

Thomas C. Sprague

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Education & Professional Appointments

Assistant Professor

- University of California, Santa Barbara, Dept of Psychological and Brain Sciences (July 2018-present)
- <https://spraguelab.psych.ucsb.edu/>

Postdoctoral Associate

- New York University, New York, NY (March 2016-December 2018)
- Advisers: [Clayton Curtis](#), Wei Ji Ma, and Jonathan Winawer

PhD in Neurosciences, with a specialization in Computational Neurosciences

- University of California, San Diego, La Jolla, CA (September 2010 – February 2016)
- PhD adviser: John Serences
- Degree conferred: February 8, 2016

B.A. in Cognitive Science and Neuroscience with Honors

- Rice University, Houston, TX (August 2006-May 2010)

Publications (1130 total citations; h-index: 11)

<https://scholar.google.com/citations?user=9eERyVwAAAAJ&hl=en>

*Li, H.-H., ***Sprague, T.C.**, Yoo, A.H., Ma, W.J., and Curtis, C.E. (2021). Joint representation of working memory and uncertainty in human cortex. (*equal contribution). *Neuron*. (Data & code available at: <https://osf.io/WDJRV/>)

Vo, V.A., Sutterer, D.W., Foster, J.J., **Sprague, T.C.**, Awh, E., and Serences, J.T. (2021). Shared long-term and short-term memory representational formats in occipital and parietal cortex. *Cerebral Cortex*. (Data & code available at: <https://osf.io/fcp5y/>)

*Hallenbeck, G.E., ***Sprague, T.C.**, Rahmati, M., Sreenivasan, K.K., and Curtis, C.E. (2021). Working Memory Representations in Visual Cortex Mediate the Effects of Distraction. (*equal contribution). *Nature Communications*. (Data available at: <https://osf.io/c9fst/>; code available at: https://github.com/clayspacelab/spDist_mFiles/tree/1.0.0)

Ester, E.F., **Sprague, T.C.**, and Serences, J.T. (2020). Categorical biases in human occipitoparietal cortex. *The Journal of Neuroscience*. (Data & code available at: <https://osf.io/xzay8/>)

Sprague, T.C., Boynton, G.M., and Serences, J.T. (2019). The importance of considering model choices when interpreting results in computational neuroimaging. Peer-reviewed commentary on “Inverted encoding models reconstruct an arbitrary model response; not the stimulus” by Gardner and Liu, 2019. *eNeuro*.

*Itthipuripat, S., ***Sprague, T.C.**, and Serences, J.T. (2019). Functional MRI and EEG index complementary attentional modulations. (*equal contribution). *The Journal of Neuroscience*. (Data & code available at: <https://osf.io/savfp/>)

*Itthipuripat, S., *Vo, V.A., **Sprague, T.C.**, and Serences, J.T. (2019). Value-driven attentional capture enhances distractor representations in early visual cortex. (*equal contribution). *PLoS Biology*. (Data & code available at: <https://osf.io/ky4jh/>)

*Henderson, M., *Vo, V.A., Chunharas, C., **Sprague, T.C.**, and Serences, J.T. (2019). Multivariate analysis of BOLD activation patterns recovers graded depth representations in human visual and parietal cortex. *eNeuro*. (Data & code available at: <https://osf.io/j7tpf/>)

Chunharas, C., Rademaker, R.L., **Sprague, T.C.**, Brady, T.F., and Serences, J.T. (2019). Separating memoranda in

depth increases visual working memory performance. *Journal of Vision*. (Data & code available at: <https://osf.io/rhf7n/>)

Sprague, T.C., *Adam, K.C.S., *Foster, J.J., *Rahmati, M., *Sutterer, D.W., and *Vo, V.A. (2018). Inverted encoding models assay population-level stimulus representations, not single-unit neural tuning. Peer-reviewed commentary on “Inverted encoding models of human population response conflate noise and neural tuning width” by Liu, Cable & Gardner, 2018 (*equal contribution, listed alphabetically). *eNeuro*.

Sprague, T.C., Itthipuripat, S., Vo, V.A., and Serences, J.T. (2018). Dissociable signatures of visual salience and behavioral relevance across attentional priority maps in human cortex. *Journal of Neurophysiology*. (Data & code available at: <https://osf.io/svuzt/>)

Vo, V.A., **Sprague, T.C.**, and Serences, J.T. (2017). Spatial tuning shifts increase the discriminability and fidelity of population codes in visual cortex. *Journal of Neuroscience*. (Data & code available at: <https://osf.io/s9vqv/>)

Sprague, T.C., Ester, E.F., and Serences, J.T. (2016). Restoring latent visual working memory representations in human cortex. *Neuron*. (Data & code available at: <https://osf.io/s5r6g/>)

*Ester, E.F., *Rademaker, R.L. and ***Sprague, T.C.** (2016). How do visual and parietal cortex contribute to visual short-term memory? Peer-reviewed commentary on “Decoding the content of visual short-term memory under distraction in occipital and parietal areas” by Bettencourt & Xu, 2016 (*equal contribution, listed alphabetically). *eNeuro*.

