**Gautam Agarwal**

**gagarwal@kecksci.claremont.edu**

**Positions**

07/2021 – present – Assistant Professor of Neuroscience

Keck Science Department, The Claremont Colleges

08/2019 – 06/2021 – Research Scientist

Redwood Center for Theoretical Neuroscience, University of California, Berkeley

08/2014 – 06/2019 - Postdoctoral Researcher

Systems Neuroscience Laboratory, Champalimaud Foundation, Portugal

01/2011 – 05/2014 - Postdoctoral Researcher

Redwood Center for Theoretical Neuroscience, University of California, Berkeley

01/2010 – 12/2010 – Postdoctoral Researcher

Isacoff Laboratory, University of California, Berkeley

**Education**

12/2009 - Ph.D. in Neuroscience

University of California, Berkeley

Supervisor: Dr. Ehud Isacoff

Thesis: “Heterogeneity in Drosophila signaling systems”

05/2003 – B.S. in Neurobiology, B.S. in Computer Science

University of Texas at Austin

Dean’s Scholars Honors Program

**Publications**

In preparation:

1. Quendera T, Hamidi M, Bergomi M, Mainen Z, **Agarwal G**. Psychophysics of complex skill learning.

Preprints:

1. **Agarwal G**, Lustig B, Akera S, Pastalkova E, Lee A, Sommer F. News without the buzz: recovering information from weak theta rhythms of the hippocampus. *bioRxiv*. 2023 Dec 21.

Journal articles:

6. Poo C, **Agarwal G**, Bonacchi N, Mainen Z. Spatial maps in piriform cortex during olfactory navigation. *Nature.* 2021 Dec 22.

5. **Agarwal G**, Stevenson IH, Berényi A, Mizuseki K, Buzsáki G, Sommer FT. Spatially distributed local fields in the hippocampus encode rat position. *Science.* 2014 May 9.

4. Warp E, **Agarwal G**, Wyart C, Friedmann D, Oldfield CS, Conner A, Del Bene F, Arrenberg AB, Baier H, Isacoff EY. Emergence of patterned activity in the developing zebrafish spinal cord. *Curr Biol.* 2012 Jan 24.

3. **Agarwal G** and Isacoff EY. Specializations of a Pheromonal Glomerulus in the *Drosophila* Olfactory System. *J Neurophysiol.* 2011 Feb 2.

2. Pathak MM, Yarov-Yarovoy V, **Agarwal G**, Roux B, Barth P, Kohout S, Tombola F, Isacoff EY. Closing in on the resting state of the Shaker K(+) channel. *Neuron*. 2007 Oct 4.

1. Guerrero G, Reiff DF, **Agarwal G**, Ball RW, Borst A, Goodman CS, Isacoff EY. Heterogeneity in synaptic transmission along a *Drosophila* larval motor axon. *Nature Neuroscience*. 2005 Sep.

Book Chapters:

2. **Agarwal G**. Local fields of the hippocampus: more than meets the eye. In *Dualism, Platonism and Voluntarism. Explorations at the Quantum, Microscopic, Mesoscopic and Symbolic Neural Levels.* Seán Ó Nualláin, editor. Newcastle upon Tyne, UK: Cambridge Scholars Publishing; 2016.

1. **Agarwal G**, Sommer FT. Measuring information in spike trains about intrinsic brain signals. Chapter 6 of *Spike Timing:* *Mechanism and Function.* Victor JD, Dilorenzo PM, editors. Boca Raton, FL: CRC Press; 2013.

**Teaching**

The Claremont Colleges:

9. Spring 2022-24

Instructor, NEUR 95L – Foundations of Neuroscience (created Computational module)

8. Fall 2021-23

Creator and Instructor, NEUR 133L – Computational neuroscience

UC Berkeley:

7. Spring 2021

Creator and Instructor, Neuro 299 – The Art of Modeling (Graduate-level course)

3 – 6. Fall 2012, Spring 2013, Fall 2013, Spring 2014

Creator and Lead Instructor, Cog Sci 98/198 - Altered States and the Brain

2. Spring 2006

Graduate Student Instructor, MCB 160 – Introduction to Neurobiology

Professors: Dr. Ehud Isacoff, Dr. Kristin Scott, Dr. Yang Dan

1. Fall 2004

Graduate Student Instructor, MCB 62 / PSY 119 – Drugs and the Brain

Professor: Dr. David Presti

Advanced summer courses:

