Thomas Donoghue

Department of Cognitive Science
University of California, San Diego (UCSD)
Office: 226 Cognitive Science Building
La Jolla, California, 92093

(858) 531-8024
tdonoghue@ucsd.edu
tomdonoghue.github.io

Languages: English (native), French (professional proficiency)

Areas of Specialization

Cognitive Neuroscience - Electrophysiology & Neural Oscillations - Data Science

Education

2014 - *current*	**Ph.D., Cognitive Science** *UC San Diego,* La Jolla, California, USA
2011- 2014	**Bachelors of Arts and Sciences (BA&Sc) Honours Cognitive Science** *McGill University*, Montreal, Quebec, Canada Major: Honours Cognitive Science; Minor: Philosophy Graduated First Class Honours with Distinction
2008 - 2011	**Diplome D'Etudes Collegial (DEC) Double Diploma in Science & Social Science** *John Abbott College*, Sainte Anne de Bellevue, Quebec, Canada In Quebec, a DEC is a necessary intermediary degree between high school & university

Training & Courses

Summer 2018	**MIND Summer School - Methods In Neuroscience at Dartmouth** Topic: Narratives and Natural Contexts. *Dartmouth College,* Hanover, NH, USA Short course on methods in neuroscience. Competitive application (~20% acceptance).
Summer 2017	**Neurohackweek** *University of Washington eScience Institute,* Seattle, WA, USA Project-based course on neuro- & data science. Competitive application (~25% acceptance).
Summer 2016	**Advanced Scientific Programming in Python** *G-Node & Centre for Integrative Neuroscience and Neurodynamics*, Reading, United Kingdom Short course on scientific programming. Competitive application (9.9% acceptance).

Research Experience

9/2014-*current*	**Advisor: Dr. Bradley Voytek** (Graduate Student Researcher) **UC San Diego,** Department of Cognitive Science, Cognitive & Neural Dynamics Lab Mechanisms of neural communication using human electrophysiological recordings.
3/2015-6/2015	**Advisor: Dr. Virginia De Sa** (Graduate Rotation Student) **UC San Diego,** Department of Cognitive Science, Natural Computation Lab Brain-computer interfaces (BCIs) to investigate the role of neural oscillations in cognition.
11/2013	**Advisor: Dr. Ghislaine Dehaene-Lambertz** (Visiting Scholar) **Neurospin,** INSERM-CEA Cognitive Neuroimaging Unit, Neurospin, Saclay, France Connectivity analysis in infant electrophysiology investigating language and cognition.
5/2013-6/2014	**Advisor: Dr. Sylvain Baillet** (Research Assistant) **Montreal Neurological Institute,** Department of Neurology & Neurosurgery Functional connectivity during sleep, using magnetoencephalography and polysomnography.
9/2012-9/2014	**Advisor: Dr. Kris Onishi** (Research Assistant) **McGill University**, Department of Psychology - McGill Infant Development Cluster (MIDC) Psycholinguistics & Developmental Psychology: language perception & statistical learning.

Preprinted Articles

*Underlined are research assistants under my direct supervision. * denotes equal contribution.*

2018   Haller M*, **Donoghue T***, Peterson EJ*, Varma P, <u>Sebastian P</u>, Gao R, Noto T, Knight RT & Voytek B (2018). Parameterizing Neural Power Spectra. *bioRxiv.*
Link: https://www.biorxiv.org/content/early/2018/04/11/299859

Conference Proceedings (Peer Reviewed Papers)

Underlined are research assistants under my direct supervision.

2018   <u>Fox W</u>, **Donoghue T** (2018). Confidence Levels in Scientific Writing: Automated Mining of Primary Literature and Press Releases. *Proceedings of the 40th Annual Conference of the Cognitive Science Society.*
Poster also presented at the Cognitive Science 2018 conference - Madison, WI, USA.

2017   Gao R, **Donoghue T** & Voytek B (2017). Automated generation of cognitive ontology via web text-mining. *Proceedings of the 39th Annual Conference of the Cognitive Science Society.*
Poster also presented at the Cognitive Science, 2017 conference - London, United Kingdom.

Conference Abstracts & Posters (Selected)

Underlined are research assistants under my direct supervision.

2018   <u>Mdanda L</u>, **Donoghue T**, & Voytek B. Parameterization of Periodic and Aperiodic Human Electrophysiology Reveals Greater Between- Than Within-Subject Variability. *Society for Neuroscience*, San Diego, CA, USA. [Upcoming]

2018   **Donoghue T**, <u>Sebastian P</u>, Noto T, Haxby S & Voytek B. Integrating Human Electrophysiology, Gene Expression and Functional Data. *Neuroinformatics*, Montreal, QC, Canada. [Upcoming]

2018   **Donoghue T**, <u>Sebastian P</u>, & Voytek B. Large-Scale Topographical Analysis of Oscillations and 1/f Background Reveals Patterns of Spatial Variation Within and Between Subjects. *International Conference on Biomagnetism*, Philadelphia, PA , USA. [Upcoming]

2018   **Donoghue T** & Voytek B. Alpha Power and 1/f Slope Provide Independent Decoding of Visual Spatial Attention. *Cognitive Neuroscience Society*, Boston, MA, USA.

