

Michael D. Nunez, PhD

Assistant Project Scientist
Department of Psychiatry and Biobehavioral Sciences
University of California, Los Angeles (UCLA)

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EDUCATION

University of California, Irvine

2017 - Ph.D. in Psychology w/ Concentration in Cognitive Neuroscience
2017 - M.S. in Cognitive Neuroscience

Cognitive Sciences Department

University of California, Irvine

2015 - M.S. in Statistics

Statistics Department

Tulane University, New Orleans, LA

2010 - B.S. in Mathematics and Economics (Double Major), Minor in Psychology

Mathematics Department

EMPLOYMENT HISTORY

Assistant Project Scientist, Fuster Laboratory of Cognitive Neuroscience

Department of Psychiatry and Biobehavioral Sciences

University of California, Los Angeles (UCLA)

I study quick decision making from recordings of neurons, intracranial data, and behavioral data in non-human primates

2019 - Present

Assistant Project Scientist, Cognition and Individual Differences Lab

Department of Cognitive Sciences

University of California, Irvine

I sought to estimate unidentified cognitive models of human behavior with physiological data, including EEG

2018 - 2019

Associate Specialist (Neuroscientist), Laboratory of Computational and Translational Neuroscience

Department of Biomedical Engineering

University of California, Irvine

I classified and statistically modeled markers of epilepsy in human patients using electric potentials recorded directly from the cortex.

2017 - 2018

Graduate Student Researcher, Human Neuroscience Lab, Cognition and Individual Differences Lab

Department of Cognitive Sciences

University of California, Irvine

I tested the veracity of combined electrocortical and cognitive models of human decision making. This was typically performed in an hierarchical Bayesian statistical framework with statistical models of EEG and human behavior.

2012 - 2017

Teaching Assistant, Cognitive Sciences Department

University of California, Irvine

2012 - 2016

Research Assistant, Psychology Department

Tulane University, New Orleans, LA

I sought to advance understanding of normal cognitive aging by exploring auditory EEG Event Related Potentials using Independent Component Analysis (ICA)

2011-2012

PROFESSIONAL SKILLS

• Neuroimaging:

- EEG (recording with EGI and ANT hardware and software, OpenVibe, ICA artifact correction, ERPs, SSVEPs, source analysis, Brain-Computer Interfaces, custom Python and MATLAB functions, EEGLAB, etc.)
- ECoG / iEEG (analysis of intracranial electrical recordings from epileptic patients using custom MATLAB functions)
- Single unit electrophysiology
- fMRI (nibabel, nilearn, SPM)

- Brain-Computer Interfaces / Adaptive Neurotechnologies (OpenVibe, Visual Evoked Potentials, SSVEPs, familiarity with BCI hardware, BCI startup company involvement)
- **Modeling:**
 - Mathematical Psychology (mathematical cognitive models of human/NHP behavior)
 - Computational Neuroscience (statistical models of EEG and ECoG)
- **Mathematics:** Frequentist and Bayesian Multivariate Statistics, Machine Learning, Neural Networks, Time Series, Signal Processing, Linear Algebra, Multivariate Calculus, etc.
- **Programming:**
 - Python (ipython, Numpy, Scipy, Tensorflow, public Github scripts, etc.)
 - R (RStudio, built MCMC samplers, BayesFactor package, public Github scripts, etc.)
 - MATLAB (advanced knowledge, full public Github repositories)
 - JAGS, STAN, Github, git, Linux Bash, html (lab website maintenance), C++ (some), julia (learning), Sublime Text 3
- **Experimental design** (programming of visual stimuli, experimental protocol setup, scheduling subjects, IRB, etc.)
- **Animal lab:** Hands-on experience caring for, cleaning implants of, training, and building experiments for NHP. Some experience working with rats for behavioral experiments from the National Course in Adaptive Neurotechnology 3-week course. Also some hands-on surgical experience with implanting ECoG grids and nerve cuff stimulators in rats from the same course.
- **Data analysis** (preparing and organizing large data sets, dimension reduction, statistical modeling, etc.)
- **Stand-alone analysis tools:** SPSS/JASP, Mathematica
- **Open science:** Sharing of code and data with github.com and osf.io, Preregistration of scientific experiments, sharing of open-access papers, conference posters, etc. on researchgate.com and other preprint/postprint locations
- **Presentation:** LaTeX (and Overleaf), Microsoft Office, GIMP (similar to Adobe Photoshop)
- **Operating systems:** Linux, Windows, Mac

