

Curriculum Vitae – December 2021

Matthew T. Kaufman, PhD

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University of Chicago
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Chicago, IL 60637

Education: Ph.D., Neuroscience, lab of Krishna Shenoy, Stanford University (Defended July, 2011).
B.S., Symbolic Systems (Neuroscience concentration), Stanford University (2005).

Academic appointments:

2018-present Assistant Professor, department of Organismal Biology and Anatomy, University of Chicago.
2018-present Member, Grossman Institute for Neuroscience, Quantitative Biology and Human Behavior.
2012-2018 Postdoctoral Fellow, Laboratory of Anne Churchland, Cold Spring Harbor Laboratory.
2011-2012 Postdoctoral Fellow, Laboratory of Krishna Shenoy, Stanford University.

Program of research: Neural population activity of motor control and decision making in rodents.
Communication between brain areas and dynamical systems modeling. Two-photon imaging, complex behavior, electrophysiology, optogenetics, and widefield imaging.

Awards and honors:

Distinguished Leader in Diversity and Inclusion Award, Biological Sciences Division, Univ. Chicago (2021)
Sloan Research Fellowship (2019)
Simons Collaboration on the Global Brain postdoctoral fellowship (2015)
McKnight Foundation Allison Doupe fellowship (2015)
Swartz postdoctoral fellowship for theoretical and computational neuroscience (2013)
Neural Control of Movement Trainee scholarship (2011)
National Science Foundation graduate research fellowship (2006)
Phi Beta Kappa, graduated with Honors and with Distinction (2005)

Current grants:

2018 NSF-NCS 1835390, Co-PI with Chethan Pandarinath (PI, Emory) and Lee Miller (Co-PI, Northwestern). “Discovering dynamics in massive-scale neural datasets using machine learning”
2019 Whitehall Foundation research grant (PI): “Dynamic brain area communication in decision and movement”
2021 NIH R01 NS121535-01A1 (PI): “Mapping neural ensemble computations to biological circuitry in motor control and decision making”
2021 Simons Collaboration on the Global Brain Pilot Award (PI): “Communication among sensorimotor cortices: where state space meets biology”

Preprints:

Sabatini DA, **Kaufman MT** (2021, preprint). A curved manifold orients rotational dynamics in motor cortex. *bioRxiv*.

Zhu F, Grier HA, Tandon R, Cai C, Giovannucci A, **Kaufman MT***, Pandarinath C* (2021, preprint). A deep learning framework for inference of single-trial neural population activity from calcium imaging with sub-frame temporal resolution. *bioRxiv*.

Malonis PJ, Hatsopoulos NG, MacLean JN*, **Kaufman MT*** (2021, preprint). M1 dynamics share similar inputs for initiating and correcting movement. *bioRxiv*.

Original papers:

Huang L, Kebschull JM, Furth D, Musall S, **Kaufman MT**, Churchland AK, Zador AM (2020). BRICseq bridges brain-wide interregional connectivity to neural activity and gene expression in single animals. *Cell*. 182(1):177-88.

Suresh AK, Goodman JM, Okorokova EV, **Kaufman MT**, Hatsopoulos NG, Bensmaia SJ (2020). Neural population dynamics are different for reach and grasp. *eLife*. 2020 Nov 17;e58848.

Musall S*, **Kaufman MT***, Juavinett AL, Gluf S, Churchland AK (2019). Single-trial neural dynamics are dominated by richly varied movements. *Nature Neuroscience*. 22, 1677-86.

Trautmann EM, Stavisky SD, Lahiri S, Ames KC, **Kaufman MT**, O'Shea DJ, Vyas S, Sun X, Ryu SI, Ganguli S, Shenoy KV (2019). Accurate estimation of neural population dynamics without spike sorting. *Neuron*. 103(2):292-308.

Kaufman MT (2018). Adapting fine with a little help from the null space [Spotlight]. *Neuron*. 100(4):771-3.

Pandarinath C, O'Shea DJ, Collins J, Jozefowicz R, Stavisky SD, Kao JC, Trautmann EM, **Kaufman MT**, Ryu SI, Hochberg LR, Henderson JM, Shenoy KV, Abbott LF, Sussillo D (2018). Inferring single-trial neural population dynamics using sequential auto-encoders. *Nature Methods*. 15(10):805-15.