2018   Gao R, **Donoghue T** & Voytek B. Defining Cognition: Automated Generation of Cognitive Ontology by Text-Mining Literature. *Cognitive Neuroscience Society*, Boston, MA, USA.

2017   Waschke L, **Donoghue T,** Oblesser J & Voytek B. Attention-Modulated Tracking of 1/f Stimulus Characteristics in Human EEG. *Signals & Noise in the Auditory Pathway*, Lubeck, Germany.

2017   **Donoghue T** & Voytek B. Assessing approaches for estimating the electrophysiological 1/f background spectrum. *Society for Neuroscience*, Washington DC, USA.

2017   **Donoghue T** & Voytek B. Automated meta-analysis of event-related potentials and their correlates through text-mining. *Cognitive Neuroscience Society*, San Francisco, CA, USA.

2016   **Donoghue T**, <u>Fox W</u>, <u>Kim A</u>, & Voytek B. The relation of oscillatory-phase to visual perception is dependent on attention and location of stimuli. *Society for Neuroscience*, San Diego, CA.

2016   <u>Sebastian P</u>, **Donoghue T**, Noto T, Haxby S, & Voytek B. Data mining to generate novel hypotheses for the genetic underpinnings and functional roles of cortical oscillations. *Society for Neuroscience*, San Diego, CA, USA.

2016   **Donoghue T**, <u>Sebastian P</u>, & Voytek B. Automated Analysis of Resting State Cortical Oscillatory Characteristics using Magnetoencephalography (MEG). *International Conference on Biomagnetism*, Seoul, South Korea.

2015   Gougelet R, **Donoghue T,** Piper M, Althoff A, Urbach TP, & Voytek B. Influencing Visual Target Detection with Oscillatory Phase-Specific Stimulus Presentation. *Society for Neuroscience*, Chicago, IL, USA, 2015.

Conference Talks

11/2018   **Parameterizing Neural Power Spectra** (Nanosymposium Presentation)
Society for Neuroscience (SfN) - All Hands Meeting, UC San Diego

1/2016   **The Effect of Oscillatory Phase on Perception and Cognition** (Research Talk)
Temporal Dynamics of Learning Centre (TDLC) - All Hands Meeting, UC San Diego

Other Research Presentations

10/2015   '*Brainstorm* **software for MEG/EEG analysis** (Assisted with Interactive Workshop)
2015 Los Angeles Brainstorm Workshop, University of Southern California

11/2013   **Introduction to** *Brainstorm* **Software for MEG/EEG analysis** (Presentation)
NeuroSpin Research Institute, Saclay, France

10/2013   *Brainstorm* **software for MEG/EEG analysis** (Assisted with Interactive Workshop)
Scale-free Dynamics and Networks in Neurosciences (conference), Université de Montreal

Research Grants & Fellowships

1/2016   **Small Grants Award, Temporal Dynamics of Learning Centre (TDLC)**
2 200$ Research Funding for an EEG project on the temporal dynamics of perceptual learning

Honours & Awards

03/2017   **Graduate Student Award** - Cognitive Neuroscience Society Conference
$500 travel award with recognition of a graduate student award winning poster.

3/2014   **Owens Scholar Award, Johns Hopkins University** - Declined
18 000$ USD additional funding over 3 years offered with admission to Johns Hopkins

11/2013   **Samuel de Champlain Quebec Program for International Collaboration**
Funds provided by my research supervisor (Dr. Baillet) for travel to NeuroSpin in France

Research Mentorship

06/2018-*cur.*   **Julio Dominguez**, Undergraduate Research Assistant, Voytek Lab, UC San Diego
03/2018-*cur.*   **Tianyu Zhang**, Undergraduate Research Assistant, Voytek Lab, UC San Diego
10/2016-*cur.*   **Luyanda Mdanda**, Undergraduate Research Assistant, Voytek Lab, UC San Diego
10/2015-*cur.*   **Priyadarshini Sebastian**, Undergraduate Research Assistant, Voytek Lab, UC San Diego
          Frontiers of Innovation Scholars Program (FISP) Trainee Award Winner
10/'15-12/'16   **Aeri Kim**, Undergraduate Research Assistant, Voytek Lab, UC San Diego
06/2015-*cur.*   **Will Fox,** High School Intern, Voytek Lab, UC San Diego
          Current: Undergraduate student at Massachusetts Institute of Technology (MIT)

Academic Memberships

2018-*current*   Cognitive Science Society
2016-*current*   Cognitive Neuroscience Society
2014-*current*   Society for Neuroscience

Teacher Training

Winter 2018   **Introduction to College Teaching**, Teaching & Learning Commons, UC San Diego
Participated in a semester long class on evidence-based teaching.

Fall 2017   **Equity, Diversity and Inclusion in Postsecondary Education**, UC San Diego Extension
Participated in a week long course on topics and strategies regarding inclusive teaching.