PUBLICATIONS

- Nunez, M. D., Gosai, A., Vandekerckhove, J., & Srinivasan, R. (2019). [The latency of a visual evoked potential tracks the onset of decision making](#). *NeuroImage*, doi: 10.1016/j.neuroimage.2019.04.052.
- Nunez, M. D., Vandekerckhove, J., & Srinivasan, R. (2017). [How attention influences perceptual decision making: Single-trial EEG correlates of drift-diffusion model parameters](#). *Journal of Mathematical Psychology*. 76:B, (pp. 117-130), doi: 10.1016/j.jmp.2016.03.003
- Nunez, M. D., Srinivasan, R. & Vandekerckhove, J. (2015). [Individual differences in attention influence perceptual decision making](#). *Frontiers in Psychology*. 8:18. doi: 10.3389/fpsyg.2015.00018
- Nunez, M. D., Nunez, P. L., & Srinivasan, R. (2016) [Electroencephalography \(EEG\), neurophysics, experimental methods, and signal processing](#). In Ombao, H., Linquist, M., Thompson, W. & Aston, J. (Eds.) *Handbook of Neuroimaging Data Analysis* (pp. 175-197), Chapman & Hall/CRC. Advance online publication. doi: 10.13140/rg.2.2.12706.63687
- Nunez, M. D. (2017). [Refining understanding of human decision making by testing integrated neurocognitive models of EEG, choice and reaction time](#) (Doctoral dissertation, UC Irvine).
- Lui, K. K., Nunez, M. D., Cassidy, J. M., Vandekerckhove, J., Cramer, S. C., & Srinivasan, R. (2018). [Timing of readiness potentials reflect a decision-making process in the human brain](#). *bioRxiv*, 338806.
- Bridwell, D. A., Cavanagh, J. F., Collins, A. G., Nunez, M. D., Srinivasan, R., Stober, S., & Calhoun, V. D. (2018). [Moving Beyond ERP Components: A Selective Review of Approaches to Integrate EEG and Behavior](#). *Frontiers in Human Neuroscience*, 12, 106.
- Schubert, A. L., Nunez, M. D., Hagemann, D., & Vandekerckhove, J. (2018). [Individual differences in cortical processing speed predict cognitive abilities: A model-based cognitive neuroscience account](#). *Computational Brain & Behavior*.
- Nunez, P. L., Nunez, M. D., & Srinivasan, R. (2019). [Multi-Scale Neural Sources of EEG: Genuine, Equivalent, and Representative. A Tutorial Review](#). *Brain Topography*, 1-22.

CONFERENCE PUBLICATIONS

- Nunez, M. D., Gosai, A., Vandekerckhove, J. & Srinivasan, R. (2017). [EEG measures of neural processing speed reflect human visual encoding time](#) Conference on Cognitive Computational Neuroscience. New York, New York. September 2017.
- Charupanit, K. Nunez, M. D., Bernardo, D., Bebin, E. M., Krueger, D. Northrup, H., Sahin, M., Wu, J. Y., & Lopour, B. A. (2018). Automated Detection of High Frequency Oscillations in Human Scalp Electroencephalogram. International Conference of the IEEE Engineering in Medicine and Biological Society. Honolulu, Hawaii. July 2018.

CONFERENCE PRESENTATIONS / INVITED TALKS

- **Nunez, M. D.** [Accurate time measurement of processing stages during simple human decision making](#). Presented at the Society for Mathematical Psychology. University of Wisconsin, Madison, WI, July 2018.
- **Nunez, M. D.** Best practices for navigating through the noise in EEG analysis. Presented at the Army Research Lab. Los Angeles, CA, June 2018.
- **Nunez, M. D., Srinivasan, R. & Vandekerckhove, J.** Model-based cognitive neuroscience for the chronometry of simple human decision making. Presented at the Society for Mathematical Psychology. University of Warwick, England, UK July 2017.
- **Nunez, M. D., Srinivasan, R. & Vandekerckhove, J.** Integrated models of both cognition and electrocortical activity predict human decision making. Presented at the Society for Mathematical Psychology. New Brunswick, NJ, August 2016.
- **Nunez, M. D.** An integrated neurocognitive model to inform targeted restoration of patient decision making. Presented at the Summer Course in Adaptive Neurotechnologies. Albany, NY, July 2016.
- **Nunez, M. D., Srinivasan, R. & Vandekerckhove, J.** Informing cognitive models of visual decision making with EEG measures of attention. Presented at the Australian Mathematical Psychology Conference. Hobart, TAS, Australia, February 2016.
- **Nunez, M. D., Srinivasan, R. & Vandekerckhove, J.** Integrating EEG with cognitive modeling to explain individual differences in perceptual decision making. Presented at the Luce Graduate Student Conference. Irvine, CA, May 2014.
- Vandekerckhove, J., **Nunez, M. D.**, Baribault, B., & Srinivasan, R. Joint models for behavioral and neural data. Presented at the Annual Meeting of the Society for Mathematical Psychology, Quebec City, Canada, July 2014.
- Vandekerckhove, J., **Nunez, M. D.**, Baribault, B., & Srinivasan, R. Latent variable methods for data fusion. Presented at the Annual Summer Interdisciplinary Conference, Moab, UT, June 2014.

