

Per Benjamin Sederberg, Ph.D.

Curriculum Vitae

Contact Information

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Personal

Born: August 15, 1974, Columbia, SC
Citizenship: USA

Professional

- **2017–**, Associate Professor, Dept. of Psychology, University of Virginia.
- 2016–2017, Chief Scientist, Ross Center for Brain Health and Performance, The Ohio State University Medical Center.
- 2016–2017, Associate Professor, Dept. of Psychology, The Ohio State University.
- 2010–2016, Assistant Professor, Dept. of Psychology, The Ohio State University.
- 2012–2017, Associate Director, Center for Cognitive and Brain Sciences, The Ohio State University.
- 2013–2017, Courtesy Appointment, Dept. of Linguistics, The Ohio State University
- 2006–2010, Postdoctoral Fellow, Princeton University (Advisor: Kenneth A. Norman, Ph.D.).
- 2004–2006, Ph.D. in Neuroscience, University of Pennsylvania (Advisor: Michael J. Kahana, Ph.D.).
- 2001–2004, Ph.D. Candidate in Neuroscience, Brandeis University (Advisor: Michael J. Kahana, Ph.D.).
- 1998–2001, Software Developer, Redpoint Systems, Inc., Little Rock, AR.
- 1996–1997, Research Assistant in Neuroscience, University of Virginia (Advisor: William B Levy, Ph.D.).

Education

- 2006 Ph.D., University of Pennsylvania (Neuroscience)

- 1996 B.A., University of Virginia (Major: Cognitive Science; Minor: Italian).

Honors and Awards

- Journal of Mathematical Psychology R. Duncan Luce Outstanding Paper Award for the years 2011–2013 for the paper “Approximate Bayesian Computation with Differential Evolution” with Brandon M. Turner.

Professional Activities

- Co-organized the Context and Episodic Memory Symposium (CEMS, 2018, Philadelphia, PA)
- Co-organized the Second Annual Global Brain Health and Performance Summit (2017, Columbus, OH)
- Co-organized the Context and Episodic Memory Symposium (CEMS, 2017, Philadelphia, PA)
- Organized the second annual OSU Cognitive and Brain Sciences Undergraduate Summer Institute (CUSI, 2016, Columbus, OH)
- Co-organized the Global Brain Health and Performance Summit (2016, Columbus, OH)
- Co-organized the Context and Episodic Memory Symposium (CEMS, 2016, Philadelphia, PA)
- Organized the first annual OSU Cognitive and Brain Sciences Undergraduate Summer Institute (CUSI, 2015, Columbus, OH)
- Co-organized the Context and Episodic Memory Symposium (CEMS, 2015, Philadelphia, PA)

Grant Support

Current

- Sensing to Understanding and Prediction Realized via an Experiment and Modeling Ecosystem (AFRL). 10/2016–9/2018.
- Collaborative Research: NCS-FO: Learning Efficient Visual Representations From Realistic Environments Across Time Scales (NSF). 9/2016–8/2020.
- Lifelogging an integrated, whole-body network (Part of a grant to The Ohio State University Center for Brain Health and Performance from the Rudi Schulte Research Institute). 8/2015–7/2018.

Completed

- SMILE: State Machine Interface Library for Experiments (CCBS Seed Grant). 5/2015–5/2017.
- On-Board Data Handling for Longer Duration Autonomous Systems on Expeditionary Missions (ONR-STTR). 7/2013–1/2014.

- Compressed Sensing the Brain: Inferring sparse spatio-temporal neural sources for improved analysis of cognitive states (Center of Cognitive Science Seed Grant). 1/2011–12/2012.
- Principal Investigator, Tracking the use of semantic and temporal cues during memory search (Individual Postdoctoral NIH NRSA). Kenneth Norman, sponsor. 4/2007–5/2010.
- Principal Investigator, Electrophysiological Correlates of Human Memory (Individual Predoctoral NIH NRSA). Michael Kahana, sponsor. 9/2005–8/2006.