1 – 3. Summer 2011, 2012, 2013   
Teaching Assistant, CRCNS course on Data Mining and Modeling in Neuroscience, UC Berkeley  
Organizer: Dr. Friedrich Sommer

**Mentorship**

PhD students:

Flávia C. Santiago de Oliveira, PhD candidate in Psychology at the University of São Paulo

Alexandre Gonzaga, PhD candidate in Psychology at the University of São Paulo

Sean Mackesey, PhD candidate in Neuroscience at UC Berkeley

Kevin Qi, PhD rotation student in Biophysics at UC Berkeley

Shafeeq Ibrahim, PhD rotation student in EECS at UC Berkeley

Tiago Quendera, PhD student at Champalimaud Research (PT)

Master’s students:

Mani Hamidi, currently in the PhD program for Intelligent Systems at Max Planck Institute

Marta Ferreira, currently a research scientist at Evidation Health

Undergraduate students:

Claremont Colleges:

Aalia Malik

Fiona Irving-Beck

Charlotte Abeshaus

Bryan Marin

Kevin Marin

Liya Yemaneberhane  
Kaya Hano

Seiji Akera

Geeyoun Jung

Rahul Jain  
Chae Park

Theo Perlin

Aimee Johnston

Cassie Mahakian

Bryce Fitzwilson

Aimee Johnston

Aidan Wogan

Theo Perlin

Ryo Sato

UC Berkeley:  
Pranati Modumudi

Vincent Wang

Previous undergraduates:

Dongrui Deng, currently an EECS PhD student at CMU  
Guilherme Freches, currently a Cognitive Science PhD student at the Donders Institute  
Eddie Groshev, currently an engineer at Osaro

Rishi Sharma, currently a PhD student at Stanford University

High school students:

Emilia Lori, a high-school student from Piacenza, Italy

**Thesis committees**

Yukteswar Perez, PhD student, California Institute of Integral Studies

Samuel Meyler, PhD student, University of Lisbon.

Andre Pombeiro, Master’s student, Instituto Superior Tecnico.

**Awarded Grants and Fellowships**

4. Bial Foundation, 2019-present ($53,000)

3. National Institutes of Health NRSA Postdoctoral Fellowship, 2011-2014 ($161,000)

2. Howard Hughes Medical Institute Predoctoral Fellowship, 2003-2008 ($125,000)

1. National Science Foundation Graduate Research Fellowship – offered

**Invited Talks**

Conference talks:

6. Jain R, Quendera T, Deng D, Hamidi M, Bergomi M, Mainen Z, **Agarwal G**. You got hexxed: persistence during complex skill learning. Fourth international symposium on the mathematics of Neuroscience.

1. Quendera T, Deng D, Hamidi M, Bergomi M, Mainen Z, **Agarwal G**. Humans learning a complex task are picky and sticky. Computational Cognitive Neuroscience Meeting, August 2022.

4. Strong vs Wise: two distinct theta rhythms in the hippocampus. Towards a Science of Consciousness, Tucson, AZ April 2022.

3. Decisions of a healthy brain: studies in the lab and the world. Opening lecture in the 11th annual Simpósio em Saúde, Brazil, February 2021.

2. The emergence of information in mesoscopic measures of brain activity. Towards a Science of Consciousness, Tucson, AZ April 2014.

1. Identification of spatio-temporal patterns in the hippocampal theta rhythm. Society for Neuroscience Annual Meeting, November 2012.

Workshop talks:

2. Decoding local field potentials in theory and in practice. 10th Bernstein Sparks Workshop: Multichannel interfacing of neuronal networks at different spatial scales, June 2016.

1. Sparse structure underlying spatial patterns in the hippocampal theta rhythm. Modeling of Neural Activity Workshop, Hawaii, June 2013.

Departmental seminars

15. News without the buzz: reading content from weak theta rhythms of the hippocampus. UCSD Institute for Neural Computation, November 2023.

13 – 14. Over-generalization in humans learning a complex skill.

14. University of California at Irvine, April 2019.

13. Redwood Center for Theoretical Neuroscience, April 2019.

12. A planning game reveals distributed patterning in player behavior. Redwood Center for Theoretical Neuroscience, UC Berkeley, USA, February 2017.

11. Compressed sensing for low­-vision applications. U. of Mississippi Medical Center, August 2015.

6 – 10. Spatially distributed local fields in the hippocampus encode rat position.