Samaha, J., **Sprague, T.C.**, and Postle, B.R. (2016). Decoding and reconstructing the focus of spatial attention from the topography of alpha-band oscillations. *Journal of Cognitive Neuroscience*.

Ester, E.F., **Sprague, T.C.**, and Serences, J.T. (2015). Parietal and frontal cortex encode stimulus-specific mnemonic representations during visual working memory. *Neuron*.

Sprague, T.C., Ester, E.F. and Serences, J.T. (2014). Reconstructions of information in visual spatial working memory degrade with memory load. *Current Biology*.

Itthipuripat S., Garcia, J.O., Rungratsameetaweemana, N. **Sprague, T.C.**, Serences, J.T. (2014). Changing the spatial scope of attention alters the pattern of neural gain in human cortex. *Journal of Neuroscience*.

Sprague, T.C. and Serences, J.T. (2013). Attention modulates spatial priority maps in human occipital, parietal and frontal cortices. *Nature Neuroscience*.

Reviews/Book chapters

Curtis, C.E. and **Sprague, T.C.** (2021). Persistent activity during working memory from front to back. *Frontiers in Neural Circuits*.

Sprague, T.C., Saproo, S. and Serences, J.T. (2015). Attention mitigates information loss in small- and large-scale neural codes. *Trends in Cognitive Sciences*. (Tutorials & sample data available at: http://bit.ly/IEM_tutorial)

Sprague, T.C. and Serences, J.T. (2015). Using human neuroimaging to examine top-down modulations of visual perception. *An Introduction to Model-based Cognitive Neuroscience*, eds. Birte Forstmann & E-J Wagenmakers.

Preprints and manuscripts in preparation

Vu-Cheung, K., Ester, E.F., and **Sprague, T.C.** (Submitted; preprint on *bioRxiv*). Spatial working memory representations in human cortex are robust to a task-irrelevant interrupting stimulus. (Preprint: <https://www.biorxiv.org/content/10.1101/2021.09.16.460692v1>).

Yoo, A.H., Bolaños, A., Hallenbeck, G.E., Rahmati, M., **Sprague, T.C.**, and Curtis, C.E. (Submitted; preprint on *bioRxiv*). Behavioral prioritization enhances working memory precision and neural population gain. (Preprint: <https://www.biorxiv.org/content/10.1101/2021.09.16.460676v1>).

Sprague, T.C. and Curtis, C.E. (In preparation). Temporal dynamics of visual working memory representations across human cortex.

Phangwiwat, T., Punchongharn, P., Chunharas, C., **Sprague, T.C.**, Wang, S., Woodman, G., Itthipuripat, S. (Submitted). Sustained attention operates via dissociable neural mechanisms across different eccentric locations.

Funding

- Institute for Collaborative Biotechnologies Seed Grant (January 2020-December 2021)
- Institute for Collaborative Biotechnologies Project Grant (December 2021-December 2023)
- Sloan Research Fellowship (September 2019-September 2021)
- UCSB Academic Senate Research Grant (2019; 2020)
- NIH Ruth. L Kirschstein National Research Service Award F32-EY028438 (2017-2019), co-advised by Clayton Curtis & Wei Ji Ma
- NYU Visual Neuroscience NIH Training Grant (2017)
- UCSD Institute for Neural Computation NIH Training Grant (2014-2015).
- National Science Foundation Graduate Research Fellow (2011-2014)

Awards

- Sloan Research Fellowship (2019)
- Leon Thal Award for Outstanding Neurosciences Graduate Student (2015)
- Vision Sciences Society Student Travel Award (2015)
- Fine Science Tools Travel Award (2012)
- National Science Foundation Graduate Research Fellowship (2010)
- Outstanding Graduate in Cognitive Sciences at Rice University (2010)
- Voted Outstanding Oral Presentation, 2nd Annual Tohoku University Brain Sciences Retreat, Sendai, Japan (2009)
- National Merit Scholar (2006)

