

# Gabriel Riegner

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## CONTACT

email: [gariegner@ucsd.edu](mailto:gariegner@ucsd.edu) phone: ( 323 ) 459 - 3484 website: [griegner.github.io](https://griegner.github.io) github: [griegner](https://github.com/griegner)

## INTERESTS

Signal and image analysis, spatiotemporal modeling, high-dimensional statistics, brain imaging applications

## EDUCATION

2022 - present  
3.91 GPA

**University of California San Diego ( UCSD )**  
PhD in Data Science

San Diego, CA

**Committee:** Armin Schwartzman PhD, Bradley Voytek PhD

**Selected coursework:** numerical linear algebra, multiple linear regression, optimization, algorithms for data science, data science in biomedicine, data science ethics, machine learning, statistical models

2015 - 2019  
3.83 GPA

**University of Southern California ( USC )**  
BA in Neuroscience ( with departmental honors )

Los Angeles, CA

**Committee:** Assal Habibi PhD, Sarah Bottjer PhD, Irving Biederman PhD

**Thesis:** Recognition Memory Musical for Melody ( [paper](#) )

**Selected coursework:** cell biology and physiology, chemistry, neurobiology, systems neuroscience, cognitive neuroscience, seminar in neurobiology, research methods and statistics, python programming

2017

**University of Otago**  
Exchange Student

New Zealand

2023

**Neuromatch Academy**

Remote

Summer course on neural networks, natural language processing, and reinforcement learning

2022

**San Diego Super Computer Center**

San Diego, CA

High performance computing training series on CUDA and MPI programming

## RESEARCH

2023 - present

**Graduate student researcher**

UCSD

**Advisors:** Armin Schwartzman PhD, Samuel Davenport PhD

- **Statistics project on comparing brain maps** ( [repository](#) )

Developed method to estimate map-to-map similarity under spatial autocorrelation

- **Statistics project on estimating timescale maps with fMRI** ( [repository](#) )

Developed method to map the rate of temporal autocorrelation decay over the brain

2019 - 2022

**Senior research technician**

UCSD

Brain Mechanisms of Pain and Health Lab

**Advisor:** Fadel Zeidan PhD

- **Clinical trial on the brain mechanisms supporting chronic pain relief by meditation**

Experimental design, clinical pain testing, MRI scanner operation, brain imaging analysis, and personnel training

- **Clinical trial on the role of endogenous opioids in chronic pain relief by meditation**

Experimental design, clinical pain testing, monitoring patients during naloxone infusion, and data analysis

- **Pilot study on the brain mechanisms supporting chronic pain relief by vaporized cannabis**

Experimental design, clinical pain testing, monitoring patients during cannabis inhalation, and MRI operation

- **Pilot study on the effects of meditation during awake craniotomy surgeries**

IRB writing and collection of physiological/behavioral data alongside of team of neurosurgeons

2021 - 2022

**Senior research technician**

UCSD

Center for Psychedelic Research

**Advisors:** Fadel Zeidan PhD, Jon Dean PhD

- **Brain imaging study on psilocybin for phantom-limb pain**

Collected and analyzed psychological, qualitative pain rating, and brain imaging data

- **Undergraduate thesis on modeling recognition memory for musical melodies using signal detection theory**  
 Experimental design, recruitment, data collection, data analysis, thesis writing, and committee defense
- **Effects of music training on brain, cognitive, and socioemotional development using fMRI and EEG**  
 Behavioral and EEG data collection, and structural MRI analysis

## SKILLS

### Programming

- **Python:** NumPy, Pandas, SciPy, Matplotlib, Scikit-Learn, and PyTorch libraries
- **R:** Tidyverse libraries
- **Version Control:** Git and GitHub
- **Typesetting:** LaTeX
- **Neuroimaging:** Nilearn, FSL, BIDS, fMRIPrep, and ASLPrep softwares

### Computing

- **High Performance Computing:** PBS and SLURM resource managers
- **Cloud Computing:** Amazon Web Services ( AWS ) S3 and EC2
- **Reproducibility:** Docker and Singularity containers

### Clinical

- **MRI/EEG:** GE and Siemens scanner operation, and BrainVision bio-signal recording
- **Physiology:** Biopac bio-signal recording
- **Clinical Procedures:** quantitative sensory pain testing and straight leg raise test of nerve pain
- **CITI Certificates:** good clinical practice and biomedical research

### Design

- **Software:** Adobe and Affinity for raster and vector graphics
- **Web Design:** developed websites for [coastalresearchinstitute.com](http://coastalresearchinstitute.com) and [douleurtx.com](http://douleurtx.com)

