Marlene R. Cohen

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Associate Director, Center for the Neural Basis of Cognition
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January 16, 2020

PROFESSIONAL POSITIONS:

University of Pittsburgh (2019-present)
Professor, Department of Neuroscience
Associate Director, Center for the Neural Basis of Cognition

University of Pittsburgh (2016-2019)
Associate Professor, Department of Neuroscience
Associate Director, Center for the Neural Basis of Cognition

University of Pittsburgh (2011-2016)
Assistant Professor
Department of Neuroscience
Center for the Neural Basis of Cognition

Harvard Medical School/ Howard Hughes Medical Institute (2007-2011)
Postdoctoral research
Advisor: John H.R. Maunsell

EDUCATION:

Stanford University (2001-2007)
PhD in Neuroscience
Advisor: William T. Newsome

Massachusetts Institute of Technology (1997-2001)
B.S. in Mathematics , B.S. in Brain and Cognitive Sciences
Research advisor: Matthew A. Wilson

Cold Spring Harbor Laboratories (summer 2004) Computational vision course
RIKEN Brain Science Institute (summer 2000) Summer lecture course in brain science

TEACHING:

University of Pittsburgh, Neuroscience undergraduate program
Neural Basis of Vision: designed and taught a new upper level elective (taught seven times beginning Spring 2013)
Research Topics in Neuroscience: lectured each semester (Spring 2012-present)
University Honors College: Friday Faculty Lecture (Spring 2016)

University of Pittsburgh, CNUP graduate program
Proseminar series for new students, lecturer (Spring 2012-present)
Graduate student journal club coordinator (Fall 2012)

Cold Spring Harbor Laboratories
Computational Vision summer course, teaching assistant (2010), lecturer (2012-present), course organizer (2017-present)

Stanford University Department of Neurobiology
Math Tools for Neuroscience, designed and taught (yearly, 2002-2006)

FUNDING:
Ongoing research support:
2R01EY022930 Cohen (PI) 8/01/2018-7/31/2023
Neuronal population coding: from vision to decision

Simons Foundation Cohen (spokesperson PI) 7/01/17-06/30/22
Brent Doiron, Adam Kohn, Christian Machens, Kenneth Miller, Alexandre Pouget, Byron Yu (co-PIs)
Communication between neural populations: circuits, coding, and behavior

Completed research support
McKnight Scholar Award Cohen (PI) 7/1/2015-6/30/2018 (in NCE until 6/30/19)
Causal and correlative tests of the hypothesis that hypothesis that the neuronal mechanisms underlying attention involve interactions between cortical areas

R01 EY022930 Cohen (PI) 8/1/2013 – 7/31/2018 (in NCE until 12/31/18)
Using Neuronal Populations to Probe Perceptual Decisions

Simons Foundation Cohen (PI), Doiron (co-PI) 9/01/14-8/31/17 (in NCE until 12/31/18)
Attentional modulation of neuronal variability constrains circuit models

K99 EY020844-01 Cohen (PI) 8/01/10-9/01/11
Using attention to understand cortical population codes

4R00EY020844 – 03 Cohen (PI) 9/01/11-2/28/15
Using attention to understand cortical population codes

Whitehall Foundation Cohen (PI) 7/1/2012 – 6/30/2015
Relating Groups of Visual Neurons to Perceptual Decisions

Klingenstein Fund Cohen (PI) 7/1/2012 – 6/30/2016
Probing the Relationship Between Groups of Visual Neurons and Perceptual Decisions

Sloan Research Fellowship Cohen (PI) 9/1/2014-9/1/2016 (in NCE until 6/1/2018)
New investigator fellowship.

HONORS/AWARDS:
Troland Research Award from the National Academy of Sciences (2018)
McKnight Scholar Award (2015-2018)
Chancellor's Distinguished Research Award, University of Pittsburgh (2015)
Sloan Research Fellowship (2014-2016)
Eppendorf and Science Prize for Neurobiology, grand prize winner (2012)
Klingenstein Fellowship Award in the Neurosciences (2012-2015)
Whitehall Foundation New Investigator Grant (2012-2015)
NIH K99/R00 Pathway to Independence Award (EY020844-03, 2010-2014)
Stanford University School of Medicine Excellence in Teaching Award (2007)
Howard Hughes Medical Institute Predoctoral Fellowship (2001-2006)
National Science Foundation Predoctoral Fellowship (2001, not used)
Hans Lukas Teuber Award for excellence in undergraduate research (2001)
American Association of University Women Excellence in Mathematics scholarship (1997)

