

CLAYTON P. MOSHER

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EDUCATION

- 2009 – 2014 Ph.D. in Neuroscience; Minor in Statistics
The University of Arizona, Tucson, AZ
Thesis title: “Neurons in the monkey amygdala detect eye contact during naturalistic social interactions.”
Advisor: Dr. Katalin M. Gothard
Committee: Andrew J. Fuglevand, Konrad Zinsmaier, Joseph C. Watkins
- 2004 – 2009 B.S. in Health Sciences, Physiology (*Honors, Summa Cum Laude*)
B.S. in Mathematics, Minor: Chemistry (*Summa Cum Laude*)
The University of Arizona, Tucson, AZ
Honors thesis: “Behavioral triggers of skin conductance and their neural correlates in the primate amygdala.”

CURRENT POSITION

- 2020 – present Project Scientist
Rutishauser Lab, Cedars-Sinai Medical Center, Los Angeles, CA

PROFESSIONAL HISTORY

- 2017 – 2020 Postdoctoral Scientist
Rutishauser Lab, Cedars-Sinai Medical Center, Los Angeles, CA
- 2016 – 2017 Research Specialist Principal
The Gothard Lab, The University of Arizona, Tucson, AZ
- 2015 – 2016 Lead Psychophysiology Researcher
MediaScience Consumer Neuroscience Research, Austin, TX
- 2014 – 2015 Postdoctoral Research Fellow
Peter Rudebeck Lab
Icahn School of Medicine at Mount Sinai, New York, NY
- 2009 – 2014 Graduate Research Assistant
Katalin Gothard Lab
Department of Neuroscience, The University of Arizona, AZ

5th February, 2021

2009 – 2012 K-12 science outreach instructor
Science Foundation Arizona

2006 – 2009 Undergraduate research assistant
Gothard Lab, Undergraduate Biology Research Program
The University of Arizona, Department of Physiology

HONORS AND AWARDS

2020 Malaniak Award for Excellence in Postdoctoral Research, Cedars-Sinai
2013 Galileo Circle Scholar, The University of Arizona College of Science
2011-2012 K-12 Teaching Fellowship, Science Foundation Arizona
2010 Faculty of 1000 Award for Scientific Poster Presentation
2009 – 2012 National Science Foundation Graduate Research Fellowship
2009 – 2012 Arizona Science Foundation Graduate Research Fellowship
2009 – 2010 Graduate Diversity Fellowship, The University of Arizona
2006 – 2009 Undergraduate Research Fellowship,
Undergraduate Biology Research Program, The University of Arizona
2008 Biomedical Research Abroad: Vistas Open Fellowship
Weizmann Institute, Rehovot, Israel
2004 – 2008 Baird Foundation Scholarship, The University of Arizona
2004 – 2008 President’s Award for Excellence, The University of Arizona
2004 – 2008 Provost Scholarship, The University of Arizona
2004 – 2009 Highest Academic Distinction, The University of Arizona

SERVICE & OUTREACH

2019 – present Letters to Prescientist STEM mentor
2017 – 2018 Information Specialist at Los Angeles LGBT Center
2014 – 2015 New York Cares, Instructor of Computer Course for Senior Citizens
2013 – 2014 Adult literacy and English language tutor at Literacy Connects, Tucson AZ
2012 Neuroscience lecturer at Marana High School
2012 Neuroscience outreach volunteer at the Tucson Festival of Books
2012 Volunteer science instructor at Senita Valley Elementary School
2011 - 2012 The University of Arizona Optics Department Laser Fun Day
2011 Science Foundation Arizona Private Eye 5th grade teacher
2008 Brain Awareness Week, Society for Neuroscience Tucson Chapter

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

2006 – present The Society for Neuroscience
2014 – 2015 New York Academy of Sciences
2012 – 2015 The Society for Social Neuroscience

SCHOLARLY PRESENTATIONS

26 Jan. 2021 Cedars-Sinai Medical Center (*Online*), Malaniak Award for Postdoctoral
Excellence, Los Angeles, CA. “Neurons in the ventral subthalamic nucleus of
the human brain support action cancellation.” (organizer: Odelia Cooper)
13 Nov. 2020 California Institute of Technology (*Online*), Human Single Neuron Meeting,
“Distinct roles of dorsal and ventral subthalamic nucleus in action selection
and action cancellation.” (organizer: Human Single Neuron Committee)
03 Nov. 2020 Cedars-Sinai Medical Center, Neurology and Movement Disorders Seminar,