Invited Talks

- Sprague, T.C.** (2020, February). Priority maps in human cortex: neural architecture supporting visual cognition. Invited talk, Cognitive Neuroscience Seminar, University of Texas, Austin.
- Sprague, T.C.** (2019, September). Priority maps in human cortex: neural architecture supporting visual cognition. Invited seminar, Donders Institute for Brain, Cognition, and Behavior, Radboud University, Nijmegen, Netherlands.
- Sprague, T.C.** (2019, July). How to use (and how not to use) inverted encoding models. Invited workshop presented with Justin Gardner, Summer Institute in Cognitive Neuroscience 2019, Santa Barbara, California.
- Sprague, T.C.** (2019, April). Priority maps in human cortex: neural architecture supporting visual cognition. Invited talk, Cognitive Brownbag Seminar Series, University of California, Riverside.
- Sprague, T.C.** (2019, January). Reconstructing neural representations: a new window into visual cognition. Invited talk, Kavli Brain Showcase, University of California, Santa Barbara.
- Sprague, T.C.** (2018, July). Inverted Encoding Models. Invited interactive workshop, CuttingEEG 2018, Paris, France
- Sprague, T.C.** (2018, January). Dissecting the neural architecture of visual cognition by quantifying stimulus representations. Invited talk, Department of Neurobiology and Behavior, University of California, Irvine.
- Sprague, T.C.** (2018, January). Dissecting the neural architecture of visual cognition by quantifying stimulus representations. Invited talk, Department of Psychological and Brain Sciences, University of California, Santa Barbara.
- Sprague, T.C.** (2017, December). Dissecting the neural architecture of visual cognition by quantifying stimulus representations. Invited talk, Department of Psychology, Rice University.
- Sprague, T.C.** (2017, November). Dissecting the neural architecture of visual cognition by quantifying stimulus representations. Invited talk, Department of Psychology, Yale University.

- Sprague, T.C.** (2018, November). New windows into neural representations supporting visual cognition. Invited talk, Department of Cognitive Science, University of California, Irvine.
- Sprague, T.C.** (2017, January). Constraints on cognition imposed by neural representations. Invited talk, Brain and Mind Institute, Western University, London, ON.
- Sprague, T.C.** (2017, January). Constraints on cognition imposed by neural representations. Invited talk, Department of Psychology, University of Oregon, Eugene, OR.
- Sprague, T.C.** (2016, January). Working memory representations measured with human fMRI degrade with load, but can be restored with attention. Invited Guest Lab Meeting, Princeton University, Princeton, NJ.
- Sprague, T.C.** (2015, November). Working memory representations measured with human fMRI degrade with load, but can be restored with attention. Cognitive Neural Systems Seminar Series, UC San Diego, La Jolla, CA.
- Sprague, T.C.** (2015, November). Working memory representations measured with human fMRI degrade with load, but can be restored with attention. Keck Center for Functional MRI Invited Seminar, UC San Diego, La Jolla, CA.
- Sprague, T.C.** (2014, August). Reconstructions of spatial information in human cortex under different task conditions. Invited Guest Lab Meeting, Princeton University, Princeton, NJ.
- Sprague, T.C., Ester, E.F., and Serences, J.T.** (2014, January). Reconstructing representations of information under different task conditions. Wa! Seminar Series, UCSD Cognitive Science
- Sprague, T.C.** Modulations of information representations in human cortex under different cognitive demands. (2014, May). UCSD Neurosciences Graduate Program Annual Retreat, Student-invited speaker.
- Sprague, T.C., Ester, E.F., and Serences, J.T.** (2013, December). Reconstructing representations of information under different task conditions. Brain Talks Seminar Series, Multimodal Imaging Lab, UCSD Radiology.
- Sprague, T.C.** (2012, January). Measuring sensory and oculomotor information coding across human visual, parietal and frontal cortex. Cognitive Neural Systems Seminar Series, UCSD.
- Sprague, T.C.** and Eagleman, D.M. (2009, July). Color-motion asynchrony depends on stimulus repetition. RIKEN BSI Summer Program, Tokyo, Japan.
- Sprague, T.C.** and Eagleman, D.M. (2009, July). The perceived duration of a stimulus depends on temporal context. Tohoku University 2nd Annual Brain Science Retreat, Sendai, Japan.

