Daniel J. O'Shea

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Links: Service, Honors, Publications, Code & Data, Talks, Conference Abstracts

Research Interests ↑

I study the neural mechanisms that control movement, and more broadly, how neural populations spanning interconnected brain regions perform the distributed computations that drive skilled behavior. I develop experimental and computational tools to understand the neural population dynamics that establish speed and dexterity. I construct dynamical systems models of neural computations, which I then test and refine using targeted perturbations of neural activity via optogenetic and electrical stimulation. I engineer robotic systems to facilitate precision movement behaviors and to deliver mechanical perturbations to probe flexible, feedback control. I aim to discover insights into brain-wide computations in health and in neurological disease, with an eye towards identifying effective, targeted neuromodulation to treat movement disorders.

Positions ↑

2023– *Postdoctoral scholar*, Advised by Karl Deisseroth
Howard Hughes Medical Institute at Stanford University, Stanford, CA

2017–2022 *Postdoctoral scholar*, Neural Prosthetics Systems Laboratory. Advised by Krishna V. Shenoy.
Howard Hughes Medical Institute at Stanford University, Stanford, CA

2010–2017 *Graduate Student*, Neural Prosthetics Systems Laboratory. Advised by Krishna V. Shenoy.
Howard Hughes Medical Institute at Stanford University, Stanford, CA

2009 Lead developer at Memrise, startup focused on language learning via optimal recall algorithms.
Princeton, NJ

2007–2009 *Undergraduate Researcher*, Laboratory of Carlos D. Brody.
Princeton University, Princeton, NJ

2008 *Research internship*, Laboratory of Sebastian Seung.
Massachusetts Institute of Technology, Cambridge, MA

2007 *Research assistant*, Embedded Systems Laboratory of Marilyn Wolf.
Princeton University, Princeton, NJ

Education ↑

2017 PhD in Neuroscience, Stanford University
Dissertation: *"Probing the motor cortical dynamics of flexible feedback control."* [DOI 10.25740/SM819JV1898]

2009 BSE in Electrical Engineering, Princeton University (*summa cum laude*)
Certificates in Applied and Computational Mathematics, Applications of Computing, Neuroscience, and Robotics and Intelligent Systems
Thesis: *"Low Rank, Pairwise Constrained Neuronal Connectivity Matrices."* [ARK 88435/DSP01XW42N995R]

Selected Teaching, Mentoring, and Service ↑

2022 Co-organizer, Workshop on *"Illuminating neural computation through perturbations and adaptive experimental designs."* at Computational and Systems Neuroscience (COSYNE). Cascais, Portugal.

2021 Certificate in Critical Consciousness and Anti-Oppressive Praxis (CCC&AOP). Office of Inclusion, Community, and Integrative Learning (ICIL), Stanford University.

2021–2022 Reviewer for Simons Collaboration for the Global Brain Undergraduate Research Fellowship (SURF) program.

2020–2022 Stanford Neuroscience Application Assistance Program mentor and mock interviewer

2017 Mentor, Research Experience for Undergraduates (REU) student, *Engineering for Science: Incorporating Mechatronics into the Study of Marmosets*, Dept. of Electrical Engineering, Stanford University

2017 Mentor, REU student, Project title: *Real-Time Computer Vision for Pose Detection in Marmoset Motor Control Experiments*, Dept. of Electrical Engineering, Stanford University

2017 Mentor, REU student, Project title: *Haptic Controller with VR Integration for Marmoset Motor Control Experiments*, Dept. of Electrical Engineering, Stanford University

2015 Teaching assistant and lecturer for PSY 287: *Brain Machine Interfaces: Science, Technology, and Application*, E.J. Chichilnisky and Brian Wandell, Depts. of Psychology and Neurosurgery, Stanford University

2014 Co-mentor, MSc research project, Project title: *Large-scale analysis of in-vivo optical neural imaging data using distributed computing*, Stanford University

2014 Mentor, REU student, Project title: *Exploring data collection methods in primate motor cortex research*, Dept. of Electrical Engineering, Stanford University

