

# Ian Stevenson

## Assistant Professor

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## Research Interests

Computational Neuroscience, Neural Data Analysis, Motor Control, Bayesian Statistics

## Education

- 2006-2011 **PhD Neuroscience** Northwestern University  
THESIS: Probabilistic models of interactions between neurons, ADVISOR: Konrad Kording
- 2002-2006 **BA Physics** Rice University

## Positions

- 2013- **Assistant Professor** University of Connecticut  
Psychological Sciences and Biomedical Engineering
- 2011-2013 **Postdoctoral Fellow** University of California, Berkeley  
Redwood Center for Theoretical Neuroscience, ADVISOR: Bruno Olshausen

## Grants & Awards

- 2017-2022 CAREER: Statistical tools for tracking synaptic plasticity in neural spiking data  
NSF CAREER IIS-1651396, PI
- 2015-2020 CRCNS: The role of statistical regularities for neural discrimination and coding of sounds  
NIH NIDCD 1R01DC015138-01, Co-Investigator with Monty Escabi (PI) and Heather Read
- 2011-2013 NSF Computing Innovation Fellowship  
NSF-0937060 CIF-D-018
- 2016 NVIDIA Academic GPU Grant
- 2011 Baskin Award for Excellence in Research - Rehabilitation Institute of Chicago
- 2011 Qualcomm Computational and Systems Neuroscience Travel Award
- 2010 Statistical Analysis of Neural Data (SAND) Travel Award
- 2009-2010 Yahoo! Key Scientific Challenges Award - Statistics/Machine Learning
- 2009 Neural Information Processing Systems (NIPS) Travel Award
- 2009 Society for the Neural Control of Movement Travel Scholarship
- 2007-2008 NIH T32 Northwestern University - Neuroscience in the Early Years Grant
- 2005-2006 Federal Employee Education and Assistance Fund Scholarship Award

## Publications

- 2016 **Stevenson IH**. Flexible models for spike count data with both over- and under- dispersion, *Journal of Computational Neuroscience* 41(1), 29-43. [\[PDF\]](#)
- 2015 Volgushev M, Ilin V, and **Stevenson IH**. Identifying and tracking simulated synaptic inputs from neuronal firing: Insights from in vitro experiments, *PLoS Computational Biology* 11(3): e1004167. [\[PDF\]](#)
- 2014 Fernandes HL, **Stevenson IH**, Phillips AN, Segraves MA, and Kording KP. Saliency and saccade encoding in the frontal eye field during natural scene search, *Cerebral Cortex* 24 (12): 3232-3245. [\[PDF\]](#)
- 2014 Ilin V, **Stevenson IH**, and Volgushev M. Injection of fully-defined signal mixtures: a novel high-throughput tool to study neuronal encoding and computations, *PLoS ONE* 9(10): e109928. [\[PDF\]](#)
- 2014 Wei K, Glaser JJ, Deng L, Thompson CK, **Stevenson IH**, Wang Q, Hornby TG, Heckman CJ, and Kording KP. Serotonin affects movement gain control in the spinal cord, *Journal of Neuroscience* 34(38):12690-12700. [\[PDF\]](#)
- 2014 Long LL, Hinman JR, Chen C-M, **Stevenson IH**, Read HL, Escabi MA, and Chrobak JJ. Novel acoustic stimuli can alter locomotor speed to hippocampal theta relationship, *Hippocampus* 24(9): 1053-1058. [\[PDF\]](#)
- 2014 Fernandes HL, **Stevenson IH**, Vilares I, and Kording KP. The generalization of prior uncertainty during reaching, *Journal of Neuroscience* 34(34): 11470-11484. [\[PDF\]](#)
- 2014 Agarwal G, **Stevenson IH**, Berenyi A, Mizuseki K, Buzsaki G, and Sommer FT. Spatially distributed local fields in the hippocampus encode rat position, *Science* 344(6184): 626-630. [\[PDF\]](#)
- 2013 Ding Q, **Stevenson IH**, Wang N, Li W, Sun Y, Körding KP, and Wei K. Motion games improve balance control in stroke survivors: a preliminary study based on the principle of constraint-induced movement therapy, *Displays* 32(2): 125-131. [\[PDF\]](#)
- 2013 Yan X, Wang Q, Lu Z, **Stevenson IH**, Körding KP, and Wei K. Generalization of unconstrained reaching with hand weight changes, *Journal of Neurophysiology* 109: 137-146. [\[PDF\]](#)
- 2012 **Stevenson IH**, London BM, Oby ER, Sachs NA, Reimer J, Englitz B, David SV, Shamma SA, Blanche TJ, Mizuseki K, Zandvakili A, Hatsopoulos NG, Miller LE, and, Körding KP. Functional connectivity and tuning curves in populations of simultaneously recorded neurons, *PLoS Computational Biology* 8(11): e1002775. [\[PDF\]](#)
- 2012 Fernandes HL, **Stevenson IH** and Körding KP. Generalization of stochastic visuomotor rotations, *PLoS ONE* 7(8): e43016. [\[PDF\]](#)
- 2011 **Stevenson IH** and Körding KP. Inferring spike-timing-dependent plasticity from spike train data, *Advances in Neural Information Processing Systems* 24, 2582–2590. [\[PDF\]](#)
- 2011 **Stevenson IH**, Cherian A, London BM, Sachs N, Lindberg E, Reimer J, Slutzky MW, Hatsopoulos NG, Miller LE, and Körding KP. Statistical assessment of the stability of neural movement representations, *Journal of Neurophysiology* 106: 764-774. [\[PDF\]](#)
- 2011 **Stevenson IH** and Körding KP. How advances in neural recording affect data analysis, *Nature Neuroscience* 14: 139-142. [\[PDF\]](#)
- 2010 Wei K, **Stevenson IH**, and Körding KP. The uncertainty associated with visual flow fields