O'Shea DJ*, Kalanithi P*, Ferenczi E, Hsueh B, Chandrasekaran C, Goo W, Diester I, Ramakrishnan C, **Kaufman MT**, Ryu SI, Yeom KW, Deisseroth K**, Shenoy KV** (2018). Development of an optogenetic toolkit for neural circuit dissection in squirrel monkeys. *Scientific Reports*. 8(1):6775.

Omrani M, **Kaufman MT**, Hatsopoulos NG, Cheney PD (2017). Perspectives on classical controversies about the motor cortex. Collection. *Journal of Neurophysiology*. 118(3):1828-48.

Licata AM, **Kaufman MT**, Raposo D, Ryan MB, Sheppard JP, Churchland AK (2017). Posterior parietal cortex guides visual decisions in rats. *Journal of Neuroscience*. 37(19):4954-66.

Kaufman MT, Seely JS, Sussillo D, Ryu SI, Shenoy KV, Churchland MM (2016). The largest response component in motor cortex reflects movement timing but not movement type. *eNeuro*. 3(4):ENEURO.0085-16.2016.

Kaufman MT, Churchland AK (2016). Many paths from state to state [News and Views]. *Nature Neuroscience*. 19(12):1541-2.

Seely JS, **Kaufman MT**, Ryu SI, Shenoy KV, Cunningham JP, Churchland MM (2016). Tensor analysis reveals distinct population structure that parallels the different computational roles of areas M1 and V1. *PLOS Computational Biology*. 12(11):e1005164.

Elsayed GF, Lara AH, **Kaufman MT**, Churchland MM, Cunningham JP (2016). Complete reorganization of the population response across linked computations in motor cortex. *Nature Communications*. 7:13239.

Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2015). Vacillation, indecision and hesitation in moment-by-moment decoding of monkey motor cortex. *eLife*. 2015;4:e04677.

Sussillo D, Churchland MM, **Kaufman MT**, Shenoy KV (2015). A neural network that finds naturalistic solutions for the production of muscle activity. *Nature Neuroscience*. 18(7):1025-33.

- Raposo D*, **Kaufman MT***, Churchland AK (2014). A category-free neural population supports evolving demands during decision-making. *Nature Neuroscience*. 17(12):1784-92.
- Kaufman MT**, Churchland MM, Ryu SI, Shenoy KV (2014). Cortical activity in the null space: permitting preparation without movement. *Nature Neuroscience*. 17(3):440-8.
- Kaufman MT**, Churchland MM, Shenoy KV (2013). The roles of monkey M1 neuron classes in movement preparation and execution. *Journal of Neurophysiology*. 110:817-25.
- Kaufman MT**, Churchland AK (2013). Cognitive neuroscience: sensory noise drives bad decisions [News and Views]. *Nature*. 496(7444):172-3.
- Cowley BR, **Kaufman MT**, Butler ZS, Churchland MM, Ryu SI, Shenoy KV, Yu BM (2013). DataHigh: Graphical user interface for visualizing and interacting with high-dimensional neural activity. *Journal of Neural Engineering*. 10:066012.
- Churchland MM*, Cunningham JP*, **Kaufman MT**, Nuyujukian P, Foster JD, Ryu SI, Shenoy KV (2012). Neural population dynamics during reaching. *Nature*. 487:51-56.
- Gilja V, Nuyujukian P, Chestek CA, Cunningham JP, Yu BM, Fan J, Churchland MM, **Kaufman MT**, Ryu SI, Shenoy KV (2012). A high-performance neural prosthesis enabled by control algorithm design. *Nature Neuroscience*. 15:1752-1757.
- Diester I, **Kaufman MT**, Mogri M, Pashaie R, Goo W, Yizhar O, Ramakrishnan C, Deisseroth K, Shenoy KV (2011). An optogenetic toolbox designed for primates. *Nature Neuroscience*. 14(3):387-97.
- Chestek CA, Gilja V, Nuyujukian P, Foster JD, Fan JM, **Kaufman MT**, Churchland MM, Rivera-Alvidrez Z, Cunningham JP, Ryu SI, Shenoy KV (2011). Long-term stability of neural prosthetic control signals from silicon cortical arrays in rhesus macaque motor cortex. *Journal of Neural Engineering*. 8(4):045005.
- Kaufman MT**, Churchland MM, Santhanam G, Yu BM, Afshar A, Ryu SI, Shenoy KV (2010). The roles of monkey premotor neuron classes in movement preparation and execution. *Journal of Neurophysiology*. 104:799-810.
- Churchland MM, Cunningham JP, **Kaufman MT**, Ryu SI, Shenoy KV (2010). Cortical preparatory activity: Representation of movement or first cog in a dynamical machine? *Neuron*. 68:387-400.
- Knutson B, Taylor J, **Kaufman M**, Peterson R, Glover G (2005). What do you expect?: fMRI of Expected Utility. *Journal of Neuroscience*. 25(19):4806-12.

