

# Vy Ai Vo

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Computational neuroscientist with 9 years of research experience. Doctoral research focused on building models to understand how the brain encodes visual information.

## SKILLS

**Programming:** MATLAB, Python, R, C/C++, Javascript, LabVIEW, shell scripting (bash/csh/etc.), Visual Basic. Version control in git, sharing on GitHub or GitLab.

**Machine learning:** model fitting with gradients or grid search, model optimization including regularization; generalized linear models including multivariate and logistic regression, supervised learning with classifiers with varying kernels, dimensionality reduction with principal or independent component analysis, unsupervised learning with clustering, deep neural networks (beginner with TensorFlow), and more

**Statistics:** Resampling/bootstrapping, permutation tests, Monte Carlo methods, Bayesian models, parametric and non-parametric null-hypothesis testing. R, SPSS, JMP.

**Parallel / large-scale computing:** GPU computing (with CUDA or in MATLAB), high-performance computing (HPC) with TORQUE, familiarity with Amazon Web Services (AWS).

## RESEARCH EXPERIENCE

### *Ph.D. research*

09/2013 - present

Neurosciences Graduate Program, University of California, San Diego, La Jolla, CA

- Applied machine learning and computer vision techniques to diverse data types (fMRI, EEG, psychophysics) to investigate how the brain processes visual information (3 publications, many pending)
- Leader in the lab in adopting and teaching software tools to others (e.g. git/gitLab)
- Skilled at optimizing analysis on large and noisy datasets, especially through parallel programming. One example: fitting ~5000 models went from ~2 weeks to ~3 days (400-500% increase in efficiency)
- Developed simple new metrics to describe complex properties of data
- Worked closely with research collaborators across the country to write publications and analyze data
- Skilled at presenting original research work to a wide range of audiences, from neuroscientists and psychologists to high school and college students (dozens of invited lectures, 2 conference talks)
- Interviewed, recruited, mentored and managed undergraduate research assistants and lab volunteers
- Wrote data analysis pipelines and software in several languages for general lab use (MATLAB, R, or Python) and for other scientists (e.g. on Open Science Framework)
- Taught advanced methods and statistics to graduate students as a guest lecturer in "Fundamentals in Statistics and Computation for Neuroscientists" and a TA for "Data Analysis in MATLAB"

### *Lab manager & research assistant*

07/2011 – 07/2013

University of Rochester, Rochester, NY

- Ran multiple studies to investigate how children learn number concepts using fMRI and behavioral tasks (1 publication)
- Used parametric and non-parametric statistical models to analyze data in SPSS, R, and Excel
- Independently implemented more advanced techniques in MATLAB (e.g. principal component analysis, canonical correlation analysis)
- Used & maintained participant databases in FileMaker Pro (using SQL queries to select groups for recruitment, pull out new data, etc.)
- Interviewed, recruited, trained and managed dozens of research assistants to collect and analyze data

### *Undergraduate thesis research*

08/2009 – 06/2011

Biology Dept. & Psychology Dept., Swarthmore College, Swarthmore, PA.

- Developed or implemented novel analysis techniques for two self-designed thesis projects
- Optimized new assay for a computer vision fly tracking algorithm, adapted from open-source Python code (1 talk at conference)
- Analyzed motion tracking data from a virtual reality experiment in R (1 poster at conference)

*Undergraduate research (NSF funded)*

06/2009 – 08/2009

Computer Science Dept., University of Southern California, Los Angeles, CA.

- Improved the real-time control of motors and actuators to control a cadaver hand for biomechanical measurements by refactoring and optimizing LabVIEW code
- Wrote documentation and unit-tested LabVIEW & MATLAB code

## EDUCATION

University of California, San Diego, La Jolla, CA.

2015 - present

Ph.D. in Neurosciences with a Computational specialization, anticipated late 2018/early 2019.

University of California, San Diego, La Jolla, CA.

2013 - 2015

M.S. in Neurosciences.

Swarthmore College, Swarthmore, PA.

2007 - 2011

B.A. with High Honors, double major in Biology & Cognitive Science.

## SELECTED AWARDS

National Science Foundation Graduate Research Fellowship (2013), ~10% award rate

Vision Sciences Society Student Travel Award (2017), <10% award rate

## PUBLICATIONS

Sprague, T.C., Adam, K.C.S., Foster, J.J., Rahmati, M., Sutterer, D.W., **Vo, V.A.** (2018). Inverted encoding models assay population-level stimulus representations, not single-unit neural tuning. *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*.

**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 and code at <https://osf.io/s9vqv/>.

**Vo, V.A.**, Li, R., Kornell, N., Pouget, A., Cantlon, J.F. (2014). Young children bet on their numerical skills: Metacognition in the numerical domain. *Psychological Science*.

## SELECTED PRESENTATIONS

**Vo, V.A.**, Sutterer, D.W., Foster, J.J., Sprague, T.C., Awh, E., Serences, J.T., (2017). Neural representations of spatial position recalled from long-term and short-term memory diverge across the cortical hierarchy. Talk at Vision Sciences Society meeting.

**Vo, V.A.**, Herrera, E.I., Serences, J.T. (2016). Orientation selective responses as measured with EEG track both featural and temporal attention enhancements. Poster at Vision Sciences Society meeting.

Emerson, R., **Vo, V.A.**, Kurtz, T., Cantlon, J.F. (2014). Mathematics expertise predicts structural and functional variability in the intraparietal sulcus. Talk at Society for Neuroscience meeting.

## OTHER TRAINING

Computational Neuroscience: Vision summer course, Cold Spring Harbor Laboratory (2016)

NVIDIA CUDA C/C++ Accelerated Computing & Deep Learning workshop (2018)