- and their influence on postural sway: Weber's law suffices to explain the nonlinearity of vection, *Journal of Vision* 10(14): 4. [\[PDF\]](#)
- 2010 **Stevenson IH\***, Cronin B\*, Sur M, and Körding KP. Sensory adaptation and short term plasticity as Bayesian correction for a changing brain. *PLoS ONE* 5(8): e12436. (\* contributed equally) [\[PDF\]](#)
- 2010 Rebesco JM, **Stevenson IH**, Körding KP, Solla SA, and Miller LE. Rewiring neural interactions by micro-stimulation. *Frontiers in Systems Neuroscience* 4:39. [\[PDF\]](#)
- 2010 **Stevenson IH** and Körding KP. On the similarity of functional connectivity between neurons estimated across timescales. *PLoS ONE* 5(2): e9206. [\[PDF\]](#)
- 2010 Cronin B\*, **Stevenson IH\***, Sur M, and Körding KP. Hierarchical Bayesian modeling and Markov chain Monte Carlo sampling for tuning curve analysis. *Journal of Neurophysiology* 103: 591-602. (\* contributed equally) [\[PDF\]](#)
- 2009 **Stevenson IH**, Fernandes HL, Vilares I, Wei K, and Körding KP. Bayesian integration and non-linear feedback control in a full-body motor task. *PLoS Computational Biology* 5(12): e1000629. [\[PDF\]](#)
- 2009 **Stevenson IH** and Körding KP. Structural inference affects depth perception in the context of potential occlusion. *Advances in Neural Information Processing Systems* 22. 1777-1784. [\[PDF\]](#)
- 2009 **Stevenson IH**, Rebesco JM, Hatsopoulos NG, Haga Z, Miller LE, and Körding KP. Bayesian inference of functional connectivity and network structure from spikes. *IEEE Trans. Neural Systems and Rehabilitation (Special Issue on Brain Connectivity)*. 17, 3: 203-213. [\[PDF\]](#)
- 2008 **Stevenson IH**, Rebesco JM, Miller LE, and Körding KP. Inferring functional connections between neurons. *Current Opinion in Neurobiology*. 18: 582-588. [\[PDF\]](#)
- 2007 Whitehead JA and **Stevenson I**. Turbulent Mixing of two-layer stratified fluid. *Physics of Fluids* 19 (12). [\[PDF\]](#)
- 2007 Chen Y, **Stevenson I**, Pouy R, Wang L, McIlroy D, Pounds T, Norton M, and Aston D. Mechanical elasticity of vapour-liquid-solid grown GaN nanowires, *Nanotechnology* 18, 135708. [\[PDF\]](#)
- 2006 Dobrokhotov V, McIlroy D, Norton M, Abuzir A, Yeh W, **Stevenson I**, Pouy R, Bochenek J, Cartwright M, Wang L, Dawson J, Beaux M, and Berven C. Principles and mechanisms of gas sensing by GaN nanowires functionalized with gold nanoparticles, *Journal of Applied Physics* 99, 104302. [\[PDF\]](#)