Selected Conference Presentations (full list available upon request)

- Sprague, T.C., Vu-Cheung, K., & Thayer, D.D.** (2021, November). Disentangling the impact of top-down spatial attention and bottom-up stimulus drive on estimates of spatial selectivity in human cortex. Poster to be presented at the Society for Neurosciences Annual Meeting.
- Thayer, D.D. & **Sprague, T.C.** (2021, November). Feature-selective priority maps in human cortex are modulated by top-down and bottom-up attention. Poster to be presented at the Society for Neurosciences Annual Meeting.
- Vu-Cheung, K. & **Sprague, T.C.** (2021, November) Spatial recoding of oriented gratings maintained in visual working memory revealed by predictive modeling of fMRI activation patterns. Poster to be presented at the Society for Neurosciences Annual Meeting.
- Itthipuripat, S., Phangwiwat, T., Punchongharn, P., Chatnuntawech, I., Chunharas, C., **Sprague, T.C.**, Wang, S., & Woodman, G.F. (2021, November). Attention operates differently across eccentricities. Poster to be presented at the Society for Neurosciences Annual Meeting.
- Thayer, D. & **Sprague, T.C.** (2021, January). Feature-selective modulations of neural priority maps in human cortex. Society for Neuroscience Global Connectome 2021.
- Lam, K. & **Sprague, T.C.** (2020, June). Spatial working memory performance is similar for simple stimuli and real world objects. Poster presented at the Virtual Vision Sciences Society Annual Meeting
- Thayer, D. & **Sprague, T.C.** (2020, June). Attentional modulation of feature-selective priority maps across human visual

cortices. Poster presented at the Virtual Vision Sciences Society Annual Meeting

- Li, H.-H., **Sprague, T.C.**, Yoo, A.H., Ma, W.J., and Curtis, C.E. (2020, June). Neural correlates of uncertainty of visual spatial working memory in human cortex. Talk presented at the Virtual Vision Sciences Society Annual Meeting
- Lam, K. & **Sprague, T.C.** (2020, June) Spatial working memory performance is similar for simple stimuli and real world objects. Talk presented at the Virtual Working Memory Symposium
- Sprague, T.C.**, Li, H.-H., Yoo, A.H., Rahmati, M., Hallenbeck, G.E., Ma, W.J., and Curtis, C.E. (2019, October). Prioritized visual spatial working memory representations are maintained more precisely and with lower uncertainty. Talk presented at the Society for Neuroscience Annual Meeting, Chicago, IL.
- Hallenbeck, G.E., **Sprague, T.C.**, Rahmati, M., Sreenivasan, K.K., and Curtis, C.E. (2019, October). Tracking spatial working memory representations during distraction. Poster presented at the Society for Neuroscience Annual Meeting, Chicago, IL.
- Sprague, T.C.**, Yoo, A.H., Rahmati, M., Hallenbeck, G.E., Ma, W.J., and Curtis, C.E. (2019, May). Prioritizing relevant information in visual working memory sculpts neural representations in retinotopic cortex to reduce their uncertainty. Poster to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Rahmati, M., **Sprague, T.C.**, Sreenivasan, K.K., and Curtis, C.E. (2019, May). The nature of top-down signals during non-spatial working memory. Poster to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Hallenbeck, G.E., **Sprague, T.C.**, Rahmati, M., Sreenivasan, K.K., and Curtis, C.E. (2019, May). Spatial working memory representations are resistant to an intervening stimulus and behavioral task. Poster to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Yoo, A.H., Bolaños, A., Hallenbeck, G.H., Rahmati, M., **Sprague, T.C.**, and Curtis, C.E. (2019, May). Prioritization affects working memory precision and neural population gain. Poster to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Ester, E., Camp, J., Latortue, T., **Sprague, T.C.**, and Serences, J.T. (2019, May). Rapid onset of category-selective biases in human cortex. Talk to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Sprague, T.C.**, Yoo, A., Rahmati, M., Ma, W.J., and Curtis, C.E. (2018, November). Tracking the dynamics and uncertainty of visual spatial WM representations across human cortex. Talk presented at the Society for Neuroscience Annual Meeting, San Diego, CA.
- Rahmati, M., Payton, M.J., **Sprague, T.C.**, Sreenivasan, K.K., and Curtis, C.E. (2018, November). Spatial priority in the service of non-spatial working memory. Talk presented at the Society for Neuroscience Annual Meeting, San Diego, CA.
- Sprague, T.C.**, Ma, W.J., and Curtis, C.E. (2018, May). Temporal dynamics of visual working memory representations across human cortex. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Hallenbeck, G.E., Bolaños, A., **Sprague, T.C.**, and Curtis, C.E. (2018, May). Frontal and parietal cortex make distinct contributions to the storage and allocation of resources that support WM. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Rahmati, M., **Sprague, T.C.**, Curtis, C.E., and Sreenivasan, K.K. (2018, May). The role of task-irrelevant space in non-spatial working memory. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Sprague, T.C.**, Rahmati, M., Yoo, A., Ma, W.J., and Curtis, C.E. (2017, November). Decoding uncertainty in visual spatial short term memory from retinotopic cortex. Poster presented at the Society for Neuroscience Annual Meeting, Washington, DC.
- Itthipuripat, S., Vo, V.A., **Sprague, T.C.**, and Serences, J.T. (2017, November). Reward and selection history shape neural representations of attentional priority in human visual and parietal cortex. Poster presented at the Society for Neuroscience Annual Meeting, Washington, DC.
- Ester, E.F., **Sprague, T.C.**, and Serences, J.T. (2017, August). Categorical representations in human visual cortex. Poster

presented at the International Conference for Cognitive Neuroscience, Amsterdam, NL.