MENTORSHIP/SERVICE:

Mentorship of current lab members: three postdoctoral fellows, two doctoral students, one graduate rotation student and two post-baccalaureate students.
Associate Editor, Journal of Neuroscience (2018-present)
Associate Director, Center for the Neural Basis of Cognition (2016-present)
Center for Neuroscience at the University of Pittsburgh graduate program admissions committee (2016-present)
Faculty search committee, Departments of Neuroscience and Mathematics, University of Pittsburgh (2018-present)
Steering committee for the Program in Neural Computation (2016-present)
Dissertation committee member for thirteen doctoral students (2011-present)
Comprehensive exam committee member for seven doctoral students (2012-present)
Reprint exam committee member for four doctoral students (2012-present)
Postdoctoral advisory committee member for three postdoctoral fellows (2012-present)
Center for the Neural Basis of Cognition executive committee member (2011-present)
General co-Chair for the Computational and Systems Neuroscience meeting (2013-2014)
Program co-Chair for the Computational and Systems Neuroscience meeting (2012-2013)
Program Committee for the Computational and Systems Neuroscience meeting (2010-2012)
Harvard Neurobiology Systems Club Organizer (2007-2009)
Stanford Neurosciences Program Student Representative (2002-2004)

PUBLICATIONS:

pdfs of all publications are available here: http://cohenlab.com/publications.html

Original research

Jun NY, Ruff DA, Tokdar ST, Cohen MR, and Groh JM (2019). Patterns of neural correlations in V1 vary with the number of objects. bioRxiv https://www.biorxiv.org/content/10.1101/777912v1
Ruff DA, Xue C, Kramer LE, Baqai F, and Cohen MR (2019) Low rank mechanisms underlying flexible visual representations. bioRxiv doi: https://www.biorxiv.org/content/10.1101/730978v1
Ruff DA and Cohen MR (2019). Simultaneous multi-area recordings suggest that attention improves performance by reshaping stimulus representations. Nature Neuroscience, 22(10):1669-1676.
Huang C, Ruff DA, Pyle R, Rosenbaum R, Cohen MR, Doiron B (2019). Circuit-based models of shared variability in cortical networks. Neuron, 101(2):337-348.
Ruff DA, Brainard DH, and Cohen MR (2018). Neuronal population mechanisms of lightness perception. J Neurophysiology, doi: 10.1152/jn.00906.2017.
Ni AM, Ruff DA, Alberts JJ, Symmonds J, and Cohen MR (2018). Learning and attention reveal a general relationship between neuronal variability and perception. Science 359(6374), pp. 463-465.
Kanashiro T, Ocker G, Cohen MR, Doiron B (2017). Attentional modulation of neuronal variability in circuit models of cortex, eLife, doi: 10.7554/eLife.23978.
Ruff DA, Cohen MR (2017). A normalization model suggests that attention changes the weighting of inputs between visual areas. Proc Natl Acad Sci. May 2017 pii: 201619857.
Ruff DA, Alberts JJ, and Cohen MR (2016). Relating normalization to neuronal populations across cortical areas. J Neurophys, 116(3):1375-86.
Ruff DA and Cohen MR (2016). Attention increases spike count correlations between visual cortical areas. J Neurosci, 36(28): 7453-7463.
Ruff DA and Cohen MR (2016). Stimulus dependence of correlated variability across cortical areas. J Neurosci, 36(28):7546-7556.
Oby ER, Perel S, Sadtler P, Ruff DA, Mischel JL, Montez DF, Cohen MR, Batista AP, Chase SM (2016). Extracellular voltage threshold settings can be tuned for optimal encoding of movement and stimulus parameters. J Neural Eng, 13(3):036009.
Rabinowitz NC, Goris RL, Cohen MR, and Simoncelli EP (2015). Attention stabilizes the shared gain

