

Curriculum Vitae

STEVEN M. CHASE

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EDUCATION

Ph.D.	Biomedical Engineering	Johns Hopkins University	2006
M.S.	Electrical Engineering	University of California, Berkeley	1999
B.S. (<i>with honors</i>)	Applied Physics	California Institute of Technology	1997

ACADEMIC POSITIONS

Professor	Carnegie Mellon University	2021-current
Neuroscience Institute and Department of Biomedical Engineering		
Courtesy Appointments: Robotics Institute, Electrical & Computer Engineering		
Associate Professor		2017-2021
Assistant Professor		2011-2017
Visiting Research Scholar	University of Pittsburgh	2010-2011
Department of Neurobiology		
Post-doctoral Research Associate	Carnegie Mellon University	2006-2010
Department of Statistics		
Jointly mentored by:		
Dr. Robert E. Kass, Dept. of Statistics, Carnegie Mellon University, and		
Dr. Andrew B. Schwartz, Dept. of Neurobiology, University of Pittsburgh		

HONORS AND PROFESSIONAL ACHIEVEMENTS

CIT Dean's Early Career Fellowship	2017
NSF CAREER Award	2016
Wimmer Faculty Fellowship	2013
Individual National Research Service Award, NIH grant DC05742	2002
California Fellowship in Microelectronics	1997
Caltech Merit Scholarship	1996

FUNDING

Current

NSF (DRL2120466) PIs: Chase, Yu, Smith, Batista Total Amount: \$3,000,000
Collaborative Research: NCS-FR: Volitional control of internal cognitive states
 Duration: 9/15/2021-9/14/2026

NIH (U01-NS123125) Co-I (PI: Collinger) CMU Amount: \$286,682
Influence of task complexity and sensory feedback on cortical control of grasp force
 Duration: 6/1/2021-5/31/2026

NIH (2R01-HD071686) PIs: Chase, Yu, Batista Total Amount: \$2,181,120
Shaping neural population dynamics to facilitate learning
 Duration: 4/21/2017-4/20/2022

NSF (IOS1553252) - **CAREER Award** PI Total Amount: \$800,000
CAREER: Neural mechanisms of skill learning
 Duration: 9/1/2016-8/31/2021 (NCE)

NIH (R21-NS115036) Co-I (PI: Kuhlman) Total Amount: \$403,817
Use of optical brain-computer interface to define principles of sensorimotor plasticity
 Duration: 9/30/2020-5/31/2022

Completed

NIH (U01-NS108922) Co-I (PI: Collinger) Total Amount: \$1,182,379
Context dependent processing in sensorimotor cortex
 Duration: 9/1/2018-8/31/2020

NSF (BCS1533672) - **Brain-Initiative Grant** PI Total Amount: \$868,950
NCS-FO: The structure of neural variability during motor learning
 Duration: 9/1/2015-8/31/2020 (NCE)

PA Dept of Health Research Formula Grant PI Total Amount: \$300,000
Predicting short time scale neural reorganization during learning
 Duration: 1/1/2017-12/31/2019

NSF (IIS1650994) Co-I (PI: Wactler) Total Amount: \$300,000
EAGER: Controlling a robotic third hand - exploring use of distributed intelligence from autonomy to brain machine interfaces for augmenting human capability
 Duration: 8/15/2016-7/31/2018

Curci Foundation PIs: Chase, Gittis, Kuhlman Total Amount: \$250,000
Computational and biological approaches to delineate the neural circuitry of learning
 Duration: 3/1/2017-2/28/2018

NIH (R01-HD071686) Co-I (PIs: Yu & Batista) Total Amount: \$1,575,000
Dissecting brain-computer interfaces: a manifold & feedback-control approach
 Duration: 9/1/2011-6/1/2017 (NCE)

DARPA Co-I (PI: Collinger) Total Amount: \$39,343
Neural control of dexterous manipulation and translation to a portable system
 Duration: 9/1/2016-8/31/2017 (Chase-lab portion)

IARPA <i>MICrONS: Visual cortical neural circuits for compositional learning and inference</i> Duration: 1/15/2016-7/15/2017	Co-I (PI: Lee)	Total Amount: \$49,674 (Chase-lab portion)
Curci Foundation <i>Computational and biological approaches to delineate the neural circuitry of learning</i> Duration: 3/1/2016-2/28/2017	PIs: Chase, Gittis, Kuhlman	Total Amount: \$200,000
Craig H. Neilsen Foundation <i>A self-recalibrating brain-computer interface</i> Duration: 1/1/2014-6/30/2016	PIs: Chase, Yu	Total Amount: \$289,651
Curci Foundation <i>Computational and biological approaches to delineate the neural circuitry of learning</i> Duration: 3/1/2015-2/29/2016	PIs: Chase, Gittis, Kuhlman	Total Amount: \$200,000
CMU ProSEED Grant <i>Computational and biological approaches to delineate the neural circuitry of learning</i> Duration: 1/1/2015-12/31/2015	PIs: Chase, Gittis, Kuhlman	Total Amount: \$50,000
DARPA <i>Reliable cortical interfaces</i> Duration: 3/1/2012-12/31/2012	PIs: Chase, Schwartz, Fedder, Cui	Total Amount: \$273,527 (Chase-lab portion)
PA Dept of Health Research Formula Grant <i>Correlated structure in motor cortical populations</i> Duration: 1/1/2012-12/31/2015	PI	Total Amount: \$733,494

INTELLECTUAL PROPERTY

1. Patent (pending): Oby ER, Batista AP, Chase SM, Degenhart AD, Golub MD, Sadtler PT, and Yu BM (2021). Method of incremental training to create new patterns of physiological control signals. Serial No. 17/343,050.
2. Disclosure (invention): Oby ER, Golub MD, Hennig JA, Degenhart AD, **Chase SM**, Yu BM, and Batista AP (2020). New neural activity patterns emerge with long-term learning. Provisional U.S. Patent Application No. 63/036,735.
3. Disclosure (invention): Yu BM, Bishop W, Degenhart A, Oby ER, **Chase SM**, and Batista AP (2018). A stabilized brain-computer interface based on neural manifold alignment. Provisional U.S. Patent Application No. 62/763,874.
4. Disclosure (source code): Golub MD, **Chase SM**, and Yu BM (2017). Matlab code for internal model estimation.
Code publically available at (https://github.com/mattgolub/internal_model_estimation).
5. Disclosure (invention): Sharma A, Nguyen K, **Chase SM**, and Gittis A (2016). A split-wheel treadmill system for rodents. Provisional U.S. Patent Application No. 62/496,572.

6. Patent: **Chase SM**, Chang-Hasnain CJ, and Waite JM (2004). Apparatus and method for controlled cantilever motion through torsional beams and a counterweight. US Patent #6,813,053 B1

PUBLICATIONS

Peer Reviewed Journal Articles

1. ⁺Smoulder AL, ⁺Pavlovsky NP, ⁺Marino PJ, Degenhart AD, McClain NT, *Batista AP, ***Chase SM** (2021) Monkeys exhibit a paradoxical decrease in performance in high-stakes scenarios. PNAS 118:e2109643118.
[Subject of a PNAS commentary.]
2. Nguyen KP, Sharma A, Gil-Silva M, *Gittis AH, ***Chase SM** (2021) Distinct kinematic adjustments over multiple timescales accompany locomotor learning in mice. Neuroscience 466:260-272.
[Subject of a Neuroscience commentary.]
3. Hennig JA, Oby ER, Golub MD, Bahureksa LA, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, *Batista AP, *Chase SM, *Yu BM (2021) Learning is shaped by abrupt changes in neural engagement. Nature Neurosci. doi:10.1038/s41593-021-00822-8.
4. *Kowalewski N, *Kauttonen J, Stan PL, Jeon BJ, Fuchs T, **Chase SM**, Lee TS, Kuhlman SJ (2021) Development of natural scene representation in primary visual cortex requires early postnatal experience. Curr Bio. 31:369-380.
5. ⁺Degenhart AD, ⁺Bishop WE, Oby ER, Tyler-Kabara EC, ***Chase SM**, *Batista AP, *Yu BM (2020) Stabilization of a brain-computer interface via the alignment of low-dimensional spaces of neural activity. Nature BME 4:672-685.
[Subject of a News & Views review.]
6. Oby ER, Golub MD, Hennig JA, Degenhart AD, Tyler-Kabara EC, *Yu BM, ***Chase SM**, *Batista AP (2019) New neural activity patterns emerge with long-term learning. PNAS. 116:15210-15215.
[Subject of a PNAS commentary.]
7. Zhou X, Tien R, Ravikumar S, and **Chase SM** (2019) Distinct types of neural reorganization during long-term learning. J Neurophysiol. 121:1329-1341.
[Received APS*select* award. Subject of a JNP Podcast.]
8. Jeon B, Swain A, Good J, **Chase SM**, and Kuhlman SJ (2018) Feature selectivity is stable in primary visual cortex across a range of spatial frequencies. Sci Rep. 8:15288.
9. Hennig JA, Golub MD, Lund PJ, Sadtler PT, Oby ER, Quick KM, Ryu SI, Tyler-Kabara EC, *Batista AP, *Yu BM, ***Chase SM** (2018) Constraints on neural redundancy. eLife 7:e36774.
[Subject of a Trends in Cognitive Sciences Spotlight. Recommended by Faculty of 1000.]
10. Downey J, Schwed N, **Chase SM**, Schwartz AB, and Collinger J (2018) Intracortical recording stability in human brain-computer interface users. J Neural Eng. 15:046016.

