavior. Talk given at the annual meeting of the Memory Disorders Research Society, St. Louis, MO.
- Pauli, W. M., Atallah, H.E., Hazy, T.E. & O'Reilly, R.C. (2007). An integrated model of instrumental conditioning. Poster at the Annual Neuroscience Society Meeting, San Diego, CA.
- Aisa, B., and Mingus, B., and O'Reilly, R.C. (2007). The Emergent Neural Network Modeling System. Poster presented at the Annual Society for Neuroscience meeting, San Diego, CA
- Reynolds, J. R., O'Reilly, R.C., & Braver, T. S. (2007). Computational, behavioral and neuro-imaging methods investigating the hierarchical organization of prefrontal cortex and goal-oriented behavior. Talk given at the Neural Information Processing Systems Workshop on the Hierarchical Organization of Behavior.
- Pauli, W.M. & O'Reilly, R.C. (2006). Attentional Control of Associative Learning. Poster at the Computational Cognitive Neuroscience Conference 2006, Houston, TX.
- Reynolds, J. R., & O'Reilly (2006). Computational constraints in the development of hierarchical goal representations. Paper presented at the annual meeting of the Society for Neuroscience, Atlanta, GA.
- Hazy, T.H., Frank, M.J., Watz, B. & O'Reilly, R.C. (2005). The PVLV model: A new biological theory of Pavlovian conditioning. Poster presented at the Annual Neuroscience Society Meeting, Washington, DC.
- Atallah, H.E. & O'Reilly, R.C. (2005). Effects of basal ganglia lesions on instrumental and Pavlovian learning in rats. Poster presented at the Annual Neuroscience Society Meeting, Washington, DC.
- Branning, P., Watz, B., Aisa, B. & O'Reilly, R.C. (2005). Simulated arm coupled with posterior parietal cortex model performs visually guided reach. Poster presented at Computational Cognitive Neuroscience I.
- Santamaria, A. & O'Reilly, R.C. (2005). A Computational Model of Interval Timing in the Cerebellum and Prefrontal Cortex. Poster presented at the Annual Cognitive Neuroscience Society Meeting, New York, NY.
- Herd, S.A. & O'Reilly, R.C. (2004). A Neural Feature Integration Theory of Visual Search. Poster presented at the Annual Neuroscience Society Meeting, San Diego, CA.
- Atallah, H.A., Rudy, J.W. & O'Reilly, R.C. (2004). Rats with a hippocampal lesion are not impaired on the transitive inference task, but are they using logic? Poster presented at the Annual Neuroscience Society Meeting, San Diego, CA.
- Frank, M.J. & O'Reilly, R.C. (2004). Dynamic dopamine modulation in the basal ganglia: A neurocomputational account of cognitive deficits in medicated and non-medicated Parkinsonism. Poster presented at the Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- Santamaria, A. & O'Reilly, R.C. (2004). Conditioned Interval Timing: A Computational Model and Experimental Tests. Poster presented at the Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- O'Reilly, R.C. (2004). Prefrontal-Hippocampal Interactions: A Computational Perspective. Talk presented at the Winter Conference on Brain Research, Copper, CO.
- Jilk, D.J., Cer, D. & O'Reilly, R.C. (2003). Effectiveness of Neural Network Learning Rules Generated by a Biophysical Model of Synaptic Plasticity. Poster presented at the Computational Neuroscience Conference, Alicante, Spain.
- Herd, S.A. & O'Reilly, R.C. (2003). Parallel Neural Network Models of Visual Search. Poster presented at the Computational Neuroscience Conference, Alicante, Spain.
- Huber, D.E., Curran, T., O'Reilly, R.C., & Woroch, B. 2003). Immediate Repetition Priming: Measuring Synaptic Depression with ERPs. Poster presented at the Computational Neuroscience Conference, Alicante, Spain.
- Santamaria, A. & O'Reilly, R.C. (2002). Interval Timing: A Cerebellar Model and Investigation of Temporal Production. Poster presented at the Annual meeting of the Psychonomic Society, Kansas City, MO.