of V4 populations. Elife, November 2015 4:e08998.
Mayo JP, Cohen MR, and Maunsell JHR (2015). A refined neuronal population measure of visual attention. PLOS One, 10(8):e0136570.
Ruff DA and Cohen MR (2014). Global cognitive factors modulate correlated response variability between V4 neurons. Journal of Neuroscience, 34(49):16408-16.
Ruff DA and Cohen MR (2014). Attention can either increase or decrease spike count correlations in visual cortex, Nature Neuroscience, 17(11):1591-7.
Cohen MR and Maunsell JHR (2011). When attention wanders: how uncontrolled fluctuations in attention affect performance. Journal of Neuroscience, 31(44):15802-06.
Cohen MR and Maunsell JHR (2011). Using neuronal populations to study the mechanisms underlying spatial and feature attention. Neuron, 70:1192-1204.
Cohen MR and Maunsell JHR (2010). A neuronal population measure of attention predicts behavioral performance on individual trials. Journal of Neuroscience, 30:15241-53.
Churchland MM, Yu BM, Cunningham JP, Sugrue LP, Cohen MR, Corrado GS, Newsome WT, Clark AM Hosseini P, Scott BB, Bradley DC, Smith MA, Kohn A, Movshon JA, Armstrong KM, Moore T, Chang SW, Snyder LH, Priebe NJ, Finn IM, Ferster D, Ryu SI, Santhanam G, Sahani M, and Shenoy KV (2010). Stimulus onset quenches neural variability: a widespread cortical phenomenon. Nature Neuroscience, 13(3):369-78.
Cohen MR and Maunsell JHR (2009). Attention improves performance primarily by reducing interneuronal correlations. Nature Neuroscience, 12(12):1594-1600.
Cohen MR and Newsome WT (2009). Estimates of the contribution of single neurons to perception depend on timescale and noise correlation, Journal of Neuroscience, 29:6635-48.
Cohen MR and Newsome WT (2008). Context-dependent changes in functional circuitry in visual area MT. Neuron, 60(1):162-173.
Barberini CL, Cohen MR, Wandell BA and Newsome WT (2005). Cone signal interactions in direction-selective neurons in the middle temporal visual area (MT). Journal of Vision, 5:603-621.
Cohen MR, Meissner GW, Schafer RJ, and Raymond JL (2004). Reversal of motor learning in the vestibulo-ocular reflex in the absence of visual input. Learning and Memory, 11(5):559-565.

Reviews and book chapters

Ruff DA*, Ni AM*, and Cohen MR (2018). Cognition as a window into neuronal population space. Annu Rev Neurosci. 41:77-97. doi: 10.1146/annurev-neuro-080317-061936.
Ruff DA and Cohen MR (2014). Relating the activity of sensory neurons to perception. In The Cognitive Neurosciences (MIT Press).
Cohen MR and Maunsell JHR (2014). Neuronal mechanisms of spatial attention in visual cerebral cortex. In The Oxford Handbook of Attention.
Ruff DA and Cohen MR (2013). Pursuing the link between neurons and behavior. Neuron, 79: 6-9.
Cohen MR (2012). When attention wanders. Science 5 October 2012: 338 (6103), 58-59.
Nienborg H*, Cohen MR*, and Cumming BG (2012). Decision-related activity in sensory neurons: correlations among neurons and with behavior. Annu Rev Neurosci, 35: 463-83.
Cohen MR and Kohn AK (2011). Measuring and interpreting neuronal correlations. Nature Neuroscience, 14:811-809.
Cohen MR and Newsome WT (2004). What electrical microstimulation has revealed about the neural basis of cognition. Current Opinion in Neurobiology, 14:1-9.
* These authors contributed equally.

PRESENTATIONS

Conference abstracts since becoming an independent investigator

Xue C, Kramer LE, and Cohen MR (2020). Multi-dimensional perceptual decision making under dynamic belief states. Computational and Systems Neuroscience meeting.
Xue C, Kramer LE, and Cohen MR (2019). Adapting to an ever-changing world: how the brain makes decisions in the face of evolving behavioral rules. Society for Neuroscience annual meeting.

Kramer LE, Xue C, and Cohen MR (2019). A multi-population, multi-task framework yields new insights about decision-making mechansms. Society for Neuroscience annual meeting.

Baqai F, Ruff DA, Doiron B, and Cohen MR (2019). Continuous decision-making as a lens into neural computation. Society for Neuroscience annual meeting.

Ni AM, Bowes BS, Ruff DA, and Cohen MR (2019). Using interactions between pharmaceutical stimulants and selective attention to test hypotheses about neuronal population activity in areas V4 and 7a. Society for Neuroscience annual meeting.

Ruff DA and Cohen MR (2019). Simultaneous population recordings from both superior colliculi do not support a limited resource theory of attention. Society for Neuroscience annual meeting.