2012 Co-created and co-taught NENS 230: *Data Analysis Techniques in Neuroscience*, Stanford University School of Medicine

2011-2014 Neuroscience Institute lead and invited lecturer, Stanford Institutes of Medicine Summer Research (SIMR) Program, Stanford University School of Medicine

2016– *Ad hoc* reviewer for Journal of Neuroengineering, Journal of Neuroscience, Journal of Neuroscience Methods, Cell Reports, Nature (co-reviewed with PI), Nature Human Behavior

Honors ↑

2023 Society for the Neural Control of Movement (NCM) Scholarship
2023 IOP Publising Outstanding Reviewer Award winner
2022 Sammy Kuo Award, Wu Tsai Neurosciences Institute, Stanford University.
Awarded 2nd place for best paper by a postdoctoral scholar for the year.
2019 IOP Publising Outstanding Reviewer Award winner
2018 BCI Society International BCI Meeting Best Poster Award
2013 NSF IGERT Video and Poster Competition, winner of Public Choice and Community Choice
2012–2015 Center for Mind, Brain, and Computation NSF IGERT Research Fellowship, Stanford University
2009–2014 Dr. Regina Casper Stanford Graduate Research Fellowship
2009–2014 National Science Foundation Graduate Research Fellowship
2009 Department of Energy Computational Graduate Research Fellowship (awarded)
2009 *Summa cum laude*, Tau Beta Pi, Phi Beta Kappa, Princeton University
2009 Tau Beta Pi Prize, School of Engineering and Applied Sciences, Princeton University
2009 Charles Ira Young Fellowship for Excellence in Research, Princeton University
2006,7 Shapiro Prize for Academic Excellence (top ≈5%), Princeton University
2005 USA Mathematical Talent Search (USAMTS), Gold medalist

Preprints

2023 Trautmann E.M., Hesse J.K., Stine G.M., Xia R., Zhu S., **O'Shea D.J.**, Karsh B., Colonell J., Lanfranchi F.F., Vyas S., Zimnik A., Steinmann N.A., Wagenaar D.A., Andrei A., Lopez C.M., O'Callaghan J., Putzeys J., Raducanu B.C., Welkenhuysen M., Churchland M., Moore T., Shadlen M., Shenoy K.V., Tsao D., Dutta B., Harris T. (2023) Large-scale brain-wide neural recording in nonhuman primates *bioRχiv* [DOI 10.1101/2023.02.01.526664v2].

2022 **O'Shea, D.J.***, Duncker, L*, Goo W, Sun X, Vyas S, Trautmann, E.M., Diester I, Ramakrishnan C, Deisseroth K, Sahani M†, Shenoy, K.V.†. (2022) Direct neural perturbations reveal a dynamical mechanism for robust computation. *bioRχiv* [DOI 10.1101/2022.12.16.520768].

Peer-reviewed Publications ↑ [Google Scholar] [PubMed NCBI]

2022 Sun X.*, **O'Shea D.J.***, Golub M.D., Trautmann E.M., Vyas S., Ryu S.I., Shenoy K.V. (2022) Cortical preparatory activity indexes learned motor memories. *Nature*. 602, 274–279. [DOI 10.1038/s41586-021-04329-x]

2021 Trautmann E.M.*, **O'Shea D.J.***, Sun X.*, Marshel J., Crow A., Hsueh B., Vesuna S., Cofer L., Bohner G., Allen W., Kauvar, I., Quirin, S., MacDougall, M., Chen, Y., Whitmire, M.P., Ramakrishnan, C., Sahani, M., Seidemann, E., Ryu, S.I., Deisseroth, K., Shenoy, K.V. (2021). Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface. *Nature Communications*. 12 (1), 1-20. [DOI 10.1038/s41467-021-23884-5]