## Recent Conference Abstracts & Papers

- 2017 Ghanbari A and Stevenson IH. 'Modeling dispersion improves decoding of population neural response', *Computational and Systems Neuroscience*. I-107.
- 2017 Khatami F, Sadeghi M, Read H, Stevenson IH, and Escabi M. 'Neural discrimination of sound category utilizes high-order sound statistics in the central auditory', *Computational and Systems Neuroscience*. II-45.
- 2016 Ghanbari A, Ilin V, Volgushev M, and Stevenson IH. 'Estimating short-term synaptic plasticity from paired spikes in vitro', *Computational and Systems Neuroscience*. I-31.
- 2015 Volgushev M, Ilin V, and Stevenson IH. 'Identifying and tracking simulated synaptic inputs from neuronal firing: insights from in vitro experiments', *Computational Neuroscience*. 262.

- 2015 Ghanbari A, Ilin V, Volgushev M, and Stevenson IH. 'Estimating short-term synaptic plasticity from paired spike recordings', *Statistical Analysis of Neural Data* 7. 17.
- 2014 Ilin V, Stevenson IH, and Volgushev M. 'Injection of fully-defined signal mixtures: A novel high-throughput paradigm to study neuronal encoding and computations', *Society for Neuroscience*. 187.14/TT63.
- 2014 Long LL, Norris AA, Hinman JR, Chen C-M, Stevenson IH, Read HL, Escabi MA, and Chrobak JJ. 'Novel acoustic stimuli can alter locomotor speed-theta relationship across the septotemporal axis of the hippocampus', *Society for Neuroscience*. 751.08/UU7.
- 2013 Zhu M, Stevenson I, Koster U, Gray C, Olshausen B, and Rozell C. 'Sparse coding model captures V1 population response statistics to natural movies', *Computational Neuroscience Meeting*. 14: P334.
- 2013 Mudigonda M, Stevenson I, Koster U, Hillar C, Gray C, and Olshausen B. 'Predicting V1 neural responses to natural movies using the shift-invariant bispectrum', *Computational and Systems Neuroscience*. Poster I-77.
- 2013 Agarwal G, Stevenson I, Mizuseki K, Buzsaki G, and Sommer F. 'Traveling waves of the hippocampal theta rhythm encode rat position', *Computational and Systems Neuroscience*. Poster I-46.
- 2013 Zhu M, Stevenson I, Koster U, Gray C, Olshausen B, and Rozell C. 'Sparse coding model and population response statistics to natural movies in V1', *Computational and Systems Neuroscience*. Poster I-5.
- 2012 Stevenson IH, Koster U, Gray CM, and Olshausen BA. 'Estimating border-ownership selectivity from V1 responses to natural movies', *Society for Neuroscience*. Selected Talk for Nanosymposium on Data Analysis and Statistics IV.
- 2012 Stevenson IH, Koster U, Gray CM, and Olshausen BA. 'Towards parametric models of V1 responses to natural movies', *Statistical Analysis of Neural Data*. Poster 39.
- 2012 Khosrowshahi A, Stevenson I, Koster U, Gray CM, and Olshausen BA. 'How does V1 encode dynamic natural scenes', *Collaborative Research in Computational Neuroscience*.
- 2012 Fernandes HL, Stevenson IH, and Kording KP. 'Generalization of Uncertainty', *Computational and Systems Neuroscience*. Poster III-9.
- 2011 Stevenson IH, Cherian A, London BM, Sachs NA, Lindberk E, Reimer J, Slutzky M, Hatsopoulos NG, Miller LE, and Kording KP. 'Statistical assessment of the stability of single neuron movement representation in primary motor cortex', *Neural Control of Movement*. Poster B-65.
- 2011 Wei K, Yan X, Wang Q, Stevenson IH, and Kording KP. 'Carrying water: the generalization function of perturbations of the hand's weight', *Neural Control of Movement*. Poster F-2.
- 2011 Acuna D, Stevenson IH, and Kording KP. 'The structure of visual scenes affects perceived depths in a motor task', *Neural Control of Movement*. Poster B-72.
- 2011 Stevenson IH, London BM, Oby ER, Sachs NA, Reimer J, Hatsopoulos NG, Miller LE, and Kording KP. 'Explaining tuning curves by estimating interactions between neurons', *Computational and Systems Neuroscience*. Selected Talk.
- 2011 Fernandes HL, Stevenson IH, Phillips A, Segraves M, and Kording KP. 'Saliency and saccade encoding in the frontal eye field during natural scene search', *Computational and Systems Neuroscience*. Poster III-78.
- 2010 Fernandes HL, Stevenson IH, and Kording KP. 'Visuomotor perturbations and uncertainty about them: Generalization patterns suggest distinct representations', *Advances in Computational Motor Control*. Selected Talk.
- 2010 Stevenson IH. 'Fully Bayesian parametric tuning curve analysis', *Statistical Analysis of Neural Data*. Selected Young Investigator Talk.