Bowes BS, Ni AM, and Cohen MR (2018). Using pharmaceuticals to study how cognition affects perception. Society for Neuroscience annual meeting.

Jun N, Mohl JT, Cohen MR, Tokdar ST, Groh JM (2018). Fluctuating activity (time-division multiplexing) varies across sensory brain regions. Society for Neuroscience annual meeting.

Bowes BS, Ni AM, Cohen MR (2018). Using pharmaceuticals to study how cognition affects perception. AREADNE, Santorini, Greece.

Ruff, DA, Cohen, MR (2018). Using population recordings from multiple brain areas to ask how attention improves perception. AREADNE, Santorini, Greece.

Ni AM, Ruff DA, and Cohen MR (2018). Optimality for generality: A new hypothesis about how neuronal populations guide behavior. AREADNE Santorini, Greece.

Huang C, Cohen MR, Pouget A, Doiron B (2018). Modulation and propagation of information in the visual pathway. Computational and Systems Neuroscience meeting.

Getz MP, Huang C, Dunworth J, Cohen MR, Doiron B (2018). Attentional modulation of neural covariability in a ring model of cortex. Computational and Systems Neuroscience meeting.

Ni AM, Ruff DA, Alberts JJ, Symmonds J, and Cohen MR (2017). Do spike count correlations in visual cortex limit perception? Evidence from attention and perceptual learning. Society for Neuroscience annual meeting.

Huang C, Ruff DA, Cohen MR, Doiron B (2017). Modeling within and across area neuronal variability in the visual system. Computational and Systems Neuroscience meeting.

Ruff DA, Alberts JJ, Symmonds J, and Cohen MR (2016). Investigating the effects of attention and adaptation on the neuronal population representation of contrast. Society for Neuroscience annual meeting.

Ni AM, Ruff DA, Alberts JJ, Symmonds J, and Cohen MR (2016). Neuronal population changes underlying visual perceptual learning and attention. Society for Neuroscience annual meeting.

Ruff DA and Cohen MR (2016). Is spatial attention special? Computational and Systems Neuroscience meeting workshops (DA Ruff, presenter).

Ruff DA and Cohen MR (2016). Multiarea approaches to studying attention? Computational and Systems Neuroscience meeting workshops (DA Ruff, presenter).

Ruff DA and Cohen MR (2015). A normalization model accounts for stimulus and attention-related changes in correlated variability across cortical areas. Society for Neuroscience annual meeting (nanosymposium, DA Ruff, presenter).

Ruff DA and Cohen MR (2015). Correlative and causal evidence that attention improves communication between cortical areas. Computational and Systems Neuroscience meeting.

Alberts JJ*, Ruff DA* and Cohen MR (2015). A common topographic and functional organization for normalization across cortical areas. Computational and Systems Neuroscience meeting.
* These authors contributed equally.

Rabinowitz N, Goris R, Cohen MR, and Simoncelli E (2015). Modulators of V4 population activity under attention. Computational and Systems Neuroscience meeting.

Ruff DA, Montez DF, and Cohen MR (2014). Attention has opposite effects on spike count correlations within and between visual areas. Society for Neuroscience annual meeting.

Montez DF, Ruff DA, and Cohen MR (2014). Relating divisive normalization to spike count correlations between and within cortical areas. Society for Neuroscience annual meeting.

Ruff DA, Brainard DH, and Cohen MR (2014). Neuronal population decoding can account for perceptual lightness illusions. Computational and Systems Neuroscience meeting.
Wiese T, Cohen MR, Doiron B (2014). Modeling attention-induced drop of noise correlations by inhibitory feedback. Computational and Systems Neuroscience meeting.
Chang R, Ruff DA, and Cohen MR (2013). Attention can adaptively increase or decrease interneuronal correlations in V4. Society for Neuroscience annual meeting.
Ruff DA, Chang R, and Cohen MR (2013). Effects of task difficulty on neuronal populations in visual area V4. Society for Neuroscience annual meeting.
Wiese T, Cohen MR, Doiron B (2013). Modeling the neural correlates of visual attention. Society for Neuroscience annual meeting.