Book chapters:

- Shenoy KV, **Kaufman MT**, Sahani M, Churchland MM (2011). A dynamical systems view of motor preparation: Implications for neural prosthetic system design. Chapter in *Progress in Brain Research: Enhancing Performance for Action and Perception*, edited by Green A, Chapman E, Kalaska JF, Lepore F. Vol. 192. Elsevier.

Conference proceedings:

- Zhu F, Sedler AR, Grier HA, Ahad N, Davenport MA, Kaufman MT, Giovannucci A, Pandarinath C (2021). Deep inference of latent dynamics with spatio-temporal super-resolution using selective backpropagation through time. 35th Conference on Neural Information Processing Systems (NeurIPS 2021).

- Pei F*, Ye J*, Zoltowski D, Wu A, Chowdhury RH, Sohn H, O'Doherty JE, Shenoy KV, Kaufman MT, Churchland MM, Jazayeri M, Miller LE, Pillow J, Park IM, Dyer EL, Pandarinath C (2021). Neural Latents Benchmark '21: Evaluating latent variable models of neural population activity. 35th Conference on Neural Information Processing Systems (NeurIPS 2021).
- Giovannucci A, Friedrich J, Kaufman M, Churchland A, Chklovskii D, Paninski L, Pnevmatikakis EA (2017). OnACID: Online Analysis of Calcium Imaging Data in real time. *Advances in Neural Information Processing Systems*.
- Gilja V*, Nuyujukian P*, Chestek CA, Cunningham JP, Yu BM, Fan JM, Churchland MM, Kaufman MT, Ryu SI, Shenoy KV (2012). A brain machine interface control algorithm designed from a feedback control perspective. *Proc. of the 34th Annual International Conference IEEE EMBS*. San Diego, CA. 1318-1322.
- Cowley BR, Kaufman MT, Churchland MM, Ryu SI, Shenoy KV, Yu BM (2012). DataHigh: Graphical user interface for visualizing and interacting with high-dimensional neural activity. *Proc. of the 34th Annual International Conference IEEE EMBS*. San Diego, CA. 4607-4610.
- Diester I, Kaufman MT, Goo W, O'Shea DJ, Kalanithi PS, Deisseroth K, Shenoy KV (2011). Optogenetics and brain-machine interfaces. *Proc. of the 33rd Annual International Conference IEEE EMBS*. Boston, MA.
- Chestek CA, Gilja V, Nuyujukian P, Foster J, Kaufman MT, Ryu SI, Shenoy KV (2010). Waveform stability and neural decoder performance across 7 weeks. *Proc. of the Neural Interfaces Conference*, Long Beach, CA.
- Choi D, Kaufman M, Langley P, Nejati N, Shapiro D (2004). An architecture for persistent reactive behavior. *Proceedings of the Third International Joint Conference on Autonomous Agents and Multi Agent Systems*. New York, NY: ACM Press.