* Denotes equal contribution.

11. Golub MD, Sadtler PT, Oby ER, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, ***Chase SM**, and *Yu BM (2018). Learning by neural reassociation. *Nature Neurosci.* 21:607-616.
[Subject of a News & Views review. Recommended by Faculty of 1000.]
12. Zhang Y and **Chase SM** (2018). Optimizing the usability of brain computer interfaces. *Neural Comp.* 22:1-36.
13. Bittner SR, Williamson RC, Snyder AC, Litwin-Kumar A, Doiron B, ***Chase SM**, *Smith MA, and *Yu BM (2017). Population activity structure of excitatory and inhibitory neurons. *PLoS One* 12(8): e0181773.
14. Suway SB, Orellana J, McMorland AJC, Fraser GW, Liu Z, Velliste M, **Chase SM**, Kass RE, and Schwartz AB (2017). Temporally segmented directionality in the motor cortex. *Cerebral Cortex* 7:1-14.
15. Rasmussen RG, Schwartz AB, and **Chase SM** (2017). Dynamic range adaptation in primary motor cortical populations. *eLife* 2017;6:e21409.
16. Oby ER, Perel S, Sadtler PT, Ruff DA, Mischel JL, Montez DF, Cohen MR, *Batista AP, and ***Chase SM** (2016). Extracellular voltage threshold settings can be tuned for optimal encoding of movement and stimulus parameters. *J Neural Eng.* 13:036009.
17. Golub MD, *Yu BM, and ***Chase SM** (2015). Internal models for interpreting neural population activity during sensorimotor control. *eLife* 10.7554/eLife.10015.
[Recommended by Faculty of 1000.]
18. Zhang Y and **Chase SM** (2015) Recasting brain-machine interface design from a physical control system perspective. Review. *J Comp Neurosci.* 39:107-118.
19. Perel S, Sadtler PT, Oby ER, Ryu SI, Tyler-Kabara EC, *Batista AP, and ***Chase SM** (2015). Single-unit activity, threshold crossings and local field potentials in motor cortex differentially encode reach kinematics. *J Neurophysiol.* 114: 1500-1512.
20. Kozai T, Du Z, Gugel Z, Smith MA, **Chase SM**, Bodily LM, Caparosa EM, Friedlander RM, Cui XT (2015) Comprehensive chronic laminar single-unit, multi-unit, and local field potential recording performance with planar single shank electrode arrays. *J Neurosci Meth.* 242C:15-40.
21. Sadtler PT, Quick KM, Golub MD, **Chase SM**, Ryu SI, Tyler-Kabara EC, *Yu BM, and *Batista AP (2014). Neural constraints on learning. *Nature.* 512:423-426.
[Cover feature and subject of a research highlight. Recommended by Faculty of 1000.]
22. Todorova S, Sadtler PT, Batista AP, **Chase SM**, and Ventura V (2014). To sort or not to sort: the impact of spike-sorting on neural decoding performance. *J Neural Eng.* 11:056005.
23. Golub MD, Yu BM, Schwartz AB, and **Chase SM** (2014). Motor-cortical control of movement speed with implications for brain-machine interface control. *J Neurophysiol.* 112:411-429.
24. **Chase SM**, Kass RE, and Schwartz AB (2012) Behavioral and neural correlates of visuomotor adaptation observed through a brain-computer interface in primary motor cortex. *J Neurophysiol.* 108:624-644.
25. **Chase SM**, Schwartz AB, and Kass RE (2010) Latent inputs improve estimates of neural encoding in motor cortex. *J Neurosci.* 30:13873-13882.

26. Legenstein R, **Chase SM**, Schwartz AB, and Maass W (2010) A reward-modulated Hebbian learning rule can explain experimentally observed network reorganization in a brain control task. *J Neurosci* 30:8400-8410.
27. Koyama S, **Chase SM**, Whitford A, Velliste M, Schwartz AB, and Kass RE (2010) Comparison between decoding algorithms in open-loop and closed-loop performance. *J Comp Neurosci* 29:73-87.
28. Legenstein R, **Chase SM**, Schwartz AB, and Maass W (2009) Functional network reorganization in motor cortex can be explained by reward-modulated Hebbian learning. In: *Advances in Neural Information Processing Systems* 22.
29. **Chase SM**, Schwartz AB, and Kass RE (2009) Bias, optimal linear estimation, and the differences between open-loop simulation and closed-loop performance of brain-computer interface algorithms. *Neural Networks* 22:1203-1213.
30. Fraser GW, **Chase SM**, Whitford A, and Schwartz AB (2009) Control of a brain-computer interface without spike sorting. *J Neural Eng* 6:055004.
31. *Jarosiewicz B, ***Chase SM**, Fraser GW, Velliste M, Kass RE, and Schwartz AB (2008) Functional network reorganization during learning in a brain-computer interface paradigm. *PNAS* 105:19486-19491.
[Recommended by Faculty of 1000.]
32. **Chase SM** and Young ED (2008) Cues for sound localization are encoded in different aspects of spike trains in the inferior colliculus. *J Neurophysiol* 99:1672-1682.
33. **Chase SM** and Young ED (2007) First-spike latency information in single neurons increases when referenced to population onset. *PNAS* 104:5175-5180.
34. **Chase SM** and Young ED (2006) Spike-timing codes enhance the representation of multiple simultaneous sound-localization cues in the inferior colliculus. *J Neurosci* 26:3889-3898.
[Recommended by Faculty of 1000.]
35. **Chase SM** and Young ED (2005) Limited segregation of different types of sound localization information among classes of units in the inferior colliculus. *J Neurosci* 25:7575-7585.
[Recommended by Faculty of 1000.]

Peer Reviewed Conference Papers

36. Zhang Y and **Chase SM** (2016) A control-theoretic approach to brain-computer interface design. *American Control Conference (ACC)* 2016:5765-5771.
37. Zhang Y and **Chase SM** (2013) A stabilized dual Kalman filter for adaptive tracking of brain-computer interface decoding parameters. *Proc 35th Annual Conf IEEE EMBS* 7100-7103.
38. Perel S, Sadtler PT, Godlove JM, Ryu SI, Wang W, Batista AP, and **Chase SM** (2013) Direction and speed tuning of motor-cortex multi-unit activity and local field potentials during reaching movements. *Proc 35th Annual Conf IEEE EMBS* 299-392.
39. Golub MD, ***Chase SM**, *Yu BM (2013) Learning an Internal Dynamics Model from Control Demonstration. *JMLR Workshop & Conference Proceedings* 28:606-614.
40. Golub MD, *Yu BM, and ***Chase SM** (2012) Internal models engaged by brain-computer interface control. *Proc 34th Annual Conf IEEE EMBS* 1327-1330.

41. Zhang Y, Schwartz AB, **Chase SM**, and Kass RE (2012) Bayesian learning in assisted brain-computer interface tasks. Proc 34th Annual Conf IEEE EMBS 2740-2743.
[Finalist, student paper competition.]