Research Articles

Submitted

- Schwemmer M.A., Skomrock N.D, Sederberg P.B., Ting J.E., Sharma G., Bockbrader M.A., and Friedenberg, D.A. (Submitted). Meeting brain-computer interface user performance expectations using a deep neural network decoding framework.
- Sreekumar, V., Nielson, D.M., Smith, T.A., Dennis, S., and Sederberg, P.B.(Submitted). The experience of vivid autobiographical reminiscence is supported by personal semantic representations in the precuneus.
- Tiganj Z., Gershman S.J., Sederberg P.B., and Howard M.W. (Submitted). Estimating scale-invariant future in continuous time.
- Spears T.A., Jacques B.G., Howard M.W., and Sederberg P.B. (Submitted). Scale-invariant temporal history (SITH): optimal slicing of the past in an uncertain world.
- Siefke B.M., Smith T.A., and Sederberg P.B. (Submitted). A Context-Change Account of Temporal Distinctiveness.
- Sederberg P.B. and Smith T.A. (Submitted). Modeling the role of context and prediction in encoding variability.
- Smith T.A. and Sederberg P.B. (Submitted). Low frequency neural oscillations during encoding reveal interactions between semantic relatedness, subsequent memory, and subsequent false memory.
- O’Connell, T., Sederberg, P.B., and Walther, D. (Submitted). Scene structure preserved in line drawings is sufficient to represent scene category but not scene identity in scene-selective cortex.

Published / In Press

1. Palestro, J. J., Weichart, E., Sederberg, P. B., and Turner, B. M. (in press). Some Tasks Demands Induce Collapsing Bounds: Evidence from a Behavioral Analysis. *Psychonomic Bulletin and Review*.
2. Scharre, D.W., Weichart, E.R., Nielson, D.M., Zhang, J., Agrawal, P., Sederberg, P.B., Knopp, M.V., Rezai, A.R. for the Alzheimer’s Disease Neuroimaging Initiative (2018). Deep Brain Stimulation of Frontal Lobe Networks to Treat Alzheimer’s Disease. *Journal of Alzheimer’s Disease*, 62, 621–633

3. Palestro, J. J., Bahg, G., Sederberg, P. B., Lu, Z.-L., Steyvers, M., and Turner, B. M. (2018). A Tutorial on Joint Models of Neural and Behavioral Measures of Cognition. *Journal of Mathematical Psychology*, 84, 20–48.
4. Gravina, M.T. and Sederberg, P.B. (2017). The neural architecture of prediction over a continuum of spatiotemporal scales. *Current Opinions in Behavioral Sciences*, 17, 194–202.
5. Nielson, D.M. and Sederberg, P.B. (2017). MELD: Mixed effects for large datasets, *PLOS: One*.
6. Turner B.M., Sederberg P.B., and McClelland J.L. (2016). Bayesian Analysis of Simulation-based Models. *Journal of Mathematical Psychology*, 72, 191–199.
7. Ratcliff, R., Sederberg, P., Smith, T., Childers, R. (2016). A Single Trial Analysis of EEG in Recognition Memory: Tracking the Neural Correlates of Memory Strength. *Neuropsychologia*, 93, 128–141.
8. Bouton, C.E., Shaikhouni, A., Annetta, N.V., Bockbrader, M.A., Friedenber, D.A., Nielson, D.M., Sharma, G., Sederberg, P.B., Glenn, B.C., Mysiw, W.J., Morgan, A.G., Deogaonkar, M., Rezai, A.R. (2016). Restoring Cortical Control of Functional Movement in a Human with Quadriplegia. *Nature*, 533 (7602), 247–250.
9. Hasinski, A.E. and Sederberg, P.B. (2016). Trial-level information for individual faces in the fusiform face area depends on subsequent memory. *NeuroImage*, 124 (A), 526–535.
10. Rezai, A.R., Sederberg, P.B., Bogner, J., Nielson, D.M., Zhang, J., Mysiw, W.J., Knopp, M.V., Corrigan, J.D. (2016) Improved Function After Deep Brain Stimulation for Chronic, Severe Traumatic Brain Injury. *Neurosurgery*, 79, 204–211.
11. Deogaonkar, M., Sharma, M., Oluigbo, C., Nielson, D. M., Yang, X., Vera-Portocarrero, L., Molnar, G. F., Abduljalil, A., Sederberg, P. B., Knopp, M. and Rezai, A. R. (2016), Spinal Cord Stimulation (SCS) and Functional Magnetic Resonance Imaging (fMRI): Modulation of Cortical Connectivity With Therapeutic SCS. *Neuromodulation: Technology at the Neural Interface*, 19, 142–153.
12. Nielson, D.M., Smith, T.A., Sreekumar, V., Dennis, S., and Sederberg, P.B. (2015). The human hippocampus represents space and time during retrieval of real-world memories. *Proceedings of the National Academy of Sciences*, 35, 11078–11083.
13. Manns J.R., Galloway C.R., and Sederberg P.B. (2015). A temporal context repetition effect in rats during a novel object recognition memory task. *Animal Cognition*, 18, 1031–1037.
14. Paul B.T., Sederberg P.B., and Feth L.L. (2015). Imagined Temporal Groupings Tune Oscillatory Neural Activity for Processing Rhythmic Sounds. *Timing & Time Perception*, 3, 172–188.
15. Hayes, T.R., Petrov, A.A., and Sederberg, P.B. (2015). Do we really become smarter when our fluid-intelligence test scores improve? *Intelligence*, 48, 1–14.