2020 Tremblay S., Acker L., Afraz A., Albaugh D.L., Amita H., Andrei A.R., Angelucci A., Aschner A., Balan P.F., Basso M.A, Benvenuti G., Bohlen M.O., Caiola M.J., Calcedo R., Cavanaugh J., Chen Y., Chen S., Chernov M.M., Clark A.M., Debes S.R., Deisseroth K., Desimone R., Dragoi V., Egger S.W., Eldridge M., El-Nahal H.G., Fabbrini F., Federer F., Fetsch C.R., Fortuna M.G., Friedman R.M., Fujii N., Gail A., Galvan A., Ghosh S., Gieselmann M.A, Gulli R.A., Hikosaka O., Hosseini E.A., Hu X., Hüer J., Inoue K., Janz R., Jazayeri M., Jiang R., Ju N., Kar K., Klein C., Kohn A., Komatsu M., Maeda K., Martinez-Trujillo J.C., Matsumoto M., Maunsell J.H.R., Mendoza-Halliday D., Monosov I.E., Muers R.S., Nurminen L., Ortiz-Rios M., **O'Shea D.J.**, Palfi S., Petkov C.I., Pojoga S., Rajalingham R., Ramakrishnan C., Remington E.D., Revsine C., Roe A.W., Sabes P.N., Saunders R., Scherberger H., Schmid M.C., Schultz W., Seidemann E., Senova Y.-S., Shadlen M.N., Siu C, Smith Y, Solomon S.S., Sommer M.A., Spudich JL, Stauffer W.R., Takada M., Tang S., Thiele A., Treue S., Vanduffel W., Vogels R., Whitmire M.P., Wichmann T., Wurtz R.H., Xu H., Yazdan-Shahmorad A., Shenoy K.V., DiCarlo J., Platt M.L. (2020) An open resource for non-human primate optogenetics. *Neuron*. 108:1-16. [DOI 10.1016/J.NEURON.2020.09.027]

2020 Vyas S., **O'Shea D.J.**, Ryu S.I., Shenoy K.V. (2020) Causal role of motor preparation during error-driven learning. *Neuron*. 106:329-339. [DOI 10.1016/J.NEURON.2020.01.019]

2019 Trautmann E.M., Stavisky S.D., Lahiri S., Ames K.C., Kaufman M.T., **O'Shea D.J.**, Vyas S., Sun X., Ryu S.I., Ganguli S., Shenoy K.V. (2019) Accurate estimation of neural population dynamics without spike sorting. *Neuron*. 103:1-17. [DOI 10.1016/J.NEURON.2019.05.003]

2018 Pandarinath, C., **O'Shea, D.J.**, Collins, J., Jozefowicz, R., Stavisky, S.D., Kao, J.C., Trautmann, E.M., Kaufman, M.T., Ryu, S.I., Hochberg, L.R., Henderson, J.M., Shenoy, K.V., Abbott, L.F., Sussillo, D., 2018. Inferring single-trial neural population dynamics using sequential auto-encoders. *Nature Methods* 15, 805–815. [DOI 10.1038/S41592-018-0109-9]

2018 **O'Shea, D.J.***, Kalanithi, P.*, Ferenczi, E.A., Hsueh, B., Chandrasekaran, C., Goo, W., Diester, I., Ramakrishnan, C., Kaufman, M.T., Ryu, S.I., Yeom, K.W., Deisseroth, K., Shenoy, K.V., 2018. Development of an optogenetic toolkit for neural circuit dissection in squirrel monkeys. *Scientific Reports* 8, 6775. [DOI 10.1038/S41598-018-24362-7]

2017 **O'Shea, D.J.**, Shenoy, K.V., (2017) ERAASR: An algorithm for removing electrical stimulation artifacts from multielectrode array recordings. *Journal of Neural Engineering* 15, 026020. [DOI 10.1088/1741-2552/AAA365]

2016 **O'Shea, D.J.**, Trautmann, E., Chandrasekaran, C., Stavisky, S., Kao, J.C., Sahani, M., Ryu, S., Deisseroth, K., Shenoy, K.V., (2016) The need for calcium imaging in nonhuman primates: New motor neuroscience and brain-machine interfaces. *Experimental Neurology*. [DOI 10.1016/J.EXPNEUROL.2016.08.003]