10. Instituto Superior de Psicologia Aplicada, May 2015.

9. Bernstein Center for Computational Neuroscience, Berlin, March 2015.

8. University of Texas at Austin, May 2014.

7. University of Arizona, Tucson, April 2014.

6. Champalimaud Centre for the Unknown, October 2013.

5. Unsolved mysteries of hippocampal dynamics. Redwood Seminar, UC Berkeley, July 2014.

4. Two streams of information in the hippocampal LFP. UC Irvine, November 2013.

3. Location-dependent Spatial Patterning of the Theta Rhythm, SUNY Downstate College of Medicine, July 2012.

2. The spatial structure of hippocampal oscillations signifies behavioral state. Indian Institute of Technology, Bombay, April 2012.

1. The spatial structure of hippocampal oscillations signifies behavioral state. Indian Institute of Technology, Kanpur, April 2012.

Working groups:

1. Recovering information from weak theta rhythms of the hippocampus. General Resonance Theory study group, July 2022.
2. Recovering information from weak theta rhythms of the hippocampus. Austin Science Network, November 2022.

Graduate Lectures:

4. Life as a post-post-post-postdoc, UC Berkeley 1st year PhD student seminar on alternative careers, 10/2019.

3. Perceptual Decision Making, Champalimaud cognition course, 05/2017.

2. How, and why, local field potentials in the hippocampus encode rat position, UC Berkeley Brain Lunch, 10/2013.

1. Spatial structure of the hippocampal theta rhythm as a signifier of state, UC Berkeley Brain Lunch, 03/2012.

Undergraduate Lectures:

3. Mapping States of Mind and Brain, Creative Media Production class at School of Innovation and Design Technologies (ETIC), 03/2018.

2. Spatially Distributed Local Fields Encode Rat Position. Berkeley Review of Cognitive Science Articles (BROCA) Course, UC Berkeley, 04/2014.

1. Organization of the Fly Olfactory Brain, Dr. Tzagarakis-Foster's Seminar Series in Biology class, University of San Francisco, 03/2008.

**Posters**

27. Abeshaus CJ, Fitzwilson B, **Agarwal G.** How revealing are on-screen movements? Faculty for Undergraduate Neuroscience poster session at the Society for Neuroscience Meeting, November 2022.

26. Akera S and **Agarwal G**. How design choices interact to determine artificial neural network function. Faculty for Undergraduate Neuroscience poster session at the Society for Neuroscience Meeting, November 2022.

25. **Agarwal G**, Lustig B, Pastalkova E, Lee A, Sommer F. News without the buzz: recovering information from weak theta rhythms in the hippocampus. Society for Neuroscience Meeting, November 2022.

24. **Agarwal G**, Lustig B, Pastalkova E, Lee A, Sommer F. Recovering information from weakly rhythmic local field potentials of the hippocampus. NIH BRAIN Initiative Meeting, June 2022.

23. Deng D, Hamidi M, Quendera T, Bergomi M, Mainen Z, Agarwal G. Psychophysics of insight- based learning in humans. Neuromatch 4.0, December 2021.

22. De Oliveira F, Gonzaga A, Fukusima S, **Agarwal G**. A influencia da idade emu ma tarefa de aprendizagem complexa. XI Reniao do IBNeC e I forum Nacional de Ligas Academicas de Neurociencias. October 2021.

21. De Oliveira F, Gonzaga A, Hamidi M, **Agarwal G**, Fukusima S. The influence of age, gender, and personality on complex skill learning. Congress on Brain, Behavior, and Emotions, August 2021.

20. **Agarwal G**, Lustig B, Pastalkova E, Lee A, Sommer F. The theta rhythm is present and informative during stillness. SfN Global Connectome, January 2021.

19. **Agarwal G** and Sommer F. [Deciphering position from hippocampal oscillations during movement](https://cdn-akamai.labroots.com/479/1758/TDA2_15905876571437313.pdf) [and stillness](https://cdn-akamai.labroots.com/479/1758/TDA2_15905876571437313.pdf). NIH BRAIN Initiative Invesitigators Virtual Meeting, June 2020.

18. **Agarwal G**, Lustig B, Mackesey S, Sommer F. Decoding hippocampal waves in a complex environment. Center for Neural Engineering and Prosthetics Retreat, December 2019.

16 - 17. **Agarwal G**, Quendera T, Bergomi M, Mainen Z. Generalization in humans learning a complex skill.

17. Institute of Cognitive and Behavioral Sciences retreat, December 2019.

16. Computational and Systems Neuroscience, February 2019.

15. **Agarwal G**, Quendera T\*, Bergomi M, Mainen Z. A psychophysics of strategy. 11th FENS Forum, July 2018. \*Co-presented

14. Poo C, **Agarwal G**, Bonacchi N, Mainen ZF. Spatial information in posterior piriform cortex. 11th FENS Forum, July 2018.