Reviews, Book Chapters & Invited Commentaries

42. Hennig JA, Oby ER, Losey DM, *Batista AP, *Yu BM, ***Chase SM** (*in press*) How Learning Unfolds in the Brain: Toward an Optimization View. *Neuron*.
43. Oby ER, Hennig JA, Batista AP, Yu BM, **Chase SM** (2020) Intracortical brain machine interfaces. In: He B (Ed) *Neural Engineering*, third edition. Springer.
44. Huggins JE, Guger C, Ziat M, Zander TO, Taylor D, Tangermann M, Soria-Frisch A, Simeral J, Scherer R, Rupp R, Ruffini G, Robinson DKR, Ramsey NF, Nijholt A, Müller-Putz G, McFarland DJ, Mattia D, Lance BJ, Kindermans PJ, Iturrate I, Herff C, Gupta D, Do AH, Collinger JL, Chavarriaga R, **Chase SM**, Bleichner MG, Batista A, Anderson CW, Aarnoutse EJ (2017) Workshops of the sixth international brain-computer interface meeting: brain-computer interfaces past, present, and future. *Brain-Computer Interfaces* 4:3-36.
45. Golub MD, **Chase SM**, Batista AP, and Yu BM (2016) Brain-computer interfaces for dissecting cognitive processes underlying sensorimotor control. *Curr Opin Neurobio* 37:53-58.
46. *Yu BM and ***Chase SM** (2014) Shedding light on learning. *Nature Neurosci.* 17:746-747. *Commissioned commentary (News and Views) on "Vollitional modulation of optically recorded calcium signals during neuroprosthetic learning" by Clancy et al., Nature Neurosci. 17:807-809.*
47. **Chase SM** (2012) Single spikes may suffice. *J Neurophysiol.* 108:1809-1809. *Commissioned commentary (Editorial Focus) on "Comparison of latency and rate coding for the direction of whisker deflection in the subcortical somatosensory pathway" by Storchi et al., J. Neurophysiol. 108:1810-1821.*
48. **Chase SM** and Schwartz AB (2011) Inference from populations: going beyond models. In: *Enhancing performance for Action and Perception, Progress in Brain Research Volume 192:103-112* (Green AC, Chapman, E, Kalaska JF, & Lepore F, eds).
49. Guger C, Bin G, Gao X, Guo J, Hong B, Liu T, Gao S, Guan C, Ang KK, Phua KS, Wang C, Chin ZY, Zhang H, Lin R, Chua KSG, Kuah C, Ang BT, George H, Kübler A, Halder S, Höslle A, Münßinger J, Palatucci M, Pomerleau D, Hinton G, Mitchell T, Ryan DB, Sellers EW, Townsend G, **Chase SM**, Whitford AS, Schwartz AB, Kawashima K, Shindo K, Ushiba J, Liu M and Schalk G (2011) State of the art in BCI research: BCI award 2010. In: *Recent Advances in Brain-Computer Interfaces* (Fazel R, ed).

Reviews & Interviews About My Work

1. Saikley A and Haroush K (2021) Toward a neurobiological model of human performance under pressure. *PNAS* 118:e2113777118.
[Commentary on Smoulder et al., *PNAS*, 2021.]
2. Jacobs JR and Carey MR (2021) Move over Rotarod, here comes RotaWheel. *Neuroscience* doi.org/10.1016/j.neuroscience.2021.05.004.
[Commentary on Nguyen et al., *Neuroscience*, 2021.]
3. Wimalasena LN, Miller LE and Pandarinath C (2020) From unstable input to robust output. *Nature BME* 4:665-667.

[Review of Degenhart et al., Nature BME, 2020.]

4. Pryluk R and Paz R (2019) Learning outside the box. PNAS. 116:15316-15318.
[Commentary on Oby et al., PNAS, 2019]
5. Yates B (2019) Distinct types of neural reorganization during long-term learning. JNP Podcasts, released 22 May 2019. <https://jneurophysiol.podbean.com/e/distinct-types-of-neural-reorganization-during-long-term-learning/>.
[Spotlight on Zhou et al., J Neurophysiol. 2019]
6. Kalaska J (2019) F1000Prime Recommendation of [Hennig JA et al., elife 2018 7]. In F1000Prime, 22 May 2019; 10.3410/f.733821237.793560118.
7. Kalaska J (2019) F1000Prime Recommendation of [Golub MD et al., Nat Neurosci 2018 21(4):607-616]. In F1000Prime, 22 May 2019; 10.3410/f.732828264.793560117.
8. Kalaska J (2019) F1000Prime Recommendation of [Sadtler PT et al., Nature 2014 512(7515):423-426]. In F1000Prime, 22 May 2019; 10.3410/f.718546237.793560114.
9. Kao TC and Hennequin G (2018) Null ain't dull: new perspectives on motor cortex. Trends in Cognitive Sciences. 22:1069-1071.
[Spotlight on Hennig et al., eLife, 2018]
10. Galgali AR and Mante V (2018) Set in one's thoughts. Nature Neurosci 21:459-460.
[Review of Golub et al., Nature Neurosci, 2018]
11. Destexhe A and Kumar A (2017) F1000Prime Recommendation of [Golub MD et al., elife 2015 4]. In F1000Prime, 12 Apr 2017; 10.3410/f.726000531.793530347.
12. Whalley K (2014) Learning and memory: Putting limits on learning. Nature Reviews Neuroscience 15:631.
[Review of Sadtler et al., Nature, 2014]
13. Frank M (2014) F1000Prime Recommendation of [Sadtler PT et al., Nature 2014 512(7515):423-426]. In F1000Prime, 01 Sep 2014; 10.3410/f.718546237.793499190.
14. Upton, S (2014) Cyborg confidential. SA Mind 25(6):30-35.
15. Fetz E and Richardson A (2009) F1000Prime Recommendation of [Jarosiewicz B et al., Proc Natl Acad Sci USA 2008 105(49):19486-19491]. In F1000Prime, 30 Mar 2009; 10.3410/f.1158542.618726.
16. King A (2006) F1000Prime Recommendation of [Chase SM and Young ED, J Neurosci 2006 26(15):3889-3898]. In F1000Prime, 27 Apr 2006; 10.3410/f.1011522.371004.
17. Middlebrooks J (2005) F1000Prime Recommendation of [Chase SM and Young ED, J Neurosci 2005 25(33):7575-7585]. In F1000Prime, 25 Aug 2005; 10.3410/f.1027578.331641.

DISSERTATIONS AND THESES

Jeon B (2021) Stability and robustness of visual feature representation in mouse V1. PhD Dissertation, Biomedical Engineering, Carnegie Mellon University.

- Hennig J (2021) Structure and time course of neural population activity during learning. PhD Dissertation, Neural Computation and Machine Learning, Carnegie Mellon University.
- Zhou X (2020) Neural reorganization supporting long-term brain-computer interface learning. PhD Dissertation, Biomedical Engineering, Carnegie Mellon University.
- Zhang Y (2018) Provably optimal design of a brain-computer interface. PhD Dissertation, Robotics Institute, Carnegie Mellon University.
- Ravikumar S (2017) Tracking chronically recorded neurons using pairwise cross-correlograms. MS Thesis, Biomedical Engineering, Carnegie Mellon University.
- Sharma A (2017) Design of a split-running wheel for studies of locomotor learning. MS Thesis, Biomedical Engineering, Carnegie Mellon University. (co-advised by Aryn Gittis)
- Jeon B (2016) Design and testing of a closed-loop brain-computer interface system for operation by a mouse. MS Thesis, Biomedical Engineering, Carnegie Mellon University. (co-advised by Sandra Kuhlman)
- Golub MD (2015) Interpreting neural population activity during feedback motor control. PhD Dissertation, Electrical and Computer Engineering, Carnegie Mellon University. (co-advised by Byron Yu)
- Lund P (2014) Predicting high-dimensional neural activity patterns during brain-computer interface control. MS Thesis, Machine Learning, Carnegie Mellon University. (co-advised by Byron Yu)
- Zhao Y (2014) An extended latent Kalman filter for nuisance variable removal in brain-computer interface decoding applications. MS Thesis, Biomedical Engineering, Carnegie Mellon University.
- Chase SM (2006) The representation of sound localization information among neural populations in the inferior colliculus. PhD Dissertation, Biomedical Engineering, Johns Hopkins University. (Advisor: ED Young)
- Chase SM (1999) A micromechanical red-shifting tunable vertical cavity filter. MS Thesis, Electrical Engineering, University of California, Berkeley. (Advisor: CJ Chang-Hasnain)