Talks:

- What's a manifold, anyway? (discussion coordinator). *Midwest Monkey Manifolds for Movement*. Chicago, 2018.
- Mapping mouse cortex with spontaneous correlations in calcium imaging (invited talk). *Simons Collaboration on the Global Brain Neural Coding and Dynamics Seminars*. New York, NY, 2016.
- Networks for decision making: signal routing in and through parietal cortex. *Simons Collaboration on the Global Brain Annual Meeting*. New York, NY, 2015.
- Decision and action: A dynamical systems perspective. *Janelia Farm Systems Neuroscience Seminar Series*. Ashburn, VA, 2015.
- Cortical activity in the null space: permitting preparation without movement (minisymposium). *Neuroscience 2014 Annual Meeting*. Washington, DC: Society for Neuroscience, 2014.
- Understanding mixed selectivity in rat parietal cortex. *Sloan-Swartz Meeting for Computational Neuroscience*. Seattle, WA, 2014.
- A novel mechanism for controlling communication between neural circuits. *Ascona 2013 conference*. Monte Verita, Switzerland, 2013.
- Controlling cortical communication using the null space. *Sloan-Swartz Meeting for Computational Neuroscience*. Brandeis University, MA, 2013.
- Decision and indecision on single trials of a monkey maze-reaching task (nanosymposium). *Neuroscience 2012 Annual Meeting*. New Orleans, LA: Society for Neuroscience, 2012.
- Changes of mind in a decision-making maze task in monkey (nanosymposium). *Neuroscience 2011 Annual Meeting*. Washington, DC: Society for Neuroscience, 2011.

A single-trial view of changes of mind in monkey motor cortex (invited presentation). Memory and Decision lunch, Psychology department, Stanford, CA, 2011.

Stanford Neuroscience Program Student Retreat (invited talk). Monterey, CA, 2010.

Lack of evidence for inhibitory gating in monkey M1 (nanosymposium). *Neuroscience 2010 Annual Meeting*. San Diego, CA: Society for Neuroscience, 2010.

Refereed abstracts:

Zhu F, Grier H, Tandon R, Cai C, Giovannucci A, Kaufman MT, Pandarinath C (2021, poster). Precise inference of single trial network dynamics from calcium imaging using LFADS. *Computational and Systems Neuroscience (COSYNE)*. Online.

Sabatini, DA, Kaufman MT (2020, poster). Temporal basis decomposition reveals a linear relationship between neural activity and kinematics. *Computational and Systems Neuroscience (COSYNE)*. Denver, CO.

Lahiri S, Trautmann E, O'Shea D, Vyas S, Sun X, Ganguli S, Shenoy K, Stavisky S, Ames KC, Kaufman MT, Ryu SI (2019, poster). Accurate estimation of neural population dynamics without spike sorting. *Computational and Systems Neuroscience (COSYNE)*. Lisbon, Portugal.

Musall S, Kaufman M, Churchland A, Gluf S (2018, poster). Functional assessment of large-scale cortical networks during multisensory decision making. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Denver, CO.

Pandarinath C, Abbott LF, Sussillo D, O'Shea D, Collins J, Jozefowicz R, Stavisky S, Kao J, Trautmann E, Kaufman M, Ryu S, Hochberg L, Henderson J, Shenoy K (2018, poster). LFADS: a deep learning technique to precisely estimate neural population dynamics on single trials. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Denver, CO.

Friedrich J, Churchland A, Chklovskii D, Paninski L, Giovannucci A, Kaufman M, Pnevmatikakis E (2018, poster). OnACID: Online Analysis of Calcium Imaging Data in real time. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Denver, CO.

Kaufman MT, Musall S, Barabasi D, Churchland AK (2017, poster). Neuron-level resolution of activity boundaries using calcium imaging. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.

Pandarinath C, Collins J, Jozefowicz R, Stavisky S, Kao J, Churchland MM, Kaufman MT, Ryu SI, Henderson J, Shenoy KV, Abbott L, Sussillo D (2017, poster). Precise estimates of single-trial neural population state in motor cortex via deep learning methods. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.

Trautmann E, Stavisky S, Kaufman MT, Ames KC, Ryu SI, Shenoy KV (2016, poster). Sortfree: Using threshold crossings to evaluate scientific hypotheses in population analyses. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.

Kaufman MT, Seely JS, Ryu SI, Shenoy KV, Churchland MM (2014, talk; presented by M Churchland). The neural basis of voluntary movement initiation. *Cold Spring Harbor Laboratory symposium: The Leading Strand*. Cold Spring Harbor, NY.