Invited talks since becoming an independent investigator

University of Chicago, Department of Neurobiology seminar, Chicago, IL (2020)
Washington University in Saint Louis, Neuroscience seminar, St. Louis, MO (2019)
Society for Neuroscience Annual Meeting minisymposium, Chicago, IL (2019)
Neural Coding, Computation, and Dynamics meeting, Capbreton, France (2019)
Symposium on the Biology of Decision-Making, Oxford, United Kingdom (2019)
National Academy of Sciences Sackler Symposium, Irvine, CA (2019)
California Institute of Technology seminar speaker, Pasadena, CA (2019)
Harvard Center for Brain Science seminar speaker, Cambridge, MA (2019)
University of Pennsylvania seminar speaker, Philadelphia, PA (2019)
Swiss Society of Neuroscience keynote speaker, Geneva, Switzerland (2019)
Neuroscience Research Seminar, Johns Hopkins University, Baltimore, MD (2018)
Simons Collaboration on the Global Brain Meeting, New York NY (2018)
Cold Spring Harbor Computational Neuroscience: Vision lecture, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (2018)
AREADNE Research in Encoding and Decoding of Neural Ensembles meeting, Santorini, Greece (2018)
McKnight Annual Meeting, Aspen, CO (2018)
McGovern Seminar Series, Massachusetts Institute of Technology, Cambridge, MA (2018)
National Academy of Sciences Award Ceremony, Washington, DC (2018)
Center for Neural Science colloquium, New York, NY (2018)
Computational and Systems Neuroscience Meeting, Denver, CO (2018)
Computational Neuroscience seminar, University of Pennsylvania, Philadelphia, PA (2017)
National Eye Insitute: Vision in the Brain symposium, Washington, DC (2017)
Motion vision: circuits, computations, and behavior, Janelia Farm, Ashburn, VA (2017)
Kavli Informal Seminar, University of California, San Francisco, CA (2017)
Champalimaud Center for the Unknown, neuroscience seminar, Lisbon, Portugal (2017)
Workshop on Attention, Carnegie Mellon University, Pittsburgh, PA (2017)
Joint Seminars in Neuroscience Seminar Series, University of California, Los Angeles, CA (2017)
VisuoNYC, Columbia, NYU, SUNY, and Cornell Universities (2016)
Simons Collaboration on the Global Brain Meeting, New York NY (2016)
Cold Spring Harbor Computational Neuroscience: Vision lecture, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (2016)
University of Chicago, Computational Neuroscience seminar (2016)
University of Pittsburgh, University Honors College (2016)
Simons Center Multiregional Models workshop, New York, NY (2016)
Yale University Swartz seminar, New Haven, CT (2015)
University of Texas at Austin, Center for Perceptual Systems seminar, Austin, TX (2015)
Duke University Neurobiology seminar, Durham, NC (2015)
Simons Collaboration on the Global Brain Meeting, New York NY (2015)
Canonical Neural Computation meeting, Florence, Italy (2015)

Klingenstein/Simons meeting, New York, NY (2015)
Statistical Analysis of Neural Data 7 (SAND7), Pittsburgh, MA (2015)
Senior Vice Chancellor's Distinguished Seminar Series, Pittsburgh, PA (2015)
Signal Transforms in the Early Visual System, Janelia Farm, Ashburn, VA (2014)
Gordon Research Conference on the Neurobiology of Cognition, Newry, ME (2014)
International Neuropsychology Symposium, Versilia, Italy (2014)
Canadian Association for Neuroscience keynote presentation, Montreal, Canada (2014)
Computational and Systems Neuroscience workshop series, Salt Lake City, UT (2014)
Harvard Medical School Neurobiology seminar, Boston, MA (2014)
Eppendorf and Science award banquet, San Diego, CA (2013)
Albert Einstein College of Medicine Dominick P. Purpura Department of Neuroscience seminar (2013)
Eppendorf company seminar, Hamburg, Germany (2013)
Summer Institute in Cognitive Neuroscience, Lake Tahoe, CA (2013)
Cognitive Neural Systems seminar series, University of California, San Diego; San Diego, CA (2013)
Perceptual Expertise Network meeting, Pittsburgh, PA (2013)
Eppendorf and Science award banquet, New Orleans, LA (2012)
Dimensionality Reduction Methods in Neuroscience, Janelia Farm, Ashburn, VA (2012)
Neuronal Response Variability and Cortical Computation Meeting, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (2012)
Vision Seminar Series, University of Pennsylvania, Philadelphia, PA (2011)
Autumn School in Cognitive Neuroscience, Oxford University, Oxford, UK (2011)
International Workshop on Attention, Allahabad, India (2011)