# Richard Gao

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## EDUCATION

**PhD., Cognitive Science**, University of California, San Diego **2014 – Present**
**BASc., Engineering Science** (Biomedical), University of Toronto. **CGPA**: 3.9/4 **2014**

## PEER REVIEWED PUBLICATIONS & PREPRINTS

1. Moore, S. M., Seidman, J. S., Ellegood, J., **Gao, R.**, Savchenko, A., Troutman, T. D., ... & Voytek, B. (2019). Setd5 haploinsufficiency alters neuronal network connectivity and leads to autistic-like behaviors in mice. *Translational Psychiatry*, 9(1), 24.
2. Haller, M., Donoghue, T., Peterson, E., Varma, P., Sebastian, P., **Gao, R.**, ... & Voytek, B. (2018). Parameterizing neural power spectra. *bioRxiv*
3. Trujillo, C. A.*, **Gao, R.***, Negraes, P. D.*, Chaim, I. A., Domissy, A., Vandenberghe, M., ... & Muotri, A. R. (2018). Nested oscillatory dynamics in cortical organoids model early human brain network development. *bioRxiv*
4. **Gao, R**., Donoghue, T., Voytek., B. (2017). Automated generation of cognitive ontology via web text-mining. *CogSci Annual Meeting Proceedings*, 2067-72
5. **Gao, R.**, Peterson, E. J. & Voytek, B. (2017). Inferring synaptic excitation/inhibition balance from field potentials. *Neuroimage* 158, 70–78.
6. **Gao, R.** (2016)**.** Interpreting the electrophysiological power spectrum. *Journal of Neurophysiology* 115, 628–630.

## ACCEPTED ABSTRACTS & PRESENTATIONS

**2019**

1. **Gao, R.**, Voytek., B. Hierarchy of cortical population characteristic timescales inferred from field potentials. *Computational and Systems Neuroscience (Cosyne)*. Peer-reviewed abstract & poster presentation.

**2018**

2. **Gao, R**., Liao, L., Voytek, B. Spectral power variation separates oscillatory from non-oscillatory stochastic neural dynamics. *Cognitive Computational Neuroscience*. Peer-reviewed abstract & poster presentation.
3. **Gao, R.**, Donoghue, T., Voytek, B. Defining Cognition: cognitive ontology via text-mining and word-embedding. *Cognitive Neuroscience Society (CNS) Annual Meeting*. Poster.

**2017**

1. Liao, L., **Gao, R**., Voytek, B. Differentiating noise from structure in electrophysiological power spectra. *Society for Neuroscience (SfN) Annual meeting.* Poster.
2. **Gao, R**., et al. Network oscillations in human iPSC-derived cortical organoids. *Society for Neuroscience (SfN) Annual meeting.* Poster.

**2016**

1. **Gao, R.**, Voytek, B. Spiking correlates and temporal variability of oscillatory frequency modulation. *Society for Neuroscience (SfN) Annual meeting.* Poster.
2. **Gao, R.**, Voytek, B. Inferring excitatory and inhibitory synaptic parameters from the local field potential. *Computational and Systems Neuroscience (Cosyne)*. p.103. Peer-reviewed abstract & poster presentation.

**2015**

3. **Gao, R.**, Voytek, B. Exploring the neural basis of the elctrophysiological power spectrum. *Society for Neuroscience (SfN) Annual meeting*. Poster
4. Noto, T., Cole, S.R., **Gao, R.**, Peterson, E.J., Voytek, B. Neural network properties can be inferred from electrophysiological power spectral geometry. *Society for Neuroscience (SfN) Annual meeting*. Poster

**2014 & Earlier**

5. **Gao, R.** Design of a closed-loop electrical stimulation system for treatment of epilepsy. Undergraduate Honour's Thesis.
6. **Gao, R.** Wireless acquisition of physiological signals for detection of activity engagement in children with communication difficulties. *IBBME Research Symposium*. Talk