Seely J, Kaufman MT, Cueva C, Paninski L, Shenoy KV, Churchland MM (2014, talk). State-space models for cortical-muscle transformations. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.

Kaufman MT, Raposo D, Churchland AK (2013, poster). Dynamics of decision and action in rat PPC. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.

Kaufman MT, Seely JS, Ryu SI, Shenoy KV, Churchland MM (2013, poster). A large untuned signal in motor cortex predicts movement onset, *NCM 23rd Annual Meeting*. San Juan, PR.

- Sussillo D, Churchland MM, Kaufman MT, Shenoy KV (2013, poster). A recurrent neural network that produces EMG from rhythmic dynamics. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.
- Elsayed G, Kaufman MT, Ryu SI, Shenoy KV, Churchland MM, Cunningham JP (2013, poster). Characterization of dynamical activity in motor cortex. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.
- Seely J, Kaufman MT, Kohn A, Smith M, Movshon A, Priebe N, Lisberger S, Ryu SI, Ryu SI, Shenoy KV, Abbott LF, Cunningham JP, Churchland MM (2013, poster). Quantifying representational and dynamical structure in large neural datasets. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE)*. Salt Lake City, UT.
- Seely JS, Kaufman MT, Kohn A, Movshon JA, Priebe NJ, Lisberger SG, Ryu SI, Shenoy KV, Cunningham JP, Abbott LF, Churchland MM (2013, poster). Quantifying representational and dynamical structure in large neural datasets, *Temporal Dynamics in Learning*. Janelia Farm, VA.
- Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2012). Controlling output from the motor cortices: avoiding unintentional movement using the null space. *Neural Control of Movement*. Venice, Italy.
- Sussillo D, Churchland MM, Kaufman MT, Shenoy KV (2012). A recurrent neural network that produces EMG from rhythmic dynamics. *Translational and Computational Motor Control (TCMC) pre-meeting to Society for Neuroscience annual meeting*. New Orleans, LA.
- Petreska B, Kaufman MT, Churchland MM, Ryu SI, Shenoy KV, Sahani M (2012). Identifying the neural initiation of a movement. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2012*. Salt Lake City, UT.
- Seely J, Kaufman MT, Churchland MM, Ryu SI, Shenoy KV, Cunningham JP (2012). Dimensionality in motor cortex: differences between models and experiment. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2012*. Salt Lake City, UT.
- Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2011, poster). Cortical preparatory activity avoids causing movement by remaining in a muscle-neutral space. *Neural Control of Movement*. San Juan, PR.
- Kaufman MT, Churchland MM, Shenoy KV (2011, poster). Cortical preparatory activity avoids causing movement by remaining in a muscle-neutral space. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2011*. Salt Lake City, UT.
- Churchland MM, Cunningham JP, Kaufman MT, Ryu SI, Shenoy KV (2011, poster). Firing rate oscillations underlie motor cortex responses during reaching in monkey. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2011*. Salt Lake City, UT.
- Cunningham JP, Churchland MM, Kaufman MT, Shenoy KV (2011, poster). Extracting rotational structure from motor cortical data. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2011*. Salt Lake City, UT.
- Churchland MM, Kaufman MT, Cunningham JP, Shenoy KV (2010, poster/spotlight). Preparatory tuning in premotor cortex relates most closely to the population movement-epoch response. *Frontiers in Neuroscience. Computational and Systems Neuroscience (COSYNE) Abstracts 2010*. Salt Lake City, UT.
- Kaufman M*, Sridharan D*, Litchfield J (2006). Action potential backpropagation failure: All-or-none rescue by synaptic input in CA1 obliques. *Fifteenth Annual Computational Neuroscience Meeting*.
- Nielsen L, Knutson B, Kaufman M, Weinstein L, Carstensen LL (2004). Facial EMG discriminates gain and loss anticipation and outcome in a monetary incentive delay task. *Psychophysiology*, 41: S80.