CONFERENCE POSTERS

- **Nunez, M. D.,** Charupanit, K., Lin, J. J., Lopour B. A. [Temporal dynamics of high frequency oscillations at slow and fast time scales in patients with epilepsy](#). Presented at the American Epilepsy Society. New Orleans, LA, December 2018.
- **Nunez, M. D.,** Scambray, K. A., Lui, K. K., Vandekerckhove, J., Srinivasan, R. [The time course of brain signals reflect different cognitive processes during human decision making](#). Presented at the Society for Neuroscience. San Diego, CA, November 2018.
- **Nunez, M. D.,** Vandekerckhove, J., Srinivasan, R. [The cognitive chronometry of rapid human decision making](#). Presented at the Society for Neuroscience. Washington, DC, November 2017.
- **Nunez, M. D.,** Gosai, A., Vandekerckhove, J., Srinivasan, R. Variability in performance during perceptual decision making is related to attentional filtering. Presented at the Society for Neuroscience. San Diego, CA, November 2016.
- **Nunez, M. D.,** Vandekerckhove, J., Srinivasan, R. Informing hierarchical Bayesian models of visual decision making with EEG. Presented at the [SAMSI: Challenges in Functional Connectivity Workshop](#). Reighley-Durham, NC, April 2016.
- **Nunez, M. D.,** Vandekerckhove, J., Srinivasan, R. Single-trial EEG measures of attention predict psychological differences during decision making. Presented at the Society for Neuroscience. Chicago, IL, October 2015.
- **Nunez, M. D.,** Srinivasan, R. & Vandekerckhove, J. Single-trial EEG measures of visual attention explain evidence accumulation during perceptual decision making. Presented at Society for Mathematical Psychology. Newport Beach, CA, July 2015.
- Schubert, A. L., **Nunez, M. D.,** Frischkorn, G. T., Hagemann, D. A model-based cognitive neuroscience account of the chronometry of human decision making. Presented at Psychologie und Gehirn. Trier, Germany, June 2017.

GRANT APPLICATIONS

- **FUNDED.** *NSF Cognitive Neuroscience Proposal "Critical tests of neurocognitive relationships,"* I helped Joachim Vandekerckhove and Ramesh Srinivasan write this grant proposal based on my proposals stemming from the previous grant.
- **FUNDED.** [NSF Cognitive Neuroscience Proposal 1658303](#), I helped Ramesh Srinivasan and Joachim Vandekerckhove write this grant proposal based on my advancement materials.

SOFTWARE

- <https://github.com/mdnunez/artscreenEEG> - MATLAB repository to perform basic artifact correction on electroencephalographic (EEG) data
- <https://github.com/mdnunez/encodingN200> - Pre-calculated EEG measures, raw behavioral data, MATLAB stimulus code, and MATLAB, Python, R, and JAGS analysis code for paper [The latency of a visual evoked potential tracks the onset of decision making](#)
- <https://github.com/mdnunez/ERPIQRT> - MATLAB and Python analysis code for paper [Individual differences in cognitive abilities are predicted by cortical processing speed: A model-based cognitive neuroscience account](#)
- <https://github.com/mdnunez/mcntoolbox> - The purpose of Mathematical Cognitive Neuroscience Toolbox is to provide users interested in cognitive neuroscience and mathematical psychology a set of example MATLAB and R scripts for data

analysis and experimentation.

- <https://github.com/mdnunez/bayesutils> - Python utilities for exploration of convergence and graphical posterior estimation of pystan and pyjags output.
- <https://github.com/mdnunez/electroencephalopy> - A code repository containing simple Python scripts for EEG analysis using numpy and scipy

PROFESSIONAL MEMBERSHIPS

- Society for Neuroscience
- Society for Mathematical Psychology
- American Epilepsy Society