- Huber, D.E., Curran, T. & O'Reilly, R.C. (2002). Temporally segregating written words through synaptic depression: The electrophysiological correlates of neural persistence and neural accommodation. Poster presented at the Summer Annual Interdisciplinary Conference, Squamish, BC, Canada.
- Huber, D.E., Curran, T. & O'Reilly, R.C. (2002). Discounting repeated words through synaptic depression: Using ERPs to measure the correlates of lingering and depressing neural activation. Poster presented at the Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- Herd, S.A., & O'Reilly, R.C. (2002). Attentional Control as Excitatory Bias – Accounting for fMRI Data. Poster presented at the Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- Huber, D.E., & O'Reilly, R.C. (2002). How is the brain able to identify items with minimal interference from prior presentations? Talk presented at the Annual Interdisciplinary Conference, Jackson Hole, WY.
- O'Reilly, R.C. (2002). Computational Principles of Learning in the Neocortex and Hippocampus. Talk at the Winter Conference on Neural Plasticity, Moorea, French Polynesia.
- O'Reilly, R.C. (2002). Neural Mechanisms of Learning in Frontal Cortex and Basal Ganglia. Talk at the Winter Conference on Brain Research, Snowmass, Colorado.
- Rudy, J.W. & O'Reilly, R.C. (2001). Conditioning to A Memory: Episodic Recall Depends on the Hippocampus. Poster presented at the Annual Society for Neuroscience Meeting, San Diego, CA.
- Huber, D.E., & O'Reilly, R.C. (2001). Unbiased benefits and deficits in short-term repetition priming. Poster presented at the 42nd Annual meeting of the Psychonomic Society, Orlando, Florida.
- O'Reilly, R.C. (2001). Toward a biological basis of systematic controlled processing: Activation- and weight-based approaches. Talk presented at the ONR Cortex Workshop, Raleigh-Durham, NC.
- O'Reilly, R.C. (2001): Interactions Between Prefrontal Cortex and Basal Ganglia in Working Memory. Talk at 34th Annual Winter Conference on Brain Research, Steamboat Springs, CO.
- Stedron, J.M., Munakata, Y., & O'Reilly, R.C. (2000). Spatial reorientation in young children: A case of modularity? Poster presented at the 2000 meeting of the International Conference on Infant Studies, Brighton, England.
- Norman, K. A., O'Reilly, R.C., & Huber, D. E. (2000). Modeling Neocortical Contributions to Recognition Memory. Poster presented at the Seventh Annual Cognitive Neuroscience Society, San Francisco, CA.
- O'Reilly, R.C. (2000). Towards a biological basis of systematic controlled processing: Activation- and weight-based approaches. Talk presented at the ONR Cortex Workshop, Elkridge, MD.
- O'Reilly, R.C. (1999). Interactions between working memory and long-term memory: Computational insights. Talk presented at the Memory Disorders Meeting, Tucson, AZ.
- O'Reilly, R.C. & Munakata, Y. (1999). Cognitive modeling using the PDP++ neural network simulation system. Tutorial presented at the Twenty First Annual Conference of the Cognitive Science Society.
- O'Reilly, R.C. & Farah, M. J. (1999). Covert Face Recognition: Further Tests of a Computational Model. Poster presented at the Sixth Annual Cognitive Neuroscience Society, Washington, DC.
- Wager, T.D. & O'Reilly, R.C. (1999). Reconciling Biology and Function in the Thalamus: A Computational Simulation of the Role of the Thalamic Reticular Nucleus in Attention. Poster presented at the Sixth Annual Cognitive Neuroscience Society, Washington, DC.
- O'Reilly, R.C. (1998). The combination of supervised and unsupervised learning facilitates rerepresentation in deep networks. Talk presented at the Neural Information Processing Systems workshops, Breckenridge, CO.
- O'Reilly, R.C. (1998). Principles for learning and processing in the cortex: Reconciling interactivity and generalization using competition and Hebbian learning. Talk presented at the Fifth Annual Cognitive Neuroscience Society, San Franciso, CA.
- O'Reilly, R.C. & Norman, (1997). A hippocampal model of recognition memory. Talk presented at the Neural Information Processing Systems workshops, Breckenridge, CO.
- O'Reilly, R.C. (1995). Combined error-driven and associative learning as a model of neocortical learning