TEACHING

Classes

42-101	FCEs: 90 enrolled, 73 responders, 0 audit	Spring 2021
Introduction to BME (12 units)	Instructor: 4.4/5.0, Course: 4.4/5.0	
42-101	FCEs: 75 enrolled, -- responders, 0 audit	Spring 2020
Introduction to BME (12 units)	Instructor: --/5.0, Course: --/5.0	
86-631/42-631	FCEs: 24 enrolled, 20 responders, 0 audit	Fall 2019
Neural Data Analysis (9 units)	Instructor: 5.0/5.0, Course: 5.0/5.0	
42-101	FCEs: 65 enrolled, 32 responders, 0 audit	Spring 2019
Introduction to BME (12 units)	Instructor: 3.8/5.0, Course: 3.7/5.0	
86-631/42-631	FCEs: 28 enrolled, 21 responders, 1 audit	Fall 2018
Neural Data Analysis (9 units)	Instructor: 4.7/5.0, Course: 4.7/5.0	
42-101	FCEs: 59 enrolled, 48 responders, 0 audit	Spring 2018

Introduction to BME (12 units) 86-631/42-631	Instructor: 4.1/5.0, Course: 4.0/5.0 FCEs: 28 enrolled, 21 responders, 1 audit	Fall 2017
Neural Data Analysis (9 units) 86-631/42-631	Instructor: 4.7/5.0, Course: 4.8/5.0 FCEs: 22 enrolled, 21 responders, 2 audit	Fall 2016
Neural Data Analysis (9 units) 42-101	Instructor: 4.7/5.0, Course: 4.6/5.0 FCEs: 54 enrolled, 37 responders, 0 audit	Fall 2015
Introduction to BME (12 units) 86-631/42-631	Instructor: 4.1/5.0, Course: 4.0/5.0 FCEs: 17 enrolled, 13 responders, 0 audit	Fall 2015
Neural Data Analysis (9 units) 42-101	Instructor: 4.8/5.0, Course: 4.7/5.0 FCEs: 76 enrolled, 52 responders, 0 audit	Spring 2015
Introduction to BME (12 units) 86-631/42-631	Instructor: 4.3/5.0, Course: 4.1/5.0 FCEs: 19 enrolled, 17 responders, 1 audit	Fall 2014
Neural Data Analysis (9 units) 42-101 (co-taught w/Newell Washburn)	Instructor: 4.8/5.0, Course: 4.8/5.0 FCEs: 55 enrolled, 30 responders, 0 audit	Fall 2013
Introduction to BME (12 units) 86-631/42-631	Instructor: 3.9/5.0, Course: 3.8/5.0 FCEs: 19 enrolled, 15 responders, 3 audit	Fall 2013
Neural Data Analysis (9 units) 86-601	Instructor: 4.8/5.0, Course: 4.7/5.0 FCEs: 3 enrolled, 2 responders, 2 audit	Spring 2013
Topics in Motor Control (3 units) 42-699B/86-595	Instructor: 5.0/5.0, Course: 4.5/5.0 FCEs: 14 enrolled, 14 responders, 1 audit	Fall 2012
Neural Data Analysis (9 units) 86-595/42-595	Instructor: 4.9/5.0, Course: 4.7/5.0 FCEs: 5 enrolled, 5 responders, 2 audit	Spring 2012
Neural Data Analysis (12 units)	Instructor: 4.8/5.0, Course: 4.8/5.0	

Guest Lectures

- | | |
|---|-------------|
| 1. uPNC Summer Seminar Series | Summer 2021 |
| 2. 03-161: Molecules to Mind | Spring 2021 |
| 3. 42-101: Introduction to BME | Fall 2020 |
| 4. uPNC Summer Seminar Series | Summer 2020 |
| 5. 03-161: Molecules to Mind | Spring 2020 |
| 6. 42-690: BME in Everyday Life | Spring 2020 |
| 7. 42-101: Introduction to BME | Fall 2019 |
| 8. uPNC Summer Seminar Series | Summer 2019 |
| 9. 03-161: Molecules to Mind | Spring 2019 |
| 10. 42-630: Introduction to neuroscience for engineers | Spring 2019 |
| 11. 85-382/18-782: The psychology and neuroscience of consciousness | Spring 2019 |
| 12. NEUS 627 / BEHN 640 (Oregon Health and Science University):
Systems Neuroscience | Fall 2018 |
| 13. 42-101: Introduction to BME | Fall 2018 |
| 14. uPNC Summer Seminar Series | Summer 2018 |
| 15. NEUS 627 / BEHN 640 (Oregon Health and Science University):
Systems Neuroscience | Fall 2017 |
| 16. 42-447: Rehabilitation Engineering | Fall 2017 |
| 17. 42-101: Introduction to BME | Fall 2017 |
| 18. uPNC Summer Seminar Series | Summer 2017 |
| 19. 42-101: Introduction to BME | Spring 2017 |
| 20. 42-201: Professional Issues in BME | Spring 2017 |
| 21. 42-201: Professional Issues in BME | Fall 2016 |

22. 42-101: Introduction to BME	Fall 2016
23. uPNC Summer Seminar Series	Summer 2016
24. 42-630: Introduction to Neuroscience for Engineers	Spring 2016
25. 42-201: Professional Issues in BME	Spring 2016
26. 42-101: Introduction to BME	Spring 2016
27. uPNC Summer Seminar Series	Summer 2015
28. 03-161: Molecules to Mind	Spring 2015
29. 42-201: Professional Issues in BME	Spring 2015
30. 42-101: Introduction to BME	Fall 2014
31. 42-632: Neural Signal Processing	Spring 2014
32. 80-270: Philosophy of Mind	Spring 2014
33. 15-386/15-686: Neural Computation	Spring 2014(2)
34. 15-386/15-686: Neural Computation	Spring 2014(1)
35. 18-819: Neural Technology, Sensing and Stimulation	Fall 2013
36. uPNC Summer Seminar Series	Summer 2013
37. 36-759: Statistical Models of the Brain	Spring 2013
38. 42-201: Professional Issues in BME	Spring 2013
39. uPNC Summer Seminar Series	Summer 2012
40. 42-201: Professional Issues in BME	Spring 2012
41. 15-386/15-686: Neural Computation	Spring 2012
42. 18-101: Introduction to Electrical and Computer Engineering	Fall 2012
43. 42-101: Introduction to BME	Spring 2012
44. BIOEN 2696 (Pitt): Control theory in neuroscience	Spring 2012
45. BIOEN 2800 (Pitt): Neurotechnology	Spring 2012
46. 86-375/86-675: Computational Perception	Spring 2012
47. uPNC Summer Seminar Series	Summer 2011
48. 15-386/15-686: Neural Computation	Spring 2011
49. 15-386/15-686: Neural Computation	Spring 2010
50. MSNBIO 2632 (Pitt): Advanced Neurophysiology	Spring 2007

PROFESSIONAL SERVICE

Director, Biomedical Engineering Graduate Programs.

Co-Director, Program in Neural Computation.

Editorial & External committee service

Program Committee, Cosyne 2018 – current.

Program Committee, Translational and Computational Motor Control Workshop, 2015 – current.

Guest editor, PLoS Comp Bio, 2015-2016.

Workshop organization

Co-organizer: BME track of the Machine Learning in Science and Engineering Conference, Atlanta, GA, June 2019.

Organizer: CMU/Pitt Neuro-Learning Workshop, Pittsburgh, PA, June 2018.

Session chair: Neuroinformatics session, Machine Learning in Science and Engineering 2018.

Session organizer: “Methods: How do you find a manifold, and what do you do when you’ve found one?” M5: Midwest Monkey Manifolds for Movement Meeting, May 2018.

BCI 2016 Workshop organizer: “Algorithms and performance using implanted devices.”

BCI 2016 Workshop organizer, “Studying learning with brain-computer interfaces.”

Organizer: CNBC retreat. Nov 2012 & Oct 2013.

Organizer: Biosignals Day Symposium, “Power in numbers: How many neurons are needed to...?” Feb 2012.

Session co-chair: Platform session on neural computation & statistical analysis of neural data, BMES 2009.

Review activities

Grant review: NSF ad-hoc NeuroNex, 2020.

Grant review: NSF NeuroNex panel, 2019.

Grant review: NIH SPC review panel, 2018.

Grant review: NSF CISS-IIS review panel, 2018.

Grant review: Singapore Ministry of Education, 2018.

Grant review: FNRS (Fonds de la Recherche Scientifique, Belgium), 2018 (once) & 2017 (twice).

Grant review: NSF BIO-IOS review panel, 2016.