## Selected & invited talks

2016 July	Computational Neuroscience Conference, Workshop Talk
2015 Feb	University of Connecticut, Department of Biomedical Engineering
2014 Mar	University of Connecticut, Department of Statistics
2014 Mar	Kyoto University Systems Neurobiology Spring School, Lecture
2013 Dec	Neural Information Processing Systems Conference, Workshop Talk
2013 Jun	Modeling Neural Activity Conference, Workshop Talk
2013 Jan	University of Connecticut, Department of Psychology
2013 Jan	Baylor College of Medicine, Department of Neuroscience
2011 May	UC Berkeley, Redwood Center for Theoretical Neuroscience
2011 Feb	Computational and Systems Neuroscience Conference
2010 May	Statistical Analysis of Neural Data Conference, Young Investigator Talk
2009 Apr	Neural Control of Movement Conference, Workshop Talk
2009 Jan	Chicago Chapter of the American Statistical Association

## Teaching

2013-	<b>University of Connecticut</b> Psychology 5270, Current Topics in Neuroscience: Measuring and Modeling Neural... Psychology 5270, Current Topics in Neuroscience: Statistical Analysis of Neural Data Psychology 2100, Principles of Research in Psychology Psychology 5200, Behavioral Neuroscience Seminar
2012	<b>UC Berkeley</b> , Guest Lecturer Vision Science 265, Neural Computation
2008	<b>Northwestern University</b> , Teaching Assistant (two lectures) Biological Sciences 326, Neurobiology of Learning and Memory
2007	<b>Northwestern University</b> , Teaching Assistant Biological Sciences 302, Fundamentals of Neurobiology I

## Service & Reviewing

2016	Workshop Co-organizer: Statistical Analysis of Neural Time Series (CNS)
2013	Workshop Co-organizer: High Dimensional Statistical Inference in the Brain (NIPS)
2010-present	Associate Faculty Member, Faculty of 1000 - Motor Systems Section
2009-2010	Northwestern University, Neuroscience Student Seminar Series Committee
2009-2014	Member of the Society for the Neural Control of Movement, Student Member (2009-2011)
2009-2014	Member of the Society for Neuroscience, Student Member (2009-2011)
2008-2011	Assistant Editor of Scholarpedia.org - peer-reviewed encyclopedia
	Reviewer: Computational Intelligence and Neuroscience, Computational and Systems Neuroscience Conference (CoSyNe), Clinical Interventions in Aging, Frontiers in Computational Neuroscience, IEEE Transactions in Neural Systems and Rehabilitation Engineering, Journal of Computational Neuroscience, Journal of Neural Engineering, Journal of Neurophysiology, Journal of Neuroscience, Journal of Neuroscience Methods, Nature Communications, Neural Computation, Neural Information Processing Systems Conference (NIPS), Neuron, PLoS Computational Biology, Psychological Review
	Guest Editor, PLoS Computational Biology
	Review Editor, Frontiers in Computational Neuroscience