- O'Reilly, R.C. (1995). Combined error-driven and associative learning as a model of neocortical learning. Poster presented at the Second Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- Goddard, N.H., McClelland, J.L., & O'Reilly, R.C. (1995). Correlation-based invertible encoding in a model of hippocampal memory. Society for Neuroscience Abstracts. & Poster presented at the 1995 Society for Neuroscience Conference, San Diego, CA.
- McClelland, J.L, McNaughton, B.L, & O'Reilly, R.C. (1993). Why there are complementary learning systems in the hippocampus and neocortex: Insights from the successes and failures of connectionist models of learning and memory. Talk presented at the Annual Meeting of the Psychonomics Society, Washington, D.C.
- O'Reilly, R.C. (1992). Object recognition and sensitive periods: A computational analysis of visual imprinting. Paper presented at the Third Annual Midwest Connectfest, Pittsburgh, PA.
- McClelland, J.L, McNaughton, B.L, O'Reilly, R.C, & Nadel, L. (1992). Complementary roles of hippocampus and neocortex in learning and memory. Society for Neuroscience Abstracts. & Poster Presented at 1992 Society for Neuroscience Conference, Anaheim, CA.
- Farah, M.J., O'Reilly, R.C., & Vecera, S.J. (1991). Dissociated overt and covert recognition as an emergent property of lesioned attractor networks. Poster presented at the Annual Meeting of the Psychonomics Society, San Francisco, CA.
- O'Reilly, R.C. (1991). The self-organization of spatially invariant representations. Paper presented at the 9th Annual Pitt-CMU Conference on Cognition, Pittsburgh, PA.

Colloquia and Other Invited Talks

- The Learning Salon, Online https://www.learningsalon.ai, March, 2021.
- Department of Cognitive Science, UC Merced, Merced, CA, February, 2020.
- Mathematics of Data and Decisions Seminar, UC Davis, Davis, CA, February, 2020.
- Center for Vision Science, UC Davis, Davis, CA, January, 2020.
- Center for Mind and Brain Idea Blitz, UC Davis, Davis, CA, September, 2019.
- Center for Neuroscience Retreat, UC Davis, Davis, CA, September, 2019.
- Princeton Neuroscience Institute, Princeton University, Princeton, NJ, April, 2019.
- Bernstein Lecture, Bernstein Center for Computational Neuroscience, Eberhard Karls University of Tübingen, Germany, July 2018.
- Neuroscience and Biology Seminar, Montreal Institute for Learning Algorithms, University of Montreal, Canada, June, 2018.
- Center for Mind and Brain, University of California Davis, December 2017.
- Neuroscience Club, University of Colorado Boulder, October 2017.
- BrainHub, Carnegie Mellon University, Pittsburgh, PA, October 2017
- University of Tokyo, Center for Early Childhood Development, Education, and Policy Research Colloquium, June 2017.
- Kyoto University, Department of Education Colloquium, June 2017.
- Advanced Telecommunications Research Institute International (ATR) Colloquium, Japan, April 2017.
- Department of Psychology, University of Arizona, Tucson, April, 2016.
- Department of Computer and Information Science (IDA), Linkoping University, Sweden, November, 2015.
- Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN, September, 2015.
- Leiden Institute for Brain and Cognition, Leiden University, Leiden, Netherlands, March 2015.
- STEMinar, University of Colorado Boulder, November, 2014
- Graduate Program in Neuroscience, University of Western Ontario, April, 2014
- Department of Psychology and Neuroscience, University of Colorado Boulder, March, 2014
- Department of Psychology, Kyoto University, Japan, June 2013
- Center for Theoretical Neuroscience, Columbia University, March 2013
- Department of Psychology, Lehigh University, October 2012
- Department of Psychology, Princeton University, October 2012
- Department of Cognitive, Linguistic, and Psychological Sciences, Brown University, October, 2012
- Department of Psychology, Cornell University, September 2012
- DELTA Center, University of Iowa, May 2012
- Neuroscience Research Group, University of Denver, November, 2011
- Department of Psychology, Carnegie Mellon University, February, 2011
- CogFest 2010, The Ohio State University, May, 2010.
- ICSI, UC Berkeley, December 2009