- Sprague, T.C.**, Rahmati, M., Yoo, A., Ma, W.J., and Curtis, C.E. (2017, May). Decoding visual spatial working memory uncertainty from human cortex. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Vo, V.A., Sutterer, D., Foster, J., **Sprague, T.C.**, Awh, E., and Serences, J.T. (2017, May). Neural representations of spatial position recalled from long-term and short-term memory diverge across the cortical hierarchy. Talk presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Chunharas, C., Rademaker, R.L., **Sprague, T.C.**, Brady, T.F. and Serences, J.T. (2017, May). Remembering stimuli in different depth planes increases visual working memory precision and reduces swap errors. Poster to be presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Sprague, T.C.**, Itthipuripat, S., Vo, V.A., and Serences, J.T. (2016, November). Graded representations of stimulus salience and attentional priority across visually-responsive cortex. Talk presented at the Society for Neuroscience Annual Meeting as part of a nano-symposium on Spatial Attention and Working Memory (organizer: **TC Sprague**). San Diego, CA.
- Vo., V.A., **Sprague, T.C.**, and Serences, J.T. (2016, November). Spatial attention modulates voxel receptive fields to boost the fidelity of multi-voxel stimulus representations. Talk presented at the Society for Neuroscience Annual Meeting as part of a nano-symposium on Spatial Attention and Working Memory. San Diego, CA.
- Samaha, J., **Sprague, T.C.**, Voytek, B., Gazzaley, A., Postle, B.R. Preparatory encoding of the location and scope of human spatial attention. Talk presented at the Society for Neuroscience Annual Meeting as part of a nano-symposium on Spatial Attention and Working Memory. San Diego, CA.
- Sprague, T.C.**, Ester, E.F., and Serences, J.T. (2016, May). Visual and parietal spatial working memory representations are robust to brief irrelevant distracters. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Chunharas, C., Itthipuripat S., **Sprague, T.C.**, Ester, E.F., Serences, J.T. (2016, May). Individual differences in depth discrimination predicts differences in visual working memory for stimuli rendered in 3D. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Henderson, M.M., Chunharas, C., Vo, V.A., **Sprague, T.C.**, Serences, J.T. Reconstructing 3D stimuli using BOLD activation patterns recovers hierarchical depth processing in human visual and parietal cortex. Poster presented at the Vision Sciences Society Annual Meeting, St Petersburg, FL.
- Sprague, T.C.**, Itthipuripat, S. and Serences, J.T. (2015, October). Different population-level measurements and analysis techniques enable complementary insights into attentional modulation of visual responses. Poster presented at the Society for Neuroscience Annual Meeting, Chicago, IL.
- Vo, V.A., **Sprague, T.C.**, and Serences, J.T. (2015, October). Linking attentional modulations of single-voxel population receptive fields and region-level spatial reconstructions. Poster presented at the Society for Neuroscience Annual Meeting, Chicago, IL.
- Ester, E.F., **Sprague, T.C.** and Serences, J.T. (2015, October). Category learning biases representations of orientation in early human visual cortex. Talk presented at the Society for Neuroscience Annual Meeting, Chicago, IL.
- Sprague, T.C.**, Ester E.F., and Serences, J.T. (2015, May). Recovery of degraded information in visuospatial working memory representations in human occipital, parietal and frontal cortex. Talk presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Ester, E.F., **Sprague, T.C.** and Serences, J.T. (2015, May). Visual working memory representations are distributed throughout human cortex. Talk presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Smith, M.E., **Sprague, T.C.**, and Serences, J.T. (2015, May). Univariate frontoparietal BOLD does not track the magnitude of attentional modulations in visual cortex. Poster presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Sprague, T.C.**, Ester, E.F., and Serences, J.T. (2015, March). Attention to items in working memory improves fidelity of

population codes in human cortex. Poster presented at COSYNE 2015, Salt Lake City, UT