Teaching Experience

August 2017   **Instructor**, Clubes de Ciencia Mexico, Monterrey, Mexico
Course title: Bots on the Brain (25 hours of instruction; laboratory course; 12 students)
Developed & taught a 1-week, intensive, hands-on, research focused course for undergrads.
Clubes de Ciencia is a non-profit organization promoting science education across Mexico.

2015-2017   **Instructor**, Academic Connections, UC San Diego
Course Title: Introduction to Cognitive Science (75 hours of instruction; 16-24 students / year)
With co-instructor Eric Leonardis, we designed and implemented a course, teaching three
iterations offering University credit classes to high-achieving high school students.
    Summer 2017: Student Ratings - Course: 4.71/5, Instructor: 4.86/5
    Summer 2016: Student Ratings - Course: 4.80/5, Instructor: 4.92/5
    Summer 2015: Student Ratings - Course: 4.59/5, Instructor: 4.92/5

2015-*present*   **Teaching Assistant,** Department of Cognitive Science, UC San Diego
COGS 108: Data Science in Practice (Winter '18, Prof. Bradley Voytek, TA Evals: 4.31/5.00)
COGS 108: Data Science in Practice (Spring '17, Prof. Bradley Voytek, TA Evals: 4.32/5.00)
COGS 107B: Systems Neuroscience (Winter '17, Prof. Douglas Nitz, TA Evals: 4.60/5.00)
COGS 17: Neurobiology of Cognition (Winter '16, Dr. Christine Johnson, TA Evals: 4.58/5.00)
COGS 9: Introduction to Data Science (Fall '15, Prof. Bradley Voytek, TA Evals: 4.34/5.00)
COGS 3: Introduction to Computing (Spring '15, Prof. Bradley Voytek, TA Evals: 4.54/5.00)
    Awarded *Excellence in Teaching* Award from the UCSD Cognitive Science Dept.
COGS 107B: Systems Neuroscience (Winter '15: Prof. Douglas Nitz, TA Evals: 4.69/5.00)
    Awarded *Outstanding Teaching* Award from the UCSD Cognitive Science Dept.

2014   **Discussion Group Leader,** Department of Philosophy, McGill University
PHIL 221: Introduction to History and Philosophy of Science (Prof. Ian Gold)

Teaching Materials & Course Design

The following are links to materials for which I played a key role in designing & implementing them.

Data Science in Practice (COGS108), Department of Cognitive Science, UC San Diego
Tutorials & Assignments for teaching data science (https://github.com/COGS108/Tutorials)

Python Boot Camp, Department of Cognitive Science, UC San Diego
Materials for grad student bootcamp (https://github.com/TomDonoghue/PythonBootcamp)

Introduction to Cognitive Science, Academic Connections, UC San Diego
Class materials, assignments & experiments (https://github.com/TomDonoghue/CogSciClass)

Guest Lectures

Winter 2018   **'Ethics of Data Science'** - COGS108: Data Science in Practice, UC San Diego
Winter 2018   **'Data Wrangling'** - COGS 108: Data Science in Practice, UC San Diego
Summer 2017   **'How to: Science'** - COGS14A: Introduction to Research Methods, UC San Diego
Spring 2017   **'Data Wrangling'** - COGS 108: Data Science in Practice, UC San Diego
Winter 2016   **'Methods in Neuroscience'** - COGS 17: Neurobiology of Cognition, UC San Diego
Fall 2015   **'Thinking About Thinking' -** COGS 1: Introduction to Cognitive Science, UC San Diego
Winter 2015   **'Intro to EEG for BCI Applications'** - Cognitive Science Students Society, UC San Diego

Computational Skills & Contributions

Languages   Fluent in **Python** and **Shell** scripting (bash), intermediate in **Matlab** and **R**.
I also have experience with **Javascript** (including D3), **Java**, **HTML** and **CSS.**

Packages   **Lead Developer**, Fitting Oscillations & One-Over-F
A package for parameterizing neural power spectra, measuring periodic & aperiodic signals.
Github: https://github.com/voytekresearch/fooof/; PYPI: https://pypi.org/project/fooof/

Contributor, neurodsp
A collection of modules & utilities to analyze neural electrophysiological recordings.
Github: https://github.com/voytekresearch/neurodsp; PYPI: https://pypi.org/project/neurodsp/

Github   Code contributions are available on Github (https://github.com/TomDonoghue).

Science Outreach

1/2014-*current*   **Science Writer / Editor / Podcast Host, Useful Science Organization** (usefulscience.org)
Writing clear, concise and useful summaries of scientific research for a general audience

10/2016-6/2018 **Volunteer Tutor, San Diego Refugee Tutoring**, San Diego, CA, USA
Tutoring children from families with refugee status with their schoolwork

1/2015-6/2016 **School Presenter, UCSD**, San Diego, CA, USA
Giving presentations to local schools (all levels) on topics in neuroscience

9/2014-6/2016 **Penpal, Mary Fey Pendleton School**, Oceanside, CA, USA
Penpal with grade 7-8 students, as a mentor and to foster an interest in science as a career

2/2013-2/2014 **High School Presenter, Brain Awareness Organization**, Montreal, QC, Canada
Gave presentations on how the brain works and the neural effects of drugs