- ICSI, UC Berkeley, December, 2009.
- ICBS, UC Berkeley, November, 2009.
- Cognitive Science Department, UCSD, November, 2009.
- CPD Group, UC Berkeley, October, 2009.
- Department of Psychology, Stanford University, October, 2009.
- Neuroscience Research Group, University of Denver, May 2007.
- Cognitive Neuroscience Section, NINDS, NIH, November 2005.
- Department of Psychology, University of Iowa, April 2005.
- Picower Center for Learning and Memory, MIT, March 2005.
- Center for Memory and Brain, Boston University, March 2005.
- Neuroscience Center, University of Colorado Boulder, February, 2004.
- Neuroscience Research Group, University of Denver, February, 2004.
- Cognitive Science Center, University of Arizona, Tuscon, AZ, January 2004.
- Developmental Brain Research Center Inaugural Symposium, Hokkaido University, December, 2003.
- Department of Psychology, Rutgers University Newark, November 2003.
- Brain Institute Student Invited Speaker, Vanderbilt University, May 2003.
- Center for the Neural Basis of Cognition Distinguished Alumni lecture, CMU, November 2002.
- RIKEN Brain Science Institute, Saitama, Japan, August 2002.
- Department of Systems Science, Tokyo University, Tokyo, Japan, August 2002.
- Department of Psychology, Otago University, Dunedin, New Zealand, July 2002.
- Department of Brain and Cognitive Sciences, MIT, May 2002.
- Department of Psychology, University of Colorado, Denver, March 2002.
- Computation and Neural Systems Seminar, California Institute of Technology, February 2002.
- Cognitive Science Program, Georgia Institute of Technology, October 2001.
- Centre for Brain and Cognitive Development, Birkbeck College, London, May 2001.
- Department of Psychology, University of Wisconsin Madison, April 2001.
- Department of Psychology, UCLA, March, 2001.
- Cognitive Science, Indiana University, March 2001.
- Gatsby Computational Neuroscience Unit at the University College, London, July 2000.
- Institute for Neuroscience at the University of Pennsylvania, April, 2000.
- University of Arizona, Tuscon, AZ, April, 1999.
- Departments of Computer Science, Psychology, and Center for the Neural Basis of Cognition Science of Learning Research Seminar, Carnegie Mellon University, Pittsburgh, PA, November, 1998.
- Colorado School of Mines, Department of Mathematics and Computer Science, Golden, Colorado, April, 1998.
- University of Denver, Department of Psychology Neuroscience Research Group, Denver, CO, October 1997.
- Umea University, Psychology Department, Umea, Sweden, January 1997.
- Harvard University Cognition, Brain, and Behavior, Cambridge, MA, November 1996.
- University of the Sorbonne, Paris, France, July 1995.

Teaching and Supervision

Awards

- Excellence in Teaching award, CU Neuroscience Club, 1999.

Courses Taught

- General Psychology (undergraduate)
- Computational Cognitive Neuroscience (graduate and undergraduate).
- Cognitive Neuroscience Proseminar (graduate).
- Introduction to Cognition and Perception (undergraduate).
- Introduction to Statistics and Research Methods (undergraduate).
- Behavioral, Biological, and Computational Principles of Learning and Memory in the Hippocampus and Neocortex (graduate).
- Analytical Methods in Psychological Modeling (graduate and undergraduate).

Supervision: Current

Senior Research Associates

- Thomas Hazy, MD (10/2001 – present)

- Seth Herd, PhD (2005 – present)
- John Rohrlich, PhD (2012 – present)
- Xiaonan Liu, PhD, 2019 – present (with Charan Ranganath)

Postdocs

- Kevin McKee, PhD, 2021 – present (with Cam Carter)

Graduate students

- Maryam Zolfaghar (9/2016 – present)
- Jacob Russin (9/2017 – present)
- Andrew Carlson (9/2020 – present)
- Yicong (Alan) Zheng (9/2020 – present, with Charan Ranganath)
- Ashley Williams (9/2019 – present, with Charan Ranganath)

Supervision: Completed

Grads, Primary Advisor

- Dr. Seth A. Herd, PhD 1999 – 2005 (now CEO of eCortex, Inc and Senior Research Associate in CCN Lab)
- Dr. Hisham Atallah, PhD 2000 – 2006 (now Postdoc with Ann Graybiel at MIT)
- Dr. Amy Santamaria, PhD 2000 – 2006 (now Staff Research Scientist, Micro Analysis and Design)
- Dr. Michael Frank, PhD 2001 – 2006 (now Professor at Brown University http://ski.cog.brown.edu/)
- Philip Branning, Masters 2005 – 2006 (now Software Engineer at Epirus, CA)
- Brad Aisa, Masters 2007 - 2009 (Software Developer in Lab 2004 - 2009; now Senior Software Development Engineer, OpenText, Inc.)
- Wolfgang M. Pauli, PhD 2005 – 2012 (now Research Scientist at Microsoft, Inc, after Postdoc with John O'Doherty at CalTech)
- Dean Wyatte, PhD 2008 – 2014 (now at Square, Boulder)
- Brian Mingus, Masters 2010 – 2013
- Prescott Mackie Masters 2012 – 2015 (now independent researcher)
- Nick Ketz, PhD 2010 – 2016 (now Research Scientist at HRL)
- Jessica Mollick, PhD 2011 – 2017 (now Postdoc with Hedy Kober at Yale)
- George William Chapman IV, Masters 9/2016 – 8/2018 (now grad student at BU)