- Sprague, T.C.**, Ester, E.F., and Serences, J.T. (2014, November). Mnemonic representations in human occipital, parietal and frontal cortex index visuospatial working memory acuity. Talk presented at the Society for Neuroscience Annual Meeting, Washington, DC.
- Vo, V.A., **Sprague, T.C.**, and Serences, J.T. (2014, November). The effects of spatial attention on voxel-level population receptive fields and spatial information content. Poster presented at the Society for Neuroscience Annual Meeting, Washington, DC.
- Sprague, T.C.**, Itthipuripat, S. and Serences, J.T. (2014, May). Within-participant differences in attention-related shifts in contrast response functions measured using EEG and fMRI. Poster presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Kaye, K.E., **Sprague, T.C.**, Itthipuripat, S. Prado, E. and Serences, J.T. (2014, May). Steady-state sensory-evoked responses are enhanced prior to oculomotor execution. Poster presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Garcia, J.O., Kaye, K.E., Williams, D., **Sprague, T.C.**, and Serences, J.T. (2014, May). The phase of intrinsic oscillations modulates feature and space-based visual attention. Talk presented at the Vision Sciences Society Annual Meeting, St. Petersburg, FL.
- Sprague, T.C.**, Ester, E.F. and Serences, J.T. (2013, November). Delay period spatial representations of remembered visual stimuli in human occipital, parietal and frontal cortex depend on memory load. Poster presented at the Society for Neuroscience Annual Meeting, San Diego, CA.
- Itthipuripat S., Garcia, J.O., Rungratsameetaweemana, N. **Sprague, T.C.**, Serences, J.T. (2013, November). Manipulating attention strategy alters patterns of neural gain in human cortex. Poster presented at the Society for Neuroscience Annual Meeting, San Diego, CA.
- Garcia, J.O., Kaye, K.E., **Sprague, T.C.**, and Serences, J.T. (2013, November). Near real-time spatial reconstructions of visual stimuli with EEG: Exploring the dynamics of spatial attention. Poster presented at the Society for Neuroscience Annual Meeting, San Diego, CA.
- Sprague, T.C.**, Ester E.F. and Serences, J.T. (2013, May). Reconstructing delay-period representations of remembered visual stimuli in visual, parietal and frontal cortex. Poster presented at the Vision Sciences Society Annual Meeting, Naples, FL.
- Sprague, T.C.** and Serences, J.T. (2012, October). Using a forward encoding model for spatial visual information reveal effects of attention across different cortical regions. Poster presented at the Society for Neuroscience Annual Meeting, New Orleans, LA.
- Sprague, T.C.** and Serences, J.T. (2012, May). Reconstructing spatial maps in occipital, parietal and frontal cortex using an encoding model of spatial receptive fields. Poster presented at the Vision Sciences Society Annual Meeting, Naples, FL.
- Sprague, T.C.** and Serences, J.T. (2011, November). Estimating motion and saccade direction-selective responses in human visual, parietal and frontal cortex. Poster presented at the Society for Neuroscience Annual Meeting, Washington, D.C.
- Sprague, T.C.** and Eagleman, D.M. (2009, May). The perceived duration of a stimulus depends on temporal context. Poster presented at the Vision Sciences Society Annual Meeting, Naples, FL.
- Sprague, T.C.** and Eagleman, D.M. (2009, February). Neural latencies are not equivalent to perceptual latencies. Poster presented at the Baylor College of Medicine Department of Neuroscience Annual Form, The Woodlands, TX.
- Sprague, T.C.** and Eagleman, D.M. (2008, November). Perceptual asynchrony depends on stimulus predictability. Poster presented at the Society for Neuroscience Annual Meeting, Washington, D.C.

Research mentorship

- Alison Li (UC Santa Barbara, PhD student, fall 2021-present)

- Kelvin Vu-Cheung (UC Santa Barbara, PhD student, fall 2019-present)
- Daniel Thayer (UC Santa Barbara, PhD student, fall 2019-present)
- Toni Schindler-Ruberg (UC Santa Barbara, undergraduate volunteer, 2021-present)
- Caden Coronado (UC Santa Barbara, undergraduate volunteer, 2021-present)
- Amel Alrifai (UC Santa Barbara, undergraduate volunteer, 2021-present)
- Maggie Miller (UC Santa Barbara, undergraduate volunteer, 2020-present)
- Ivan Trigueros (UC Santa Barbara, undergraduate volunteer, 2020-present)
- Jeremy Marquez (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Luke Hamilton (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Precious Ruvalcaba (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Jonathan Jolly (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Rijul Singhal (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Ivan Trigueros (UC Santa Barbara, undergraduate volunteer, 2020-present)
- Maggie Miller (UC Santa Barbara, undergraduate volunteer, 2020-present)
- Klaire Hua (UC Santa Barbara, undergraduate volunteer, 2019-present)
- Lindsey Gollom (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Emma Wiedeling (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Melody Pezeshkian (UC Santa Barbara, undergraduate volunteer, 2019-2020)
- Rafael Cruz (New York University, Psychology masters student, 2017-2018)
- Connor Williams (New York University, undergraduate volunteer, 2017)
- Gaoyang Gui (New York University, Psychology masters student, 2017-2018)
- Alfredo Bolaños (New York University, PhD student; 2016-2018)
- Helena Palmieri (New York University, masters student, 2016-2018)
- Grace Hallenbeck (New York University, PhD student; 2016-present)
- Haider Al-Hakeem (UC San Diego; undergraduate research assistant; 2014- 2015)
- Jon MacLeod (William & Mary University; undergraduate summer volunteer; summer 2013)
- Zoe Kohl (Rice University; undergraduate summer volunteer; 2012)