2016 Ozden, I., Wang, J., Lu, Y., May, T., Lee, J., Goo, W., **O'Shea, D.J.**, Kalanithi, P., Diester, I., Diagne, M., Deisseroth, K., Shenoy, K.V., Nurmikko, A.V., (2013) A coaxial optrode as multifunction write-read probe for optogenetic studies in non-human primates. *Journal of Neuroscience Methods* 219, 142–154. [DOI 10.1016/J.JNEUMETH.2013.06.011]

2014 Kerr, C.C., **O'Shea, D.J.**, Goo, W., Dura-Bernal, S., Francis, J.T., Diester, I., Kalanithi, P., Deisseroth, K., Shenoy, K.V., Lytton, W.W., (2014) Network-level effects of optogenetic stimulation in a computer model of macaque primary motor cortex. *BMC Neuroscience* 15, P107. [DOI 10.1186/1471-2202-15-S1-P107]

2012 Mattis, J., Tye, K.M., Ferenczi, E.A., Ramakrishnan, C., **O'Shea, D.J.**, Prakash, R., Gunaydin, L.A., Hyun, M., Fenno, L.E., Gradinaru, V., Yizhar, O., Deisseroth, K., (2012) Principles for applying optogenetic tools derived from direct comparative analysis of microbial opsins. *Nature Methods* 9, 159–172. [DOI 10.1038/NMETH.1808]

2011 Yizhar, O., Fenno, L.E., Prigge, M., Schneider, F., Davidson, T.J.,**O'Shea, D.J.**, Sohal, V.S., Goshen, I., Finkelstein, J., Paz, J.T., Stehfest, K., Fudim, R., Ramakrishnan, C., Huguenard, J.R., Hegemann, P., Deisseroth, K., (2011) Neocortical excitation/inhibition balance in information processing and social dysfunction. *Nature* 477, 171–178. [DOI 10.1038/NATURE10360]

Previews and Peer-reviewed conference proceedings ↑

2016 **O'Shea, D.J.**, Shenoy, K.V., (2016) The importance of planning in motor learning (Preview). *Neuron* 92, 669–671. [DOI 10.1016/J.NEURON.2016.11.003]

2016 Trautmann, E.*, **O'Shea, D.J.***, Shrestha, S., Lin, S., Ryu, S., Shenoy, K., 2015. Design of an implantable artificial dural window for chronic two-photon optical imaging in non-human primates. *Conf. Proc. IEEE Eng. Med. Biol. Soc.* 2015, 7554–7557. [DOI 10.1109/EMBC.2015.7320140] [GITHUB DJOSHEA/OBCI]

2011 Diester I., Kaufman M.T., Goo W., **O'Shea D.J.**, Kalanithi P.S., Deisseroth K, Shenoy K.V. (2011) Optogenetics and brain-machine interfaces. *Conf. Proc. IEEE Eng. Med. Biol. Soc.*.

Code and Datasets ↑

2022 **O'Shea DJ**. Haptic Control: real-time controller for Force Dimension delta.3 robot enabling precision reaching and motor learning tasks. [GITHUB DJOSHEA/HAPTIC-CONTROL] [DOCS]

2021 **O'Shea DJ**. Neuropixel Utilities: a toolkit for accessing, manipulating, and visualizing SpikeGLX datasets. Zenodo. [DOI 10.5281/ZENODO.5790124] [GITHUB DJOSHEA/NEUROPIXEL-UTILS] [DOCS]

2021 **O'Shea DJ***, Trautmann EM*, Sun X*, Deisseroth K**, Shenoy KV** (2021) Datasets for Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface. Dryad, Dataset. [DOI 10.5061/DRYAD.CNP5HQC4K]

2021 **O'Shea DJ**, Trautmann EM, Sun X, Deisseroth K**, Shenoy KV** (2021) Real-time optical brain computer interface code repository for Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface. Zenodo. [DOI 10.5281/ZENODO.4766453] [GITHUB DJOSHEA/OBCI] [DOCS]

