

# Richard Gao

Department of Cognitive Science, University of California, San Diego  
9500 Gilman Drive, La Jolla, California, 92093  
rdgao.com | r.dg.gao@gmail.com | github.com/rdgao

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## EDUCATION

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

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## PEER REVIEWED PUBLICATIONS

### 2018

1. Trujillo, C\*, **Gao, R\***, Negraes, P\*, et al. Spontaneous development of functional circuits in organoids resembles programmed early brain development (*in review*).

### 2017

2. **Gao, R.**, Donoghue, T., Voytek, B. Automated generation of cognitive ontology via web text-mining. *CogSci Annual Meeting Proceedings*, 2067-72 (2017)
3. **Gao, R.**, Peterson, E. J. & Voytek, B. Inferring synaptic excitation/inhibition balance from field potentials. *Neuroimage* 158, 70–78 (2017).

### 2016

4. **Gao, R.** Interpreting the electrophysiological power spectrum. *Journal of Neurophysiology* 115, 628–630 (2016).
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## 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

1. **Gao, R.**, Liao, L., Voytek, B. Spectral power variation separates oscillatory from non-oscillatory stochastic neural dynamics. *Cognitive Computational Neuroscience*. Poster
2. **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 electrophysiological 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

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### **GRANTS & AWARDS**

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

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

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## MENTORSHIP

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**