Grant review: Department of Defense Peer Reviewed Medical Research Program (PRMRP), 2015.

Ad-hoc reviewer for: American Controls Conference, Biological Cybernetics, Cerebral Cortex, Computational Methods and Programs in Biomedicine, Current Biology, Current Opinions in Neurobiology, eLife, Frontiers in Neuroscience, IEEE Engineering in Medicine and Biology Society, IEEE Signal Processing Letters, IEEE Transactions on Biomedical Engineering, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Journal of the Association for Research in Otolaryngology, Journal of Neural Engineering, Journal of Neurophysiology, Journal of Neuroscience, Journal of Neuroscience Methods, Nature, Nature Biomedical Engineering, Nature Communications, Nature Medicine, Nature Neuroscience, Neural Computation, Neurobiology of Disease, Neuroinformatics, Neuroscience, Neuron, PLOS Computational Biology, PLOS One, PNAS, Science, Science and Translational Medicine, and Scientific Reports.

Scientific Societies

Founding Member: BCI Society.

Member: AAAS, APS, SfN, NCM.

Internal leadership & committee roles

University Committee on Faculty Promotions without Indefinite Tenure, 2019-current.

CNBC Executive committee, 2011-current.

Neuroscience Undergraduate Education Committee, 2017-current.

Graduate Affairs Committee, Biomedical Engineering, 2011-2020.

BME search committee, 2018-2019.

CNBC/Biological sciences search committee, 2018-2019.
 Carnegie Mellon Neuroscience Institute planning committee, 2018.
 Graduate affairs committee, Program in Neural Computation, 2013-2016.
 BrainHub engineering search committee, 2015.
 BME search committee, 2014-2015.

OUTREACH

Media Mentions

- 08/2020 Quoted by Vox: Heilweil R “Elon Musk is one step closer to connecting a computer to your brain.”
- 04/2020 Press release about my work “Stabilizing brain-computer interfaces” picked up by several online news sites, including interestingengineering.com, sciencedaily.com, unite.ai, and neurosciencenews.com.
- 08/2019 Zhou et al. (2019) cited in an article in Axios, “Looking to AI to understand how we learn.”
- 06/2019 Press release about me work “Pitt and CMU researchers discover how the brain changes when mastering a new skill” picked up by medindia.net, innovationtoronto.com, among others.
- 05/2019 Work subject of a Journal of Neurophysiology Podcast: “Distinct types of neural reorganization during long-term learning.”
- 12/2018 Quoted by Reuters: Rapaport L “Brain implants might one day help paralyzed patients use tablets.”
- 07/2018 FutureTech podcast: Jacobs R “Mind Control – Steven Chase and Byron Yu, Professors of Biomedical Engineering, Carnegie Mellon University – Computer brain interfaces that could allow control of body movement through thought.”
- 04/2018 Quoted in Wearable: Caddy B “Beyond sci-fi: Building the bioic body.”
- 03/2018 Davis K “When Learning A New Task, Our Brains Are Less Flexible Than We Thought.” WESA (Pittsburgh’s NPR station).
- 03/2018 Rennie J “Brain clings to old habits when learning new tricks.” Quanta Magazine.
- 02/2018 Quoted in the Brown Daily Herald, “University study improves interfaces between brain, computers.”
- 05/2017 Quoted in WIRED, “Want a true bionic limb? Good luck without machine learning.”
- 04/2017 Contributed an ‘Expert Views’ piece to an article published by AXIOS, “When computers merge with our minds.”
- 02/2016 Templeton D “CMU study explores why we make mistakes,” Pittsburgh Post-Gazette.
- 12/2015 Press release about my work “Researchers gain understanding of why the brain makes mistakes,” picked up by MedicalXpress (and shared by Neuroscience News, Science Beta, and DeepStuff.org).
- 07/2013 Interview, IGN (an online news service)

External Outreach

- 08/2018 Science Briefing, Congressman Keith Rothfus
- 03/2017 Judge, Pittsburgh Regional Science & Engineering Fair
- 10/2016 Speaker, Society of Women Engineers high school outreach day
- 08/2016 Speaker, Andrew Carnegie Society
- 02/2016 Instructor, OSHER lifelong learning course
- 05/2015 Science Briefing, Heinz Foundation
- 03/2014 Science Briefing, Congressman Chaka Fattah
- 03/2014 Judge, Pittsburgh Regional Science & Engineering Fair
- 03/2013 Science Briefing, Hillman Foundation
- 10/2012 Science Briefing, Hillman Foundation

Internal Outreach / Mentorship

- 05/2018 Panelist, NSF CAREER writing workshop
- 09/2017 Panelist, Young Investigator Grants information session
- 08/2017 Panelist, Work/Life Balance workshop
- 05/2017 Panelist, NSF CAREER writing workshop 04/2014 Panelist, CNBC Panel, “Graduate Academic Job Search”
- 06/2013 Mentor, CNBC Data Blitz
- 05/2012 Panelist, GBMES Panel, “Discussions at the Interface of Nature & Technology”

PRESENTATIONS

Invited Talks

1. 2021. PMC XIII, Auckland, New Zealand. “Acting out your feelings: internal state signals in motor cortex.” *virtual*
2. 2021. Ben Gurion University, Be'er Sheva, Israel. “Dissecting learning and memory with brain-computer interfaces.” *virtual*
3. 2020. 6th CiNet Conference. Osaka University, Osaka, Japan. “Neural manifolds: from basic science to practical improvements in brain-computer interfaces.”
4. 2019. Action Club, Northeastern, Boston, MA. “Dissecting learning processes with brain-computer interfaces.”
5. 2019. Cedars-Sinai, Los Angeles, CA. “Brain-computer interfaces for dissecting motor learning.”
6. 2019. Machine Learning in Science and Engineering, Atlanta, GA. “A stabilized brain-computer interface based on neural manifold alignment.”
7. 2019. Sungkyunkwan University, Suwon, South Korea. “Neural manifolds: from basic science to practical improvements in brain-computer interfaces.”
8. 2019. IEEE 2019 Winter BCI Conference, High 1 Resort, South Korea. “Neural manifolds: from basic science to practical improvements in brain-computer interfaces.”
9. 2018. Oregon Health & Science University, Portland, OR. Invited to give two classroom lectures on motor system function and brain-machine interfaces.

10. 2018. CMU/Pitt Neuro-Learning Workshop, Pittsburgh, PA. “Dissecting the neural mechanisms of learning with brain-computer interfaces.”
11. 2018. Machine Learning in Science and Engineering, Pittsburgh, PA. “Using machine learning to understand biological learning.”
12. 2018. Neural control of movement panel, Sante Fe, NM. “BCI learning: fast and slow.”
13. 2017. Oregon Health & Science University, Portland, OR. Invited to give two classroom lectures on motor system function and brain-machine interfaces.
14. 2017. TEDxCMU Pittsburgh, PA. “The limits of learnability.”
15. 2016. UPMC Enterprises, Pittsburgh, PA. “State-of-the-art in intracortical brain-computer interfaces.”
16. 2016. Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA. “Cognitive factors that shape neural prosthetic control.”
17. 2016. Department of Biomedical Engineering, University of Rochester, Rochester, NY. “Cognitive factors in neural prosthetic control.”
18. 2016. American control conference panel, Boston, MA. “A control-theoretic approach to brain-computer interface design.”
19. 2015. International Neuropsychological Symposium, Collioure, France. “Internal conceptions of external systems.”
20. 2015. Center for Neural Engineering Prostheses and Redwood Center for Theoretical Neuroscience, UC Berkeley, Berkeley, CA. “Internal models for interpreting neural population activity.”
21. 2014. SASP-SSP Continuing Education Symposium, Pittsburgh, PA. “From BrainHub to brain-computer interfaces: new research initiatives at Carnegie Mellon.”
22. 2014. Johns Hopkins Biomedical Engineering Retreat, Ocean City, MD. “From goats to brain-computer interfaces.”
23. 2014. Computational Motor Control Workshop, Beer-Sheva, Israel. “Internal model mismatch is responsible for the majority of errors in neuroprosthetic control.”
24. 2013. 2nd Annual Next Generation Medical Imaging Workshop, Pittsburgh, PA. “Movement-related information conveyed by non-traditional signal sources in motor cortex.”
25. 2013. Fourth Annual Aspen Brain Forum, Aspen, CO. “Developing algorithms for enhanced brain-machine interfaces.”
26. 2013. International BCI Meeting, Pacific Grove, CA. “Visuomotor adaptation in BCI: differences and similarities from natural reaching.”
27. 2011. The IEEE Pittsburgh Section Signal Processing and EMBS Chapters, Pittsburgh, PA. “Important and unimportant factors in neural prosthetic control.”
28. 2011. George Mason University, Fairfax, VA. “Visuomotor adaptation observed through a brain-computer interface.”
29. 2011. Harvard University, Cambridge, MA. “Visuomotor adaptation observed through a brain-computer interface.”
30. 2011. Boston University, Boston, MA. “Visuomotor adaptation observed through a brain-computer interface.”
31. 2010. CNUP Annual Retreat, Wheeling, WV. “Visuomotor adaptation observed through a brain-computer interface.”