2018 **O'Shea DJ** (2018). LFADS interface: a toolkit for organizing, hyperparameter optimization, and analysis of LFADS models and dynamical neural stitching. Zenodo. [DOI 10.5281/ZENODO.5790162] [GITHUB LFADS/LFADS-RUN-MANAGER] [DOCS]

2018 **O'Shea DJ**, Trautmann EM, Sussillo, D, Shenoy KV** (2018) Code and data to reproduce LFADS neural dynamical stitching results. Zenodo. [DOI 10.5281/ZENODO.5789844] [GITHUB DJOSHEA/LFADS-NEURAL-STITCHING-REPRODUCE] [DOCS]

2017 **O'Shea DJ**, Shenoy KV (2017). ERAASR: Estimation and Removal of Array Artifacts via Sequential principal components Regression. Code. [DOI 10.5281/ZENODO.5768793] [GITHUB DJOSHEA/ERAASR]

Invited talks ↑

2022 Grossman Center for the Statistics of Mind at Columbia University. *The population dynamics of perturbations in motor cortex.* Columbia University, New York, NY.

2022 Flatiron Institute Center for Computational Neuroscience. *The population dynamics of perturbations in motor cortex.* Flatiron Institute, New York, NY.

2022 Computational and Systems Neuroscience (COSYNE). *Electrical but not optogenetic stimulation drives nonlinear contraction of neural states.*. COSYNE Workshop. Cascais, Portugal.

2019 UC Davis Department of Psychology Brown Bag Seminar. *"Optical tools for understanding primate motor cortical dynamics"*. UC Davis. Davis, CA.

2019 Keren Haroush Laboratory, Research Group Talk. *"Optical tools for understanding primate motor cortical dynamics"*. Stanford University. Stanford, CA.

2019 Computational and Systems Neuroscience (COSYNE). *"Inferring brain-wide neuronal dynamics on single trials via neural stitching of many Neuropixels recordings."*. Lisbon, Portugal. [Video]

2018 Eiman Azim Laboratory, Research Group Talk. *Motor cortical dynamics enabling flexible feedback control.* Salk Institute. La Jolla, CA.

2018 Karl Deisseroth Laboratory, Research Group Talk. *"Motor cortical dynamics enabling flexible feedback control"*. Center for Cracking the Neural Code, Stanford University. Stanford, CA.

2018 Janelia Conference: Mechanisms of Dexterous Behavior. *"Population dynamics of proprioceptive error dynamics in motor cortex."* Janelia Research Campus. Ashburn, VA.

2017 College of Neural Sciences Research Seminar Talk. *"Motor cortex is robust to transient excitatory perturbations."* University of Texas at Austin. Austin, TX.

2017 Janelia Research Seminar. *"Robustness to transient excitation in motor cortex via a neural population dynamical null space."* Janelia Research Campus. Ashburn, VA.

2015 IEEE International Conference on Robotics and Automation: Haptics for Neuroscience and Neuroimaging Symposium. *"Leveraging haptics to explore feedback control in the motor cortex"*. Seattle, Washington.

2015 Course lecture. Brain Machine Interfaces: Science, Technology, and Application. *"'Motor Prostheses: Primate Models and Motor Physiology."* Stanford University Psychology 287 / Neurosurgery 287. Stanford, CA.

2015 Math, Monkeys, and Machines Research Seminar Talk. *"Motor cortex implements a goal-dependent feedback control policy."* Stanford University. Stanford, CA.

2014 Stanford Robotics seminar series. *"Towards the neural dynamics of motor feedback control."* Stanford University. Stanford, CA.

2013 Philip Sabes Research Group Talk. *"Motor cortical dynamics following optogenetic disruption of motor preparation."*. UCSF. San Francisco, CA.

2013 Stanford Center for Mind, Brain, and Computation seminar series. *"Pushing in the wrong direction: optogenetic perturbation misaligns with motor cortical dynamics."* Stanford University. Stanford, CA.