Research Experience

Postdoctoral Associate, Curtis Lab, NYU, advised by Clayton Curtis, Wei Ji Ma, and Jon Winawer (March 2016-present)
 Graduate Student, Perception and Cognition Lab, UCSD, advised by John Serences (June 2011-February 2016)
 Undergraduate Research Assistant, Laboratory for Perception and Action, Baylor College of Medicine, advised by David Eagleman (February 2007-August 2010)

Teaching Experience

Instructor – “PSY 108: Cognitive Psychology” - (UC Santa Barbara; Spring 2019; Spring 2020).

Instructor – “PSY 163TS/PSY594TS: Models of Working Memory” – (UC Santa Barbara; Fall 2019; Spring 2021)

Guest lecturer – “Attention” - Cognitive Neuroscience (NYU; Spring 2018).

- Present lectures to undergraduate course

Lecturer – Invited Workshop on Inverted Encoding Models (March 2015), single-topic workshop at Bernstein Center for Computational Neuroscience in Berlin, attended by graduate students, post-doctoral researchers and faculty

- Develop course materials, including datasets and analysis code (available at bit.ly/IEM_tutorial)
- Lead participants through interactive analysis exercises

Course organizer – UCSD Vision Journal Club (Winter 2015), seminar course attended by faculty, post-doctoral researchers and graduate students from multiple departments, faculty oversight by Karen Dobkins

- Organized thematic content (“visual population codes”)

- Led discussion: “mixed vs. fixed selectivity in population codes during decision-making”
- Assisted with planning weekly discussion topics and readings

Co-Lead Computational Neuroscience Teaching Assistant, Project Leader – UCSD Neurosciences Graduate Program “Boot Camp” (2011-2014), intensive 2-week introduction to electrophysiology, imaging, and computational methods, organized by Bill and Kathy Kristan (2011-2013), Stefan Leutgeb and Jing Wang (2014)

- Assist students with data analysis using MATLAB and Python
- Design and lead computational data analysis student projects (2012: multivariate analyses of fMRI data, reconstructing images based on brain activation patterns; 2014: 2-photon calcium imaging of sensory systems)
- Design and assist with computational modeling student projects (2011: synaptic model of working memory; 2013: conductance-based model of attention)

Lecturer - Analytical Methods in Computational Neuroscience (UCSD; Spring 2014), student team-taught course, faculty oversight by Tatyana Sharpee

- Taught lecture and developed/graded problem set: “Methods in functional magnetic resonance imaging”

Course Organizer; Lecturer – Analytical Methods in Computational Neuroscience (UCSD; Spring 2013), student team-taught course, faculty oversight by EJ Chichilnisky and Tatyana Sharpee

- Graduate-level computational neuroscience course
- Upper-year computational neuroscience students give lectures highlighting a data-driven analysis technique
- Taught lecture and developed/graded problem set: “Encoding and Decoding in Systems Neuroscience”
- Organized thematic content of course and recruited lecturers from UCSD Computational Neuroscience student community

Guest lecturer – Neurodynamics, taught by Gert Cauwenbergh (Fall 2011, 2012)

- Graduate-level engineering course for computational neurosciences students
- Developed and taught tutorial on using BRIAN network simulation package for Python

Teaching Assistant – Introduction to Computational Neuroscience, taught by Pamela Reinagel (UCSD; Fall 2011)

- Graduate-level course for students interested in understanding methods in computational neuroscience, but little or no mathematical background
 - Topics: Poisson processes, information theory, Fourier analysis, cross- and autocorrelations, clustering analyses, Markov processes, Bayesian inference, random walks & diffusion processes, dimensionality reduction (PCA & ICA)
 - Guest lectures by EJ Chichilnisky & Terrance Sejnowski (Salk Institute)
- Taught weekly review section
- Planned course readings & lecture topics

Software Contributions

Inverted Encoding Model (IEM) tutorials: <https://github.com/tommysprague/IEM-tutorial>