32. 2010. Computational Motor Control Workshop, Beer-Sheva, Israel. “Visuomotor adaptation observed through a brain-computer interface.”
33. 2010. Hebrew University, Jerusalem, Israel. “Visuomotor adaptation observed through a brain-computer interface.”
34. 2010. Johns Hopkins Applied Physics Laboratory, Laurel, MD. “Important and unimportant factors in neural prosthetic control.”
35. 2009. Nertworks: a BMES satellite meeting, Pittsburgh, PA. “Leveraging BCI paradigms to study neural plasticity.”
36. 2009. McGowan Institute Annual Retreat, Farmington, PA. “Advances in neural prosthetic control.”

Conference Presentations

2021

1. Herrera AJ, Dekleva BM, Boninger ML, Yu BM, Batista AP, **Chase SM**, Collinger JL (2021) Effect of object presence and grasp intention on M1 activity during BCI controlled reaches. Brain Initiative investigators meeting.
2. Hennig JH, Oby ER, Golub MD, Bahureksa L, Sadtler P, Quick K, Ryu S, Tyler-Kabara E, *Batista AP, ***Chase SM**, *Yu BM (2021) Learning is shaped by an abrupt change in "neural engagement". IEEE NER mini-symposium.
3. Jeon BJ, **Chase SM**, and Kuhlman SJ (2021) Integration of new skills does not perturb preexisting function in primary visual cortex. SfN Global Connectome.
4. Hennig JA, Oby ER, Golub MD, Bahureksa LA, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, *Batista AP, ***Chase SM**, *Yu BM (2021) Learning is shaped by abrupt changes in neural engagement. Cosyne annual meeting.

2020

5. Herrera AJ, Deklava BM, Boninger ML, Yu BM, Batista AP, **Chase SM**, Collinger JL (2020) Effect of object presence and grasp intention on M1 activity during planning and movement execution. Human single neuron conference.
6. +Smoulder AS, +Pavlovsky NP, +Marino P, Degenhart AD, *Batista AP, ***Chase SM** (2020) Monkeys exhibit paradoxical decrement in performance in high-stakes scenarios – they ‘choke under pressure’. MLMC workshop.
7. Fisac CF and **Chase SM** (2020) Sensory feedback impacts volitional control of single neurons even after prolonged training. CMU BME Forum.
8. +Pavlovsky NP, +Smoulder AS, Degenhart AD, Marino P, *Batista AP, ***Chase SM** (2020) Monkeys exhibit paradoxical decrement in performance in high-stakes scenarios. CMU BME Forum.
9. Losey DM, Hennig JA, Oby ER, Golub MD, Sadtler PT, Quick KM, Ryu S, Tyler-Kabara EC, *Batista AP, *Yu BM, ***Chase SM** (2020) Evidence of a memory trace in motor cortex after short term learning. Cosyne annual meeting.

10. Koh TH, Bishop W, Kawashima M, Ahrens M, *Chase SM, *Yu BM (2020) Simultaneous dimensionality reduction and deconvolution for calcium imaging recordings. Cosyne annual meeting.
11. Menendez J, Hennig J, Golub M, Oby E, Batista A, Chase SM, Yu BM, Latham P (2020) A motor cortical model of brain-machine interface learning, fast and slow. Cosyne annual meeting.

2019

12. Losey DM, Hennig JA, Oby ER, Golub MD, Sadtler PT, Quick KM, Ryu S, Tyler-Kabara EC, *Batista AP, *Yu BM, *Chase SM (2019) Evidence of a memory trace in motor cortex after short term learning. SfN annual meeting.
13. Pavlovsky N, Degenhart AD, Marino P, *Batista AP, *Chase SM (2019) Monkeys choke under pressure. SfN annual meeting.
14. Jeon BB, *Chase SM, *Kuhlman SJ (2019) Use of optical brain computer interface to identify neural strategies underlying new skill acquisition and performance following extended practice. SfN annual meeting.
15. Herrera AJ, Gaunt RA, Boninger ML, Batista AP, Yu BM, Chase SM, Collinger JL (2019) The influence of object presence on M1 activity during movement planning and execution. SfN annual meeting.
16. Fitzgerald J, Zhou W, Chase SM, Joiner WM (2019) Sensory dissociation reveals postural influences on motor adaptation. SfN annual meeting.
17. +Stan PL, +Kauttonen J, Jeon BB, Fuchs T, Chase SM, Lee TS, Kuhlman SJ (2019) Impact of standard experience on tuning diversity and natural scene discrimination in primary visual cortex. SfN annual meeting.
18. Bahureksa L, Joiner WM, Chase SM (2019) Influence of movement workspace on M1 neural representations of arm movement. CMU BME Forum.
19. Koh TH, Bishop WE, *Chase SM, *Yu BM (2019) Simultaneous dimensionality reduction and deconvolution of calcium imaging activity. CMU BME Forum.
20. Jeon BB, *Chase SM, *Kuhlman SJ (2019) Well-trained mice maintain distinct but multiple neural strategies to solve a task. CNBC Retreat.
21. Koh TH, Bishop WE, *Chase SM, *Yu BM (2019) Simultaneous dimensionality reduction and deconvolution of calcium imaging activity. SAND 9 Workshop.
22. Jeon BB, Chase SM, Kuhlman SJ (2019) Feature selectivity is stable in primary visual cortex across a range of spatial frequencies. SAND 9 Workshop.
23. Fisac CF and Chase SM (2019) Sensory context interferes with volitional modulation of single neurons. NCM annual meeting.
24. Pavlovsky N, Degenhart A, Marino P, *Batista A, *Chase SM (2019) Monkeys choke under pressure. Brain initiative PI meeting.
25. Collinger JL, Batista AP, Boninger ML, Herrera AJ, Chase SM, Gaunt RA, Karapetyan V, Loughlin P, Tyler-Kabara E, Yu BM (2019) Context-dependent processing in sensorimotor cortex. Brain Initiative PI meeting.

26. Herrera AJ, Downey JE, Gaunt RA, Boninger ML, Batista AP, Yu BM, **Chase SM**, Collinger JL (2019) Object presence changes latent neural activity in motor cortex during reaching. Brain Initiative PI meeting.

2018

27. Nguyen KP, Sharma A, Liu J, Gil-Silva MR, Maheshwari N, *Gittis AH, ***Chase SM** (2018) Mice learn to modulate intra-and inter-limb paw kinematics with training on a novel locomotor behavioral paradigm. SfN annual meeting.
28. Herrera AJ, Degenhart AD, Bishop WE, Oby ER, Tyler-Kabara EC, **Chase SM**, Batista AP, Yu BM, Collinger JL (2018) Neural signal stabilization improves human intracortical BCI control. SfN annual meeting.
29. Whitford AD, **Chase SM**, Schwartz AB (2018) Patterns of cortical population activity during intentional control of single neurons. SfN annual meeting.
30. Fisac CF and **Chase SM** (2018) Dissociating volitional and non-volitional drivers of activity in M1. CMU BME Forum.
31. Nguyen KP, Sharma A, Liu J, Gil-Silva MR, Maheshwari N, *Gittis AH, ***Chase SM** (2018). Mice learn to modulate intra-and inter-limb paw kinematics with training on a novel locomotor behavioral paradigm. CMU BME Forum.
[Winner, best poster award.]
32. Bahureksa L, Joiner W, **Chase SM** (2018) Comparing M1 neural reorganization during contralateral and ipsilateral visuomotor rotation learning. CMU/Pitt Neuro-Learning Workshop.
33. +Degenhart A, +Bishop W, Oby E, Tyler-Kabara E, ***Chase SM**, *Batista AP, *Yu BM (2018) A stabilized brain-computer interface based on neural manifold alignment. CMU/Pitt Neuro-Learning Workshop.
34. Oby E, Golub M, Hennig J, Degenhart A, Tyler-Kabara E, *Yu B, ***Chase SM**, *Batista A (2018). Long term learning can change neural covariability. CMU/Pitt Neuro-Learning Workshop.
35. Nguyen KP, Sharma A, Liu J, Gil-Silva MR, Maheshwari N, *Gittis AH, ***Chase SM** (2018). Mice learn to modulate intra-and inter-limb paw kinematics with training on a novel locomotor behavioral paradigm. CMU/Pitt Neuro-Learning Workshop.
36. Bishop W, Crowder E, Zandvakili A, Zhou X, **Chase SM**, Kohn A, Olson C, and Yu B (2018). Leveraging low-dimensional structure in neural population activity to combine neural recordings. CMU/Pitt Neuro-Learning Workshop.
37. Herrera AJ, Downey JE, Moran DE, Batista AP, **Chase SM**, Yu BM, Boninger ML, Gaunt RA, Collinger JL (2018) Population-level changes in primary motor cortex induced by the presence of an object. BCI 2018.
38. **Chase SM** and Collinger JL (2018) Practical uses of manifolds. M5: Midwest Monkey Manifolds for Movement Meeting.
39. **Chase SM** (2018) BCI learning: fast and slow. Part of a panel: Torres-Oviedo G, Haith A, Penhune V, **Chase SM** (2018) The role of practice in motor learning: from sensorimotor adaptation to mastering de-novo skills. NCM annual meeting.