2013 Mark Churchland Research Group Talk. *"Robust neural population dynamics drive rapid recovery from optogenetic disruption in moror cortex."* Columbia University. New York, NY.

2013 Cold Spring Harbor Summer Seminar Series. *"Neural dynamics in motor cortex following optogenetic disruption of motor preparation."* Cold Spring Harbor Laboratory. Cold Spring Harbor, NY.

2012 Arto Nurmikko Research Group Talk. *"Optogenetic disruption of motor preparation in primates"*. Brown University. Providence, RI.

2011 Stanford Photonics Research Society Annual Symposium. *"Optogenetic tools designed for primates"*. Stanford University. Stanford, CA.

2008 Hebb Laboratory, Sebastian Seung. *"Building the mouse retinal 'parts list': Automated characterization of neuronal morphology and determination of stratification depth from confocal image stacks"*. Massachusetts Institute of Technology. Cambridge, MA.

Conference abstracts and presentations ↑

2022 **O'Shea D.J.***, Duncker L.*, Vyas, S., Sun, X., Sahani, M., Shenoy, K.V. (2022) Optogenetic and electrical perturbations in motor cortex reveal a neural population mechanism for robust computation. *Society for Neuroscience.* San Diego, CA.

2022 **O'Shea D.J.***, Duncker L.*, Vyas, S., Sun, X., Sahani, M., Shenoy, K.V. (2022) Electrical but not optogenetic stimulation drives nonlinear contraction of neural states. *Computational and Systems Neuroscience (COSYNE).* Poster 2-069. Lisbon, Portugal.

2021 **O'Shea D.J.**, Trautmann E.M., Sun X., Vyas S., Shenoy K.V. (2021) Motor cortical neural dynamics are finely spatially intermingled. *Computational and Systems Neuroscience (COSYNE).* Poster 526. Online.

2021 **O'Shea, D.J.**, Trautmann, E.M., Sun, X., Vyas, S., Shenoy, K.V. (2021) High-density silicon probes reveal signatures of neural circuit organization in motor cortical dynamics. *Neural Control of Movement Annual Meeting*, Online.

2020 Duncker L*, **O'Shea DJ***, Shenoy KV, Sahani M (2020) A dynamical model with E/I balance explains robustness to optogenetic stimulation in motor cortex. Frontiers in Neuroscience. Conference Abstract: Computational and Systems Neuroscience (COSYNE), Denver, CO. Poster number III-41.

2019 **O'Shea, D.J.**, Allen, W., Luo, L., Deisseroth, K., Sussillo, D. (2019) Inferring brain-wide neuronal dynamics on single trials via neural stitching of many Neuropixels recordings. Frontiers in Neuroscience. Conference Abstract: *Computational and Systems Neuroscience (COSYNE)*, Lisbon, Portugal. Talk number T-43.

2018 **O'Shea, D.J.**, Trautmann, E.M., Ryu, S., Shenoy, K.V. Population dynamics of proprioceptive error signals in motor cortex. Program No. 735.15. Neuroscience Meeting Planner. *Society for Neuroscience.* San Diego, CA.

2017 **O'Shea, D.J.**, Pandarinath, C., Collins, J., Jozefowicz R., Stavisky, S.D., Kao J.C., Trautmann, E.M., Churchland, M.M., Kaufman, M.T., Ryu, S., Henderson, J.M., Shenoy, K.V., Abbott, L.F., Sussillo, D. (2017) Dynamic neural stitching: Learning consistent neural population dynamics from separately recorded neural populations across months using LFADS. Program No. 346.19. Neuroscience Meeting Planner. *Society for Neuroscience.* Washington, D.C.

2017 Duncker L.*, **O'Shea D.J.***, Goo W., Shenoy K.V., Sahani M. (2017, talk) Low-rank non-stationary population dynamics can account for robustness to optogenetic stimulation. Frontiers in Neuroscience. *Conference Abstract: Computational and Systems Neuroscience (COSYNE)*, Salt Lake City, UT. T-29.