16. Ziniel J., Schniter P., and Sederberg P. (2015). Binary Linear Classification and Feature Selection via Generalized Approximate Message Passing. *Signal Processing, IEEE Transactions on*, 63, 2020–2032.
17. Turner B.M. and Sederberg P.B. (2014). A generalized, likelihood-free method for parameter estimation. *Psychonomic Bulletin & Review*, 21, 227–250.
18. Polyn, S.M. and Sederberg, P.B. (2014). Brain rhythms in mental time travel. *NeuroImage*. 85, 678–684.
19. Serruya, M.D., Sederberg, P.B., and Kahana, M.J. (2014). Power shifts track serial position and modulate encoding in human episodic memory. *Cerebral Cortex*, 24, 403–413, doi: 10.1093/cercor/bhs318.
20. Gershman S.J., Blei D.M., Norman K.A., and Sederberg P.B. (2014) Decomposing spatiotemporal brain patterns into topographic latent sources. *NeuroImage*, 98, 91–102.
21. Smith T.A., Hasinski A.E., and Sederberg P.B. (2013). The Context Repetition Effect: Predicted events are remembered better, even when they don’t happen. *JEP: General*, 142(4), 1298–1308.
22. Turner, B.M., Sederberg, P.B., Brown, S.D., and Steyvers, M. (2013). A method for efficiently sampling from distributions with correlated dimensions. *Psychological Methods*, 18(3), 368–384.
23. Johnson, M.R., Higgins, J.A., Norman, K., Sederberg, P.B., Smith, T.A. and Johnson, M.K. (2013). Foraging for thought: An inhibition of return-like effect resulting from directing attention within working memory. *Psychological Science*, 24(7), 1104–1112.
24. Turner, B.M., Forstmann, B.U., Wagenmakers, E.J., Brown, S.D., Sederberg, P.B., and Steyvers, M. (2013). A Bayesian framework for simultaneously modeling neural and behavioral data. *NeuroImage*, 72, 193–206.
25. Turner B.M. and Sederberg P.B. (2012). Approximate Bayesian computation with differential evolution. *Journal of Mathematical Psychology*, 56(5), 375–385.
26. Gershman S.J., Moore C.D., Todd M.T., Norman K.A., and Sederberg P.B. (2012). The successor representation and temporal context. *Neural Computation*, 24(6), 1553–1568.
27. Turk-Browne N.B., Simon M.G., and Sederberg P.B. (2012). Scene representations in parahippocampal cortex depend on temporal context. *The Journal of Neuroscience*, 32(21), 7202–7207.
28. Hayes, T., Petrov, A.A., and Sederberg, P.B. (2011). A novel method for analyzing sequential eye movements reveals strategic influence on Raven’s Advanced Progressive Matrices. *Journal of Vision*, 11(10:10), 1–11.
29. Sederberg P.B., Gershman S.J., Polyn S.M., and Norman K.A. (2011). Human memory reconsolidation can be explained using the temporal context model. *Psychonomic Bulletin & Review*, 18(3), 455–468.