13. **Agarwal G**, Quendera T, Ferreira M, Mainen Z. A planning game reveals individual differences in strategy that are highly constrained. Computational and Systems Neuroscience, February 2017.

12. **Agarwal G**, Quendera T\*, Ferreira M, Mainen Z. A high-dimensional interface to study complex decisions. 10th FENS Forum, July 2016. \*Co-presented

11. **Agarwal G**, Medina R, Renart A, Mainen Z. Movement trajectories encode stimulus dynamics in a decision making task. Bridging Neural Mechanisms and Cognition, April 2015.

10. **Agarwal G**, Mizuseki K, Bereny A, Buzsaki G, Sommer F. Two forms of information found in local field potentials of the hippocampus. Computational and Systems Neuro, February 2014.

9. **Agarwal G**, Berenyi A, Mizuseki K, Schomburg E, Buzsaki G, Sommer F. Sparse signatures of neuronal activity in high-frequency LFP. Society for Neuroscience Meeting, November 2013.

8. **Agarwal G**, Berenyi A, Stevenson I, Mizuseki K, Buzsaki G, Sommer F. Traveling waves of the hippocampal theta rhythm encode rat position. Computational and Systems Neuroscience, February 2013.

7. Sommer F, Buzsaki G, **Agarwal G**. The spatial structure of hippocampal theta rhythms encodes behavioral state. Society for Neuroscience Annual Meeting, November 2012.  
6. **Agarwal G**, Buzsaki G, Sommer S. Spatial properties of the hippocampal theta rhythm. Computational and Systems Neuroscience, February 2012.

5. Warp E, **Agarwal G**, Wyart C, del Bene F, Arrenberg AB, Baier H, Isacoff EY. In vivo acquisition of correlated spontaneous activity in the developing vertebrate spinal cord. Society for Neuroscience Annual Meeting, November 2011.

4. **Agarwal G** and Isacoff EY. Modes of Input Integration in the *Drosophila* Lobe. Chemical Senses: Receptors and Circuits. Keystone Symposium, March 2009.   
3. **Agarwal G** and Isacoff EY. Functional Patterning of the *Drosophila* Lobe. Neurobiology of Drosophila meeting, Cold Spring Harbor Laboratory, October 2007.

2. Peled ES, Ball RW, **Agarwal G**, Kauwe G, Stowers RS, Isacoff EY. Optical probing of synaptic development and strength in the neuromuscular junction of Drosophila meeting, Cold Spring Harbor Laboratory, October 2007.

1. Pathak MM, **Agarwal G**, Kurtz L, Gandhi CS, Isacoff EY. (2005). A fluorescence scan to determine the structural organization of the Shaker K+channel. Mechanotransduction & Gravity Signaling in Biological Systems, Gordon Research Conference, July 2005.

**Honors and Prizes**

4. 2016 FENS-IBRO stipend recipient, Federation of European Neuroscience Socieities.

3. 2015 Art of Neuroscience - Honorable Mention, Art of Neuroscience Competition.

2. 2015 FENS-IBRO stipend recipient, Federation of European Neuroscience Socieities.

1. 2013 Cosyne Presenter's Travel Grant, Computational and Systems Neuroscience

**Service**

Committee assignments:

2. Fall 2022 – present - Keck Science Department Executive Committee.

1. Fall 2022 – Spring 2023 – Pitzer College Teaching and Learning Committee.

Conference Reviewer:

2. 2018 Champalimaud Symposium on Quantitative Approaches to Behavior and Neural Systems, Lisbon, Portugal.

1. 2017 Computational and Systems Neuroscience Conference (CoSyNe), Salt Lake City, UT.

Journal Reviewer:

3. 2014, 2020, 2021, 2022 - Frontiers in Neuroinformatics

2. 2013 - PLoS ONE

1. 2012 - PLoS Computational Biology

**Public Outreach**

Citizen Science:

1. 06/2020

Creator, [*Hexxed*](https://play.google.com/store/apps/details?id=org.godotengine.hexxed)

Developed a mobile app-based game to engage citizen scientists while they participate in a large-scale study of complex decision-making.