2016 Sun X.*, Trautmann E.*, **O'Shea D.J.***, Ryu S.I., Marshel J., Allen W., Kauvar I., Ramakrishnan C., Deisseroth K., Shenor K.V. (2016) Stable, chronic two-photon imaging in awake, behaving rhesus macaque. Program No. 92.15. Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience.* Online.

2016 **O'Shea D.J.**, Shenoy K.V. (2016) Electrical microstimulation in primate premotor cortex hijacks local neural activity. Program No. 247.23 / TT5. Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience.* Online.

2015 **O'Shea D.J.**, Trautmann E.M., Lin S., Shenoy K.V. (2015) Motor cortical neurons reflect the active goal-dependent feedback control policy. Program No. 244.05. Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. Chicago, IL.

2015 Trautmann E.*, **O'Shea D.J.***, Shrestha S., Lin S., Ryu S.I., Shenoy K.V. (2015) Design of an implantable artificial dural window for chronic two-photon optical imaging in non-human primates. Program No. 732.02. Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. Chicago, IL.

2014 **O'Shea D.J.**, Trautmann E.M., Shenoy K.V. (2014) Macaque motor feedback responses rapidly reflect haptically-rendered environmental constraints. Program No. 735.15. Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. Washington, DC.

2014 **O'Shea D.J.**, Goo W., Diester I., Kalanithi P., Deisseroth K., Shenoy K.V. (2014) Optogenetic perturbation and low-dimensional motor cortical activity. *Neural Control of Movement*, Amsterdam.

2014 **O'Shea D.J.**, Goo W., Kalanithi P., Diester I., Deisseroth K., Shenoy K.V. (2014, poster) Pushing in the wrong direction: optogenetic perturbation misaligns with motor cortical dynamics. Frontiers in Neuroscience. Conference Abstract: *Computational and Systems Neuroscience (COSYNE)*, Salt Lake City, UT. III-100.

2013 **O'Shea D.J.***, Goo W.*, Kalanithi P., Diester I., Ozden I., Wang J., Nurmikko A.V., Deisseroth K., Shenoy K.V. (2013) Dynamics of primate premotor cortical recovery following optogenetic disruption of motor preparation. Program No. 750.13. 2013 Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. San Diego, CA.

2013 **O'Shea, D.J.**, Goo, W. Kalanithi P., Diester I., Ozden I., Wang J., Nurmikko A.V., Deisseroth K., Shenoy K.V. (2013) *Probing neural dynamics with optogenetic perturbations in primate cortex.* Brain Science Institute, RIKEN, Wako, Japan.

2013 **O'Shea D.J.***, Goo W.*, Kalanithi P., Diester I., Ramakrishnan C., Deisseroth K., Shenoy K.V. (2013) Neural dynamics following optogenetic disruption of motor preparation. Frontiers in Neuroscience. *Conference Abstract: Computational and Systems Neuroscience (COSYNE)*, Salt Lake City, UT. III-60.

2012 Goo W.*, **O'Shea D.J.***, Kalanithi P., Diester I., Ramakrishnan C., Deisseroth K., Shenoy K.V. (2012, talk) Disruption of motor preparation by optogenetic stimulation of primate premotor cortex. Program No. 229.06. 2012 Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. New Orleans, LA.

2012 **O'Shea D.J.**, Goo W., Kalanithi P., Diester I., Ramakrishnan C., Deisseroth K., Shenoy K.V. (2012) Optogenetic perturbation of motor preparation in primate dorsal premotor cortex. Program No. 208.05. 2012 Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online. New Orleans, LA.

2011 **O'Shea D.J.***, Goo W.*, Diester I., Kalanithi P., Yizhar O., Ramakrishnan C., Deisseroth K., Shenoy K.V. (2011) Optogenetic control of excitatory neurons via a red-shifted opsin in primate premotor cortex. Program No. 306.11. Neuroscience Meeting Planner. Washington, DC: *Society for Neuroscience.* Online.