40. Jeon BB, **Chase SM**, Kuhlman SJ (2018) Feature selectivity is stable in primary visual cortex across a range of spatial frequencies. Cold Spring Harbor Neural Circuits meeting.
41. Oby E, Golub M, Hennig J, Degenhart A, Tyler-Kabara E, *Yu B, ***Chase SM**, *Batista A (2018). Learning can change neural covariability. Brain initiative PI meeting.
42. Oby E, Golub M, Hennig J, Degenhart A, Tyler-Kabara E, *Yu B, ***Chase SM**, *Batista A (2018). Learning can generate new patterns of neural population activity. Cosyne annual meeting. [Accepted as a talk: 4% acceptance rate.]
43. Bishop W, Crowder E, Zandvakili A, Zhou X, **Chase SM**, Kohn A, Olson C, and Yu B (2018). Leveraging low-dimensional structure in neural population activity to combine neural recordings. Cosyne annual meeting.

2017

44. Bahureksa L, Joiner W, **Chase SM** (2017) Comparing M1 neural reorganization during contralateral and ipsilateral visuomotor rotation learning. SfN annual meeting.
45. Zhou W, Colucci-Chang K, **Chase SM**, Joiner WM (2017) Dissociating the influence of postural and visual shifts on the transfer of motor adaptation to novel workspace locations. SfN annual meeting.
46. Jeon B, Quick K, **Chase SM**, Kuhlman SF (2017) Stability of orientation and spatial frequency tuning in mouse primary visual cortex. SfN annual meeting.
47. Stan P, Kauttonen J, Jeon B, **Chase SM**, Lee TS, Kuhlman SF (2017) Primary visual cortex encodes orientation-invariant attributes of complex images. SfN annual meeting.
48. ⁺Bishop W, ⁺Degenhart A, Oby ER, Tyler-Kabara EC, Batista AP, ***Chase SM**, *Yu BM (2017) Extracting stable representations of neural population state from unstable neural recordings. SAND 8 Workshop.
49. Joiner WM, Colucci-Chang K, Zhou W, and **Chase SM** (2017) Dissociating the influence of postural and visual shifts on the transfer of motor adaptation to novel workspace locations. NCM annual meeting.
50. Hennig JA, Golub MD, Lund PJ, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, *Yu BM, ***Chase SM** (2017) Predicting neural activity in behaviorally irrelevant dimensions. Cosyne annual meeting.
51. ⁺Bishop W, ⁺Degenhart A, Oby ER, Tyler-Kabara EC, ***Chase SM**, *Batista AP, *Yu BM (2017) Extracting stable representations of neural population state from unstable neural recordings. Cosyne annual meeting.
52. Golub MD, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, ***Chase SM**, *Yu BM (2017) Learning by neural reassociation. Cosyne annual meeting.

2016

53. Golub MD, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, ***Chase SM**, *Yu BM (2016) Learning by neural reassociation. Brain-Initiative PI meeting.
54. Flesher SN, Downey JE, Weiss J, Tyler-Kabara EC, **Chase SM**, Schwartz AB, Boninger ML, Collinger JL, Gaunt RA (2016) Grasp Force Control with Somatosensory Feedback in a Brain-Computer Interface. Brain-Initiative PI meeting.

55. Hennig JA, Golub MD, Lund PJ, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, *Yu BM, *Chase SM (2016). Predicting neural activity in behaviorally irrelevant dimensions. SfN annual meeting.
56. Golub MD, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, *Chase SM, *Yu BM (2016) Population-level changes in neural activity during learning. SfN annual meeting.
57. ⁺Degenhart A, ⁺Bishop W, Oby ER, Tyler-Kabara EC, Batista AP, *Chase SM, *Yu BM (2016). Self-recalibrating brain-computer interfaces based on population subspace alignment. SfN annual meeting.
58. Oby ER, Degenhart A, Tyler-Kabara E, Yu B, Chase SM, and Batista AP (2016) Learning to generate new patterns of neural activity. Brain Day, University of Pittsburgh.
59. ⁺Degenhart A, ⁺Bishop W, Oby ER, Tyler-Kabara EC, Batista AP, *Chase SM, *Yu BM (2016). Self-recalibrating brain-computer interfaces based on population subspace alignment. Brain Day, University of Pittsburgh.
60. Zhang Y and Chase SM (2016). A control-theoretic approach to brain-computer interface design. American Controls Conference 2016.
61. Chase SM (2016) Provably optimal design of intracortical BCI decoding algorithms. BCI 2016 workshop, “Algorithms and performance using implanted devices” organized by Chase, Batista, Yu, and Carmena.
62. Zhou X, Tien R, and Chase SM (2016) Distinct timescales of cortical reorganization in a long-term learning task. BCI 2016.
63. Golub MD, Chase SM, Batista AP, and Yu BM (2016) Brain-computer interfaces for dissecting cognitive processes underlying sensorimotor control. Complexity of Neural Computation and Cognition Workshop, Janelia Farms.
64. Oby ER, Degenhart A, Tyler-Kabara E, Yu B, Chase SM, and Batista AP (2016) Exploring learning-induced changes in neural population activity. NCM annual meeting.
65. Zhou X, Tien R, and Chase SM (2016) Distinct timescales of cortical reorganization in a long-term learning task. Cosyne annual meeting.
66. Bittner S, Williamson RC, Snyder AC, Litwin-Kumar A, Doiron B, *Chase SM, *Smith MA, and *Yu BM (2016) Effects of excitatory versus inhibitory neuron sampling on outputs of dimensionality reduction. Cosyne annual meeting.
67. Golub MD, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, *Chase SM, and *Yu BM (2016) Learning engages both high- and low-covariance modes of neural population activity. Cosyne annual meeting.
68. Golub MD, Sadtler PT, Quick KM, Ryu SI, Tyler-Kabara EC, Batista AP, *Chase SM, and *Yu BM (2016) Population-level changes in neural activity during learning. Cosyne workshop, “Sensorimotor learning through multi-dimensional spaces” organized by Golub.

2015

69. Oby ER, *Chase SM, *Yu BM, *Batista AP (2015) Exploring learning-induced changes in neural manifolds. Brain Initiative PI meeting.

70. Zhou X, Tien R, and **Chase SM** (2015) Distinct timescales of cortical reorganization in a long-term learning task. TCMC workshop.
71. Alemayehu B, Pavlovsky N, Chiou J, **Chase SM**, and Batista AP (2015) Eye-centered tuning is weak in dorsal premotor cortex when monkeys are not trained to fixate. SfN annual meeting.
72. Zhou X, Tien R, and **Chase SM** (2015) Distinct timescales of cortical reorganization in a long-term learning task. SfN annual meeting.
73. Zhang Y and **Chase SM** (2015) Recasting brain-machine interface design from a physical control system perspective. SAND 7 Workshop.
74. Matano F, **Chase SM**, Shalizi C, and Ventura V (2015). Improved kinematic models for decoding neural activity. SAND 7 Workshop.
75. Golub MD, *Yu BM, and ***Chase SM** (2015) Internal models for interpreting neural population activity during sensorimotor control. McGovern Institute Spring Symposium.
76. Golub MD, *Yu BM, and ***Chase SM** (2015) Internal models for interpreting neural population activity during sensorimotor control. Cosyne annual meeting.