Other abstracts:

- Grier HA, Kaufman MT (2021, poster). Mouse sensorimotor cortex reflects complex kinematic details during reaching and grasping. *2021 Neuroscience Meeting Planner*. Society for Neuroscience 2021. Online.
- Zhu F, Grier H, Tandon R, Cai C, Giovannucci A, Kaufman M, Pandarinath C (2021, poster). Inferring single-trial neural population dynamics from calcium imaging with sub-frame temporal resolution via deep learning. *2021 Neuroscience Meeting Planner*. Society for Neuroscience 2021. Online.
- Pei F*, Ye J*, Zoltowski DM, Wu A, Chowdhury RH, Sohn H, O'Doherty JE, Shenoy KV, Kaufman MT, Churchland MM, Jazayeri M, Miller LE, Dyer EL, Park IM, Pillow JW, Pandarinath C (2021, poster). Advancing the investigation of neural population structure with the Neural Latents Benchmark. *Society for Neuroscience Meeting Planner*. Society for Neuroscience 2021. Online.
- Grier HA, Kaufman MT (2019, poster). Calcium imaging reveals neurons with complex activity patterns in mouse motor cortex during a reach-to-water task. *2019 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Sabatini DA, Kaufman MT (2019, poster). Temporal basis functions reveal systematic variation in rotational dynamics in monkey M1. *2019 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Tandon R, Grier H, Kaufman MT, Pandarinath C (2019, poster). Deep learning to extract single-trial trajectories from two-photon calcium imaging. *2019 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Huang L, Kechschull JM, Furth D, Musall S, Kaufman MT, Churchland AK, Zador AM. BRICseq bridges brain-wide interregional connectivity to neural activity and gene expression in single animals (2019, poster). *2019 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Kaufman MT, Musall S, Churchland AK (2016). Cellular-level resolution of barrel cortex borders using calcium imaging. *2016 Neuroscience Meeting Planner*. Society for Neuroscience. San Diego, CA. Online.
- Elsayed GF, Kaufman MT, Ryu SI, Shenoy KV, Churchland MM, Cunningham JP (2015, poster). Testing the statistical significance of dynamical structure in neural population responses. *2015 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Yeagle EM, Megevand P, Mercier M, Kaufman MT, Chartarifsky L, Churchland AK, Mehta AD (2015, poster). Is the sound-induced double-flash illusion generated in primary visual cortex? Insights into multisensory integration from intracranial EEG recording in humans. *2015 Neuroscience Meeting Planner*. Society for Neuroscience. Chicago, IL. Online.
- Odoemene K, Brown AM, Kaufman MT, Churchland AK (2014, poster). Disrupting inhibition in posterior parietal cortex reduces decision accuracy. *2014 Neuroscience Meeting Planner*. Society for Neuroscience. Washington, DC. Online.
- Kaufman MT, Raposo D, Churchland AK (2013, poster). Dynamics of decision and action in rat posterior parietal cortex. *2013 Neuroscience Meeting Planner*. Society for Neuroscience. San Diego, CA. Online.
- Hussar CR, Kaufman MT, Cunningham JP, Ryu SI, Shenoy KV, Churchland MM (2012, poster). Frequency of multiphasic responses in dorsal premotor and primary motor cortex. *2012 Neuroscience Meeting Planner*. Society for Neuroscience. New Orleans, LA. Online.
- Seely J, Kaufman MT, Kohn A, Smith MA, Movshon J, Priebe NJ, Lisberger SG, Ryu SI, Shenoy KV, Cunningham JP, Churchland MM. (2012, poster). Comparing visual and motor cortex: Representational coding versus dynamical systems. *2012 Neuroscience Meeting Planner*. Society for Neuroscience. New Orleans, LA. Online.

- Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2011, poster). Cortical preparatory activity avoids causing movement by remaining in a muscle-neutral space. *Bio-X Interdisciplinary Initiatives Symposium*, Stanford, CA.
- Churchland MM, Cunningham JP, Kaufman MT, Foster JD, Nuyujukian P, Ryu SI, Shenoy KV (2011, nanosymposium). Structure of neural population dynamics during reaching. *2011 Neuroscience Meeting Planner*. Washington, DC. Society for Neuroscience, 2011. Online.
- Cunningham JP, Churchland MM, Kaufman M, Shenoy KV (2011, nanosymposium). Extracting rotational structure from motor cortical data. *2011 Neuroscience Meeting Planner*. Washington, DC. Society for Neuroscience, 2011. Online.
- Cowley BR, Kaufman MT, Churchland MM, Ryu SI, Shenoy KV, Yu BM (2011, poster). DataHigh: Graphical user interface for visualizing and interacting with high-dimensional neural trajectories. *2011 Neuroscience Meeting Planner*. Washington, DC. Society for Neuroscience, 2011. Online.
- Churchland MM, Kaufman MT, Cunningham JP, Ryu SI, Shenoy KV (2010, poster). Some basic features of the neural response in motor and premotor cortex. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
- Diester I, Goo W, Kaufman MT, Pashaie R, Mogri M, Yizhar O, Ramakrishnan C, Deisseroth K, Shenoy KV (2010, poster). An optogenetic toolbox designed for primates. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
- Chestek CA, Gilja V, Nuyujukian P, Foster J, Kaufman MT, Ryu SI, Shenoy KV (2010, poster). Waveform stability and neural decoder performance across 7 weeks. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
- Kaufman MT, Churchland MM, Shenoy KV (2009, poster). Putative interneurons respond more rapidly than pyramidal cells in monkey premotor cortex. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
- Churchland MM, Kaufman MT, Cunningham JP, Shenoy KV (2009, poster). The tuning of plan activity in premotor / motor cortex is best captured by intrinsic parameters derived from the movement-period population response. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
- Kaufman MT, Churchland MM, Shenoy KV (2008, poster). Neurons in monkey premotor cortex change roles across complex movements. *Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience. Online.
- Churchland MM, Kaufman MT, Shenoy KV (2008, poster). A novel maze task for the study of motor preparation. *Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience. Online.

Teaching and mentoring:

- PI of four graduate students (one co-mentored) and one undergraduate (now a PhD student at Harvard), and member of 14 graduate and one undergraduate thesis committees.
- Course director / primary instructor for CPNS 34231 “Computational Methods in Neuroscience” (2020-). Mentor, Neuromatch Academy (2020).
- Guest lecturer in four University of Chicago courses.
- Mentor for undergraduate student participant in NSF-funded REU in Computational Neuroscience and Bioinformatics (PI: Churchland; 2016). Student now in Bioinformatics PhD program at Harvard.
- Guest lecturer for Stanford University’s course, “Computational models of the neocortex” (2016).

Designed and taught an unofficial 11-week course titled “Linear Algebra and its Applications to Systems Neuroscience” at CSHL for graduate students and postdocs (2014).

Acting mentor for graduate students in the Shenoy lab during PI’s extended medical leave (2011-2012).

University service and outreach:

Disability Interest Resource Group, member (2021-)

Access UChicago Now, core leadership team (2020-)

OBA Diversity, Equity, Inclusion and Access committee, founding member (2020-)

Independent graduate disability working group, sole faculty member (2020-)

Neuroscience undergraduate major executive committee (2019-)

Neurobiology faculty search committee (2019-2020)

Wrote essay on practical advice for disability in STEM; on disability.uchicago.edu website (2019)

Public interview on the web on having a disability in STEM (2019)

Organizer of neuro chalk talk series (currently suspended due to COVID; 2018-)

Member of Computational Neuroscience Committee, Committee on Neurobiology (2018-)

Member of Integrative Biology Student Advisory Committee (2020-)

Other experience, service, and professional memberships:

NIH study section (twice, 2021).

Reviewer for Leverhulme Trust (2020).

Member of review panel for NSF Neural and Cognitive Systems (2019).

Reviewer for Computational and Systems Neuroscience meeting (2019).

Developer of DataHigh, software for visualizing high-dimensional data (2013).

Developed spike analysis software package during PhD, licensed to Blackrock Microsystems (2009-2012) then open-sourced through Ripple LLC (2012-present) as MKsort.

Journals and meetings reviewed for: *Nature*, *Cell*, *Nature Neuroscience*, *Nature Communications*, *Neuron*, *J Neuroscience*, *eLife*, *J Neurophysiology*, *Cell Reports*, *J Cognitive Neuroscience*, *Cerebral Cortex*, *Science Advances*, *Frontiers*, *COSYNE*.

Member of: Society for Neuroscience, Society for the Neural Control of Movement.