Press:

[Scientists tap gamers to learn how people problem-solve](https://news.berkeley.edu/2020/12/14/neuroscientists-tap-gamers-to-learn-how-people-problem-solve/)

[What makes human intelligence exceptional? The answer may be hidden inside this game](https://www.eurekalert.org/pub_releases/2020-12/ccft-wmh121120.php)

Podcasts:

1. 05/2019  
Interviewee, *45 Graus* podcast

[H](https://quarentaecincograus.libsyn.com/51-en-gautam-agarwal-neurocincias-e-inteligncia-artificial-neuroscience-and-artificial-intelligence)ow can a neuroscience study inspire the construction of more advanced AI?

Press Releases:

1. “[The Neuroscience of Following Your Nose](https://www.pitzer.edu/communications/2022/01/04/the-neuroscience-of-following-your-nose/)” Pitzer College, January 2022.

Interdisciplinary Workshops:

3. 2018, 2019

Co-organizer, [Neurogamejam](http://neurogamejam.com/)

Developed event to bring together neuroscientists and video game developers in a weekend of gamifying behavioral experiments.

1. & 2. 04/2015 and 08/2016

Organizer and Co-facilitator, A Study in Somatic Rhythms workshop

Along with a professional musician, developed a week-long curriculum, through which we introduced ~40 students from a variety of fields to scientific and musical perspectives on the generation, perception, learning, measurement, and performance of rhythms.

Interactive demonstrations

11. How do we become exceptional?

Developed an interactive booth where visitors will play a game I designed, to learn how their behavior can help understand the nature of intelligence and interpersonal diversity.

- European Night of Researchers at Natural History Museum, Lisbon, 09/2018.

10. Psiloscope

With colleagues, developed a system to control lasers and lights using participants’ EEG and EKG measurements.

- Green Ray, Lux Nightclub, Lisbon, 12/2017.

8 & 9. BioPong

With mentees Tiago Quendera, Marta Ferreira, and Guilherme Freches, developed a biofeedback version of the video game Pong where players’ arousal controls paddle size, teaching players to relax while competing.

9. LX Patching Circle, Desterro, 02/2016.

8. Champalimaud Symposium closing night, Teatro do Bairro, 09/2015.

7. Neurodisco

For a neurofeedback exhibit created by sound artist Richard Warp, developed a real-time visualization that responds to participants’ EEG activity, helping subjects experience changes in their neural activity.

- Nightlife, a Science Night at California Academy of Sciences, San Francisco, 01/2013.

1 - 6. [Mindchill](http://www.antillipsi.net/art-1/bioart)

With Berkeley CogSci undergraduates Tim Mullen and Jonathan Toomim designed and built a biofeedback system that uses subjects' arousal to control time lapse movies of natural processes. Taught diverse audiences about biorhythms at:

6. Mind and Brain Night, Willard Middle School, 05/2011.

5. Outreach Day, Piedmont Middle School, 11/2010.

4. Mind and Brain Night, Washington Elementary, 05/2009.

3. Fluxpoint, Chez Poulet SF, 06/2008. A night of experimental music and film. An audience member's arousal was visualized and projected while she listened to a live electroacoustic performance.

2. Dance for Peace, Clark Kerr Campus, UC Berkeley, 05/2008.

1. Yuri's Night Bay Area, NASA Ames, 04/2008. An annual celebration of art, science, and technology.

Art Installations:

1. [Fabricated Rhythm](http://www.nicklally.com/exhibitions-performances-12-15/)

With artist Nick Lally, researched the connection between rhythms in the brain and in other physical systems, culminating in an art piece that received Honorable Mention in the 2015 Art of Neuroscience contest.

- Mind Matters art exhibition, UC San Francisco Sandler Center, 03/2014.

Working groups:

4. 10/2020 – 07/2021

Co-organizer and participant, Union mental health support group

Meet bi-weekly with other academic researchers and postdocs from the UC system to check in on our mental health, curate resources for incoming members, and communicate mental health concerns to UC administration.

3. 08/2017 – 05/2019

Co-organizer and participant, AutoScope

Brought together neuroscientists and experts in body-mind disciplines for interactive workshops and discussions on the relationship between neuroscience and practice-based methods. Procured €1500 of departmental funding to pay guest facilitators.

2. 09/2015 - 02/2017

Participant, Mindfulness working group

Along with colleagues participated in a regular meditation practice, including discussions of the relationship between mindfulness, the workplace, and neuroscience.

1. 01/2016 – 05/2016

Participant, Me @ Work

Along with colleagues, implemented a group experiment in Hurlburt’s Descriptive Experience Sampling, consisting of detailed verbal reports of daily experiences, to determine the diversity of internal thought processes across participants.