30. Sederberg, P.B., Miller, J.F., Howard, M.W., and Kahana, M.J. (2010). The temporal contiguity effect predicts episodic memory performance. *Memory & Cognition*, 38(6), 689-699.
31. Solway A., Geller A.S., Sederberg P.B., and Kahana M.J. (2010). PyParse: A semiautomated system for scoring spoken recall data. *Behavior Research Methods*, 42(1), 141-147.
32. Hanke M., Halchenko Y.O., Sederberg P.B., Olivetti E., Frund I., Rieger J.W., Herrmann C.S., Hanson S.J., Haxby J.V., and Pollmann S. (2009). PyMVPA: A Unifying Approach to the Analysis of Neuroscientific Data. *Frontiers in Neuroinformatics*, 3(3), 1-13.
33. Hanke M., Halchenko Y.O., Sederberg P.B., Hanson S.J., Haxby J.V., and Pollmann S. (2009). PyMVPA: A Python toolbox for multivariate pattern analysis of fMRI data. *Neuroinformatics*, 7(1), 37-53.
34. Socher, R., Gershman, S.J., Perotte, A.J., Sederberg, P.B., Blei, D.M., and Norman, K.A. (2009). A Bayesian analysis of dynamics in free recall. *Advances in Neural Information Processing Systems*, 22, 1714-1722.
35. Howard M.W., Sederberg P.B., and Kahana M.J. (2009). Reply to Farrell & Lewandowsky: Recency-contiguity interactions predicted by the temporal context model. *Psychonomic Bulletin & Review*, 16(5), 973-984.
36. Sederberg, P.B., Howard, M.W., and Kahana, M.J. (2008). A context-based theory of recency and contiguity in free recall. *Psychological Review*, 115(4), 893-912.
37. Kahana, M.J., Sederberg, P.B., and Howard, M.W. (2008). Putting short-term memory into context: Reply to Usher and colleagues. *Psychological Review*, 115(4), 1119-1125.
38. Howard, M.W., Kahana, M.J., and Sederberg, P.B. (2008). Postscript: Distinguishing between temporal context and short-term store. *Psychological Review*, 115(4), 1125-1126.
39. Sederberg, P.B., Schulze-Bonhage, A., Madsen, J.R., Bromfield, E.B., Litt, B., Brandt, A., and Kahana, M.J. (2007). Gamma oscillations distinguish true from false memories. *Psychological Science*, 18(11), 927-932.
40. Sederberg, P.B., Schulze-Bonhage, A., Madsen, J.R., Bromfield, E.B., McCarthy, D.C., Brandt, A., Tully, M.S., and Kahana, M.J. (2007). Hippocampal and neocortical gamma oscillations predict memory formation in humans. *Cerebral Cortex*, 17(5), 1190-1196.
41. Geller, A.S., Schleifer, I.K., Sederberg, P.B., Jacobs, J. and Kahana, M.J. (2007). PyEPL: A cross-platform experiment-programming library. *Behavior Research Methods*, 39(4), 950-958.
42. van Vugt, M.K., Sederberg, P.B., and Kahana, M.J. (2007). Comparison of spectral analysis methods for brain oscillations. *Journal of Neuroscience Methods*, 162(1-2), 49-63.
43. Sederberg, P.B., Gauthier, L.V., Terushkin, V., Miller, J.F., Barnathan, J.A., and Kahana, M.J. (2006). Oscillatory correlates of the primacy effect in episodic memory. *NeuroImage*, 32(3), 1422-1431.

44. Sederberg, P.B., Kahana, M.J., Donner, E., and Madsen, J.R. (2003). Theta and gamma oscillations during encoding predict subsequent recall. *Journal of Neuroscience*, 23(34), 10809–10814.
45. Levy, W.B, Sederberg, P.B., and August, D.A. (1998). Sequence compression by a hippocampal model: A functional dissection. *Computational Neuroscience: Trends in Research (J. M. Bower, Ed.)*, 435–439.
46. Levy W.B., and Sederberg P.B. (1997). A neural network model of hippocampally mediated trace conditioning. *IEEE International Conference on Neural Networks*, 1, 372–376.

Books

- Palestro, J. J., Sederberg, P. B., Osth, A. F., Van Zandt, T., and Turner, B. M. (2018). Likelihood-free Bayesian inference in cognitive science. Springer: New York.

Book Chapters

- Sederberg, P. B. and Norman, K. A. (2010). Learning and memory: Computational models.. In G. F. Koob, M. Le Moal, and R. F. Thompson (Ed.), *Encyclopedia of Behavioral Neuroscience* (pp. 145–153) Oxford: Oxford: Academic Press.

Invited Talks

- Cannes Lions Festival of Creativity (June, 2017)
- Fitch, Inc., BOLD Day on *Making Future Memories* (July, 2016)
- Vanderbilt University (April, 2016)
- Emory University (January, 2016)
- Princeton University (October, 2015)
- University of Pennsylvania (May, 2015)
- Mathematics + Computation + Science = Solutions (MCSS Symposium), IUPUI (September, 2014)

Supervision

- Troy Smith, PhD (Postdoc, 2010–2015). Assistant Professor, *University of North Georgia*.
- Adam Hasinski, PhD (Graduate Student, 2012–2015). Data Scientist at Neilsen.
- Dylan Nielson, PhD (Graduate Student, 2012–2015). Data Science and Sharing Team, National Institute of Mental Health.
- Brian Siefke, PhD (Graduate Student, 2011–2017). Lecturer at The Ohio State University.
- Vishnu Sreekumar, PhD (Graduate Student with Simon Dennis, 2013–2015). Postdoctoral Fellow at NIH.

- Brandon Jacques (Graduate Student, 2017–).
- Ryan Kirkpatrick (Graduate Student, 2016–).
- Tyler Spears (Graduate Student, 2017–).
- Emily Weichart (Graduate Student, 2015–).

Professional Society Memberships

- Society for Neuroscience
- Cognitive Neuroscience Society
- Psychonomic Society (Fellow)
- Society for Mathematical Psychology
- Organization for Human Brain Mapping