- Publicly-available tutorials and workshop lecture materials for linear inverted encoding model (IEM) analysis
- Recipe for implementation of novel multivariate analyses enabling reconstruction of feature representations from brain activity patterns (fMRI, EEG).
- MATLAB implementation

gridfitgpu - GPU-optimized grid search to seed nonlinear optimization problems (e.g., voxel receptive field modeling):

<https://github.com/tommysprague/gridfitgpu>

- In progress: integrating functionality into widely-used visual neuroimaging analysis packages (vistasoft)
- MATLAB implementation

iEye_ts – *in-progress* – package for automated eye movement scoring: https://github.com/tommysprague/iEye_ts

- Adapted from interactive eye movement scoring package *iEye* (Mackey & Curtis, in preparation)
- Optimized for scoring data from memory-guided saccade tasks
- MATLAB implementation, compatible with Eyelink data files

Academic Service

UC Santa Barbara Dynamical Neurosciences Graduate Program Admissions Committee (2021-2022)

UC Santa Barbara Psychological and Brain Sciences Graduate Admissions Committee (2019-2020)

UC Santa Barbara Psychological and Brain Sciences Shared Lab Policies Committee (2019-present)

UC Santa Barbara Psychological and Brain Sciences Newsletter Committee (2019-present)

UC Santa Barbara Psychological and Brain Sciences Building/Reopening Committee (2021-present)

SFN 2016 Nanosymposium organizer (Spatial Attention and Working Memory, chair: Clayton Curtis)

- Invited speakers from nonhuman primate and human labs studying different aspects of visual spatial cognition
- Developed nanosymposium application and coordinated talk order

UCSD Neurosciences Curriculum Committee (2010-2014)

- Identified course topics with student interest
- Recruited faculty to develop student-initiated courses
- Represent student body in discussions of curriculum efficacy

UCSD Neurosciences Computational Neuroscience Committee (2010-2015)

- Worked with faculty program directors to improve breadth and depth of computational neurosciences courses
- Leadership role in developing a seminar course taught by students

NSF Graduate Funding Panel

- Presented advice for optimizing NSF Graduate Research Fellowship applications
- Assisted students with edits to application documents

Neurosciences Graduate Program new student recruitment

- Organized or assisted with organizing non-academic activities for prospective students (2011-2013)
- Present posters during recruitment poster sessions (2012-2015)
- Led cognitive neuroscience lab tour (2013-2015)

Ad-hoc manuscript review

Cerebral Cortex; Cognitive, Affective and Behavioral Neuroscience; Current Biology; eLife; eNeuro; Frontiers in Human Neuroscience; Frontiers in Systems Neuroscience; Human Brain Mapping; Journal of Cognitive Neuroscience; Journal of Experimental Psychology: Human Perception and Performance; Journal of Neuroscience; Journal of Neurophysiology; Nature Communications; Nature Communications Biology; Nature Human Behavior; Nature Neuroscience; Neuroimage; PLoS Computational Biology; PLoS Biology; PNAS; Scientific Reports; Trends in Cognitive Sciences

Ad-hoc conference abstract review

- Cognitive Computational Neuroscience (2017; 2018; 2019)

Ad-hoc proposal/grant review

- National Science Foundation (2019; 2021)
- UCSB Errett Fisher Foundation Postdoctoral Fellowship (2021)

Academic Memberships

- Society for Neuroscience (2007-present)
- Vision Sciences Society (2008-present)

Academic Lecture Courses/Summer Schools

- Summer Institute for Cognitive Neuroscience, “Visual Attention and Emotional Cognition” (Santa Barbara, CA; Summer 2014)
- Cold Spring Harbor Laboratory Summer Course, “Computational Neuroscience: Vision” (Long Island, NY; Summer 2012)
- RIKEN Brain Science Institute Summer Lecture Course, “Interacting Brains” (Tokyo, Japan; Summer 2009)

Additional Activities

- UCSD Neuroscience Outreach Program volunteer (visit local middle and high schools to teach neuroscience, Fall 2010–Winter 2016)
- Writer, Catalyst: Rice Undergraduate Science and Engineering Review (Fall 2009-Spring 2010)
- Building Rice Academics in Neuroscience (BRAiN), a student/faculty initiative for implementing an undergraduate neuroscience program and increasing community neuroscience awareness, co-founder and co-president (Fall 2008-Spring 2010)
- Rice Undergraduate Scholars Program Research Fellow (Fall 2008–Spring 2009)
- Scientia, an institute for the history of science and culture; C.P. Snow Student Fellow (Fall 2008-Spring 2009)
- Gulf Coast Consortia for Theoretical and Computational Neuroscience NSF REU Research Fellow (summer 2008)