## GRANTS & AWARDS

- UCSD CRES Undergrad Research Award (advising Lauren Liao): **$5,000** **2018**
- Kavli Institute for Brain and Mind, Innovative Research Grant: **$50,000** **2017**
- NSERC Postgraduate Scholarship-Doctoral: **$21,000/year** **2016 – 2019**
- NSERC Alexander Graham Bell Canada Graduate Scholarship (Declined) **2016**
- Cosyne 2016 Travel Grant: **$800** **2016**
- UCSD Frontiers of Innovation Scholar Program Research Grant: **$25,000** **2015**
- UCSD Katzin Prize. Fellowship: **$10,000/year** **2014 – 2019**
- Engineering Science Award of Excellence (CGPA 3.9/4 or above, 10 awardees) **2014**
- NSERC Industrial Undergraduate Student Research Award. **$6,000** **2012 – 2013**
- NSERC Undergraduate Student Research Award. **$6,000** **2011**
- Queen Elizabeth Aim For the Top Scholarship. **$3,000/year** **2009 – 2014**
- International Baccalaureate Diploma **2009**

## TEACHING

**Writing Center (Writing Hub)** Graduate Writing Consultant, **UC San Diego**

- Paid writing consultant/peer tutor for graduate students on high-level writing concerns.

**Seminar: Representation in the Mind (2018 Spring)** Co-Organizer, **UC San Diego**

- Graduate seminar on the past, present, and future of representation in the mind and other intelligent systems. Covers topics including neural, embodied, and distributed representation.

**Introduction to Data Science (2017 & 2018)** Teaching Assistant, **UC San Diego**

- Intro level class on broad topics of data science, including data munging and visualization in Python, statistics and ML, text-mining, and privacy. Class was hosted on JupyterHub.

**Introduction to Cognitive Science (2016, 2015)** Teaching Assistant, **UC San Diego**

- Intro level class class on various subfields of cognitive science, including neuroscience, linguistics, machine intelligence, and social and embodied cognition.

**Machine Learning I (2015)** Teaching Assistant, **UC San Diego**

- Advanced undergraduate class on machine learning algorithms, including Bayesian techniques, clustering, linear classifiers, artificial neural networks, and others.

**Introduction to Statistical Analysis (2015)** Teaching Assistant, **UC San Diego**

- Intro level undergraduate class on probability, statistics, and hypothesis testing.

**Praxis I: Engineering Design (2014)** Design Studio Leader, **University of Toronto**

- Freshmen class on engineering design processes, communication skills, and critical thinking.

## REVIEW SERVICES

Journal of Neuroscience (2), PLOS Computational Biology (1), Journal of Cognitive Neuroscience (1), NeuroImage (1)

## MENTORSHIP

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|---|---|
| Tanner Turner, UCSD Applied Mathematics & Computer Science | 2016 – 2017 |
| Lauren Liao, UCSD Mathematics (Probability & Statistics) | 2016 – 2019 |
| Sitan (Stan) Liu, UCSD Exchange student from Sichuan University | 2017 |
| Dylan Christiano, UCSD Cognitive Science | 2017 – 2018 |
| Julio Dominguez, UCSD Cognitive Science | 2017 – 2018 |
| Christopher Caligiuri, Canyon Crest Academy | 2017 – |

## RESEARCH & PROFESSIONAL EXPERIENCE

**2015**

**Summer School – Computational Neuroscience, Redwood Center, UC Berkeley**

- Lectures and lab sessions on computational and theoretical neuroscience.

**Research Rotation, 4 months** **Alysson Muotri, UCSD**

- Modeling Rett syndrome using human induced pluripotent stem cell derived neural cultures.

**Research Rotation, 4 months** **Eran Mukamel, UCSD**

- Neural mass modeling of phase-amplitude coupling changes during anesthesia.

**Research Rotation, 4 months** **Douglas Nitz, UCSD**

- Analyzing single unit and local field potential recordings in rat ventral tegmental area.

**2014 & Earlier**

**Undergraduate Honour's Thesis, 8 months** **Roman Genov, UofT**

- Designing closed-loop electrical stimulation system for treatment of intractable epilepsy.

**Research & Development Intern, 16 months** **InteraXon Inc. Toronto**

- Developing EEG-based BCI algorithms for mindfulness meditation training.

**Undergraduate Research, 4 months,** **Tom Chau, UofT**

- Creating a GUI and physiological signal collection system for real-time analysis of affect in children with communication disorders.

**Undergraduate Research, 4 months** **Adam Anderson, UofT**

- Classifying emotional response to affective stimuli using physiological signals.

**References Available Upon Request**