## PUBLICATIONS

- 2023 access papers on [google scholar](https://scholar.google.com)  
**The role of endogenous opioids in mindfulness and sham mindfulness-meditation for the direct alleviation of evoked chronic low back pain: a randomized clinical trial**  
 L Khatib, J Dean, V Oliva, **G Riegner**, N Gonzalez, J Birenbaum, G Cruanes, J Miller, M Patterson, H Kim, K Chakravarthy, F Zeidan  
*Nature Neuropharmacology*
- 2023 **Neural and psychological mechanisms in the relationship between resting breathing rate and pain**  
 V Oliva, J Baumgartner, S Farris, **G Riegner**, L Khatib, Y Jung, R Coghill, F Zeidan  
*Mindfulness*
- 2022 **Disentangling self from pain: mindfulness meditation-induced pain relief is driven by thalamic-default mode network decoupling**  
**G Riegner**, G Posey, V Oliva, Y Jung, W Mobley, F Zeidan  
*PAIN*
- 2022 **The effects of mindfulness-based stress reduction on trauma in victims of gun violence: a pilot study**  
 L Khatib, **G Riegner**, J Dean, V Oliva, G Cruanes, B Mulligan, F Zeidan  
*Mindfulness*
- 2020 **Neurophysiological mechanisms supporting mindfulness meditation-based pain relief: an updated review**  
 A Jinich, E Garland, J Baumgartner, N Gonzalez, **G Riegner**, J Birenbaum, L Case, F Zeidan  
*Current Pain and Headache Reports*
- in preparation **Meditation effects on multivariate fMRI-based pain signatures**  
**G Riegner**, T Wager, F Zeidan
- ## CONFERENCES
- 2022 **Meditation reduces pain through generalized and stimulus-type-specific brain representations of negative affect**  
**G Riegner**, J Dean, G Posey, Y Jung, T Wager, M Čeko, T Wager  
*Society for Neuroscience*
- 2022 **I fear your pain: the role of amygdala in human empathy**  
 V Oliva, **G Riegner**, L Khatib, J Dean, J Ross, C Lopez, A Allen, D Barrows, A Uvarova, M Reyes, R Fuentes, D Mosbey, W

Mobley, F Zeidan  
*Society for Neuroscience*

2022 Mindfulness meditation reduces acutely exacerbated chronic back pain through non-opioid mechanisms  
L Khatib, J Dean, N Gonzalez, V Oliva, G Riegner, et al.  
*Society for Neuroscience*

2022 Meditation effects sensory but not extra-sensory cerebral pain signatures  
G Riegner, J Dean, G Posey, V Oliva, L Khatib, Y Jung, T Wager, F Zeidan  
*US Association for the Study of Pain*

2021 Neurofunctional connections supporting mindfulness-based pain relief  
G Riegner, G Posey, V Oliva, L Khatib, J Baumgartner, R Kraft, Y Jung, F Zeidan  
*Society for Neuroscience*

2020 Higher brain entropy predicts mindfulness meditation-based pain relief  
A Jinich, G Posey, J Baumgartner, G Riegner, N Gonzalez, J Birenbaum, J Vaughan, Y Jung, R Kraft, F Zeidan  
*Society for Neuroscience*

2020 Meditation-induced depressive mode reductions is associated with decreased connectivity between ventromedial prefrontal cortex and amygdala  
L Khatib, V Oliva, G Riegner, G Posey, J Dean, J Baumgartner, R Kraft, J Birenbaum, F Zeidan  
*Society for Neuroscience*

2020 Prefrontal cortico-thalamic regulation of pain by mindfulness meditation  
G Riegner, J Baumgartner, G Posey, A Jinich, Y Jung, F Zeidan, N Gonzalez, J Birenbaum  
*US Association for the Study of Pain*

2020 Mindfulness meditation engages newly discovered pathways for pain relief  
F Zeidan, G Posey, J Baumgartner, G Riegner, N Gonzales, J Birenbaum, B Vaughan, Y Jung, R Kraft  
*International Association for the Study of Pain*

#### **ADVISING**

2023-2024 Undergraduate Cognitive Science Honors Project: Milka Waniak  
2023 - 2024 Undergraduate Brain Connectivity Project: Daphne Fabella, Daniel Zhang, Terho Koivisto, Andrew Cheng  
2023 Undergraduate Brain Imaging Project: Brad Powell, Jeremy Nurning

#### **SCHOLARSHIPS**

2022 UCSD Competitive Edge Program: summer research stipend  
2015 - 2019 USC Tuition Exchange Scholarship: 80% tuition covered  
2017 - 2018 USC Student Research Scholarship: summer research stipend

#### **SERVICE**

2018 - 2019 Outdoor Guide at USC Outfitters Student Organization  
Organized and led surfing, rock climbing, and hiking trips for groups of ~10 students