Grads, Secondary Advisor

- Richard Busby, Applied Math Masters Student
- Daniel Cer, CS PhD Student
- Brian Loughry, CS Masters Student
- Rodolfo Soto, Psych PhD Student

Postdocs

- Dr. David Huber, 1999 - 2003 (now Professor at UMass Amherst)
- Dr. Kenneth Norman, 1999 - 2002 (now Professor at Princeton University http://compmem.princeton.edu/)
- Dr. Nicolas Rougier, 2000 - 2003 (now Research Scientist at LORIA France http://www.loria.fr/~rougier/)
- Dr. Jeremy Reynolds, 2005 - 2008 (now Senior Data Scientist Lead at Microsoft, after being Assistant Professor at University of Denver)
- Dr. Alex Petrov, 2005 - 2006 (now Associate Professor at Ohio State University http://alexpetrov.com/)
- Dr. Tsung-Ren Huang, 2011-2014 (now Assistant Professor at National Taiwan University)
- Dr. Trent Kriete, 2010 – 2014 (now Chief Data Scientist at RxRevu, Denver, CO)
- Dr. Sergio Verduzco-Flores 2011 – 2015 (now Postdoctoral Fellow at Okinawa Institute of Science and Technology)
- Kai Krueger, PhD, 3/2011 – 8/2021 (now Senior Data Scientist at Wells-Fargo)

Professional Activities

Editorial boards

- Consulting Editor, *Psychonomic Bulletin and Review*, 2013-present
- Associate Editor, *Psychological Review*, 2003-2006
- Reviewing Editor, *Hippocampus*, 2003-2006

- Reviewing Editor, *Hippocampus*, 2003-2006.
- Associate Editor, *Cognitive Science*, 2001-2004.
- Faculty of 1000 Contributor, (www.facultyof1000.com), Theoretical Neuroscience, 2001-2005

Professional memberships

- American Psychological Association
- American Psychological Society
- Society for Neuroscience
- Cognitive Neuroscience Society
- Cognitive Science Society
- International Society for Behavioral Neuroscience
- Memory Disorders Research Society

Program Committees

- Computational Cognitive Neuroscience Conference, 2005-2006.
- Cognitive Science Society Conference, 2002.

Reviewing

- NIMH inaugural RDOC meeting on Working Memory, 2011.
- NSF grant proposal reviewing (CRCN panel, May 2002; ad hoc).
- National Institutes of Health grant peer review panels, ad hoc member several times.
- Journals, Conferences, Books: *Biological Cybernetics*, *Cognitive Science*, *Cognitive Science Society*, *eLife*, *Experimental Brain Research*, *Hippocampus*, *IEEE Transactions on Neural Networks*, *Journal of Experimental Psychology: General*, *Journal of Neuroscience*, *Memory*, *Memory and Cognition*, *MIT Press*, *Nature*, *Network: Computation in Neural Systems*, *Neural Computation*, *Neural Information Processing Systems NIPS)*, *Neural Networks*, *Neuron*, *Oxford University Press*, *PLOS Computational Biology*, *PNAS*, *Psychological Bulletin*, *Psychological Review*, *Science*, *Trends in Cognitive Sciences*.

Professional Service

- DoD Future Directions Workshop on Human-Machine Learning, July 2019.
- DARPA Defense Sciences Research Council, April 2012.
- Chair of inaugural organizing committee for Computational Cognitive Neuroscience Conference, Washington, DC, 2005.
- Cognitive Program Chair, Department of Psychology, University of Colorado Boulder, 2002-3.
- Member of organizing committee for fourth International Conference on Cognitive Modeling, George Mason University, 2001.
- Co-organized workshop on “The hippocampus and episodic memory” at the Neural Information Processing Systems conference in Breckenridge, CO, 1997.
- Maintain email list for *Emergent* software, and provide assistance to researchers using this software (1995-present).

Personal information

- Citizenship: USA

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