2014

77. Kappel D, Pecevski D, Whitford AS, **Chase SM**, Maass W (2014). Stochastic motor control as probabilistic inference in spiking neural networks with noise. SfN annual meeting.
78. Rasmussen RG, **Chase SM**, Schwartz AB (2014). Limits on transmission of information in primary motor cortex during multidimensional reaches. SfN annual meeting.
79. Suway SB, McMorland AJC, Fraser GW, Sohn JW, **Chase SM**, Liu Z, Velliste M, Kass RE, Schwartz AB (2014) Short time-scale stability of directional tuning in motor cortex measured using maximum likelihood estimation. SfN annual meeting.
80. Rasmussen RG, Swartz AB, and **Chase SM** (2014). Dynamic range adaptation in motor cortical neurons. Cosyne annual meeting.

2013

81. Perel S, Sadtler PT, Ryu SI, Batista AP, **Chase SM** (2013). Tuning to reach kinematics of single-unit activity, threshold-crossings, and local field potentials in motor cortex. SfN annual meeting.
82. Alemayehu B, Pavlovsky N, Tyler-Kabara EC, **Chase SM**, Batista A (2013). Neurons in monkey dorsal premotor cortex are weakly sensitive to eye position when gaze fixation is untrained. SfN annual meeting.
83. Zhang Y and **Chase SM** (2013) A stabilized dual Kalman filter for adaptive tracking of brain-computer interface decoding parameters. EMBC.
84. Perel S, Sadtler PT, Godlove JM, Ryu SI, Wang W, Batista AP, **Chase SM** (2013) Direction and speed tuning of motor-cortex multi-unit activity and local field potentials during reaching movements. EMBC.

2012

85. Todorova S, **Chase SM**, Ventura V (2012). Simple automatic spike sorting can improve the efficiency of decoding from neuron spike trains. WiML 2012, Lake Tahoe, NV.

86. Todorova S, **Chase SM**, Ventura V (2012). Model-Based Clustering of non-Poisson, non-homogenous Point Processes Events with Application to Neuroscience. 7th Annual Machine Learning Workshop of the NYAS. New York, NY.
87. Golub MD, *Yu BM, and ***Chase SM** (2012) Internal models engaged by brain-computer interface control. SfN annual meeting.
88. Zhang Y, Schwartz AB, **Chase SM**, and Kass RE (2012) Bayesian learning in assisted brain-computer interface tasks. EMBC.
89. Golub MD, *Yu BM, and ***Chase SM** (2012) Internal models engaged by brain-computer interface control. EMBC.
90. Golub MD, Yu BM, Schwartz AB, and **Chase SM** (2012) Enhanced stability of cursor stopping in brain-computer interfaces. EMBC.
91. Todorova S, **Chase SM**, and Ventura V (2012) Model-Based Clustering of non-Poisson, non-homogenous Point Processes Events with Application to Neuroscience. Classification Society Annual Meeting.
92. Golub MD, ***Chase SM**, and *Yu BM (2012) Internal model estimation for closed-loop brain-computer interfaces. Young Investigator Talk, SAND 6 Workshop.
93. Todorova S, **Chase SM**, and Ventura V (2012) Simple automatic spike sorting methods improve decoding accuracy in a 3D movement task. SAND 6 Workshop.
94. Zhang Y, Schwartz AB, **Chase SM**, and Kass RE (2012) Bayesian learning in assisted brain-computer interface tasks. SAND 6 Workshop.
95. Golub MD, ***Chase SM**, and *Yu BM (2012) Internal model estimation for feedback control in brain-computer interfaces. Cosyne annual meeting & Machine Learning, Statistical Inference, and Neuroscience, Janelia Farms.

2011

96. Rao H, Schwartz AB, and **Chase SM** (2011) Adaptation to visuomotor gains applied through a brain-computer interface. SfN annual meeting.
97. Golub MD, Yu BM, Schwartz AB, and **Chase SM** (2011) Improving cursor stops in closed-loop brain-computer interfaces by leveraging trajectory curvature. SfN annual meeting.

2010

98. **Chase SM**, Whitford AS, Kass RE, and Schwartz AB (2010) Operant conditioning to identify volitionally controllable patterns of neural activity. SfN annual meeting.
99. Whitford AS, **Chase SM**, and Schwartz AB (2010) Coordination and control of cortical activity patterns identified via operant conditioning. SfN annual meeting.
100. McMorland AJC, Liu Z, **Chase SM**, Velliste M, Kass RE, and Schwartz AB (2010) Towards better prediction of temporal dynamics of M1 firing rates during reaching. SfN annual meeting.
101. **Chase SM**, Kass RE, and Schwartz AB (2010) Differentiating global and local adaptation responses to visuomotor rotations of a brain-computer interface. CNS10 Workshop.
102. **Chase SM** (2010) Separating intention from action in motor cortical tuning curves. Young Investigator Talk, SAND 5 Workshop.

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103. Legenstein R, **Chase SM**, Schwartz AB, and Maass W (2009) A reward-modulated Hebbian learning rule can explain experimentally observed network reorganization in a brain control task. NIPS
104. **Chase SM**, Schwartz AB, and Kass RE (2009) Adaptive gain modulation in the motor system observed through a brain-computer interface. SfN annual meeting.
105. Whitford AS, **Chase SM**, and Schwartz AB (2009) Task-specific tuning properties of motor cortical units used to control a brain-computer interface. SfN annual meeting.
106. Fraser GW, **Chase SM**, Koyama S, Kass RE, and Schwartz AB (2009) Important and unimportant factors for neural prosthetic control. SfN annual meeting.
107. **Chase SM**, Schwartz AB, and Kass RE (2009) Computational approaches for investigating network adaptive behavior in a brain-computer interface. BMES annual meeting.
108. **Chase SM**, Kass RE, and Schwartz AB (2009) Recent advances in neural prosthetic control. BMES annual meeting.
109. Schwartz AB, Kass RE, and **Chase SM** (2009) Learning and decoding in a multielectrode brain-machine interface paradigm. CRCNS PI meeting.
110. Koyama S, **Chase SM**, Whitford A, Velliste M, Schwartz AB, and Kass RE (2009) Comparison between decoding algorithms in open-loop and closed-loop performance. Cosyne annual meeting.

2008

111. **Chase SM**, Kass RE, and Schwartz AB (2008) A framework for modeling the closed-loop performance of brain-computer interface algorithms. SfN annual meeting.
112. Legenstein R, **Chase SM**, Schwartz AB, and Maass W (2008) A model for learning effects in motor cortex that may facilitate the brain control of neuroprosthetic devices. SfN annual meeting.
113. Koyama S, Whitford A, **Chase SM**, Velliste M, Schwartz AB, and Kass RE (2008) Recursive Bayesian algorithms for real-time cortical control of 3D neuroprosthetic devices. SfN annual meeting.
114. **Chase SM**, Schwartz AB, and Kass RE (2008) General adaptation strategies used to compensate for perturbations of a brain-computer interface. SAND 4 Workshop.

pre-2008

115. **Chase SM**, Fraser GW, Kass RE, and Schwartz AB (2007) Neural adaptation to a 3-dimensional, rotation perturbation in a closed loop brain-computer interface. SfN annual meeting.
116. **Chase SM**, Kass RE, and Schwartz AB (2007) BCI – A novel paradigm for studies of neural plasticity. BMES annual meeting.
117. **Chase SM**, Fraser GW, Kass RE, and Schwartz AB (2007) Neural adaptation to a 2-dimensional rotation perturbation in a closed loop brain-computer interface. CRCNS PI meeting.

118. **Chase SM** and Young ED (2006) Using a population reference for stimulus onset time in first spike latency coding. Cosyne annual meeting.
119. **Chase SM** and Young ED (2005) Spike timing dependent information on sound location in the inferior colliculus. SfN annual meeting.
120. **Chase SM** and Young ED (2005) The representation of sound location information among neural populations in the inferior colliculus ARO 28th midwinter meeting.
121. **Chase SM** and Young ED (2004) The processing of sound location cues by classes of units in the inferior colliculus. ARO 27th midwinter meeting.