5th February, 2021

- Los Angeles, CA. "Distinct roles of dorsal and ventral subthalamic nucleus in action selection and cancellation." (organizer: Michele Tagliati)
- 23 August 2019 The University of Michigan, Department of Anesthesiology, Anne Arbor, MI. "Cardiac-related modulation of the extracellular action potential waveform in vivo reveals multiple cell classes in human hippocampus." (organizer: Kamran Diba)
- 06 June 2019 University of California Davis, National Primate Research Center, Davis, CA. "Neurons in the amygdala support social communication among primates." (organizer: Eliza Bliss-Moreau)
- 02 Nov. 2016 Cedars-Sinai Medical Center, Department of Neurosurgery, Los Angeles, CA. "Social communication among primates activates neurons in the amygdala." (organizer: Ueli Rutishauser)
- 25 Feb. 2015 Mount Sinai School of Medicine, Comparative Cognition Group, New York, NY. "Social communication among primates activates neurons in the amygdala." (organizer: Pete Rudebeck)
- 08 April 2014 The University of Arizona, Quantitative Biology Seminar, Tucson, AZ, "Quantifying how the primate brain supports social behavior" (organizer: Joseph Watkins)
- 14 Feb. 2014 The National Institute of Mental Health, Laboratory of Neuropsychology, Bethesda, MA. "Neurons in the monkey amygdala mediate communication with facial expressions." (organizer: David Leopold)
- 26 Nov. 2013 California Institute of Technology, Department of Neurobiology, Pasadena, CA. "Neurons in the monkey amygdala mediate communication with facial expressions." (organizer: Doris Tsao)
- 02 May 2013 The University of Arizona, Department of Physiology, Tucson, AZ. "Single unit activity in the amygdala during the production of facial expressions." (organizer: Ralph Fregosi)
- 13 April 2012 The University of Arizona, Department of Physiology, Tucson, AZ. "The amygdala evaluates and regulates social behavior in monkeys." (organizer: John Allen)
- 19 March 2012 Cognitive Neuroscience Seminar, The University of Arizona, Tucson, AZ. "The amygdala evaluates and regulates social behavior in monkeys." (organizer: Lynn Nadel)
- 16 May 2011 The University of Arizona, Undergraduate Biology Research Program Orientation, Tucson, AZ. "The neural bases of primate emotional and social behavior." (organizer: Carol Bender)
- 25 Jan. 2011 The University of Arizona, Neuroscience Community Datablitz, Tucson, AZ. "Eye movements during movie viewing attests to social perception in monkeys." (organizer: Carol Barnes)
- 25 Oct. 2008 The University of Arizona, Undergraduate Research Abroad Datablitz, Tucson, AZ. "How does the amygdala participate in emotional memory consolidation during sleep?" (organizer: Carol Bender)

TEACHING

- Sept. – Dec. 2015 Introduction to Biostatistics, MPH 0300, Icahn School of Medicine at Mount Sinai, New York
- Aug. – Dec. 2011 Teaching Assistant, MATH 303: Introduction to Statistical Methods, Dr. Joseph Watkins, The University of Arizona. syllabus: <http://math.arizona.edu/~jwatkins/math363f14s.htm>

PUBLICATIONS

Journal publications

1. **Mosher, C.P.**, Mamelak, A.N., Malekmohammadi, M., Pouratian, N.P., Rutishauser, U. (2020). "Distinct roles of dorsal and ventral subthalamic neurons in action selection and cancellation" *Neuron*. doi: [10.1016/j.neuron.2020.12.025](https://doi.org/10.1016/j.neuron.2020.12.025)
2. **Mosher, C.P.**, Wei Y., Kaminski, J., Nandi, A., Mamelak, A., Anastassiou, C.A., Rutishauser U. (2020). "Cellular classes in the human brain revealed in vivo by heartbeat-related modulation of the extracellular action potential waveform." *Cell Reports*, 30(10): 3535-3551. doi: [10.1016/j.celrep.2020.02.027](https://doi.org/10.1016/j.celrep.2020.02.027)
3. Reed, C., **Mosher, C.P.**, Chandravadia, N., Chung, J., Mamelak, A., and Rutishauser, U. (2020). "Extent of single-neuron modulation by hippocampal interictal discharges predicts declarative memory disruption in humans." *The Journal of Neuroscience*. doi: [10.1523/JNEUROSCI.1380-19.2019](https://doi.org/10.1523/JNEUROSCI.1380-19.2019)
4. Morrow, J., **Mosher C.P.**, and Gothard, K.M. (2019). "Multisensory neurons in the primate amygdala." *The Journal of Neuroscience*, 3663-3675. doi: [10.1523/JNEUROSCI.2903-18.2019](https://doi.org/10.1523/JNEUROSCI.2903-18.2019)
5. Kaminski, J., Mamelak, A.N., Birch, K., **Mosher, C.P.**, Tagliati, M., & Rutishauser, U. (2018). "Novelty-sensitive dopaminergic neurons in the human substantia nigra predict success of declarative memory formation." *Current Biology*, 28: 1-11. doi: [10.1016/j.cub.2018.03.024](https://doi.org/10.1016/j.cub.2018.03.024)
6. Gothard, K.M., **Mosher, C.P.**, Zimmerman, P.E., Putnam, P.T., Morrow, J.K., & Fuglevand, A.J. (2018). "New perspectives on the neurophysiology of primate amygdala emerging from the study of naturalistic social behaviors." *Wiley Interdiscip Rev Cogn Sci*, 9: e1449. doi: [10.1002/wcs.1449](https://doi.org/10.1002/wcs.1449)
7. Minxha, J., **Mosher, C.P.**, Morrow, J.K., Mamelak, A.N., Adolphs, R., Gothard, K.M., & Rutishauser, U. (2016). "Fixations gate species-specific responses to free viewing of faces in the human and macaque amygdala." *Cell Reports*, 18: 878-891. doi: [10.1016/j.celrep.2016.12.083](https://doi.org/10.1016/j.celrep.2016.12.083)
8. Ballesta, S., **Mosher, C.P.**, Szep, J., Fischl, K.D., & Gothard, K.M. (2016) "Social determinants of spontaneous eye blinks in adult male macaques." *Scientific Reports*, 6: 38686. doi: [10.1038/srep38686](https://doi.org/10.1038/srep38686)
9. **Mosher, C.P.**, Zimmerman, P.E., Fuglevand, A.J., & Gothard, K.M. (2016). "Tactile stimulation of the face and the production of facial expressions activate neurons in the primate amygdala." *eNeuro*, 3(5): 1-9. doi: [10.1523/ENEURO.0182-16.2016](https://doi.org/10.1523/ENEURO.0182-16.2016)
10. **Mosher, C.P.** & Rudebeck, P.H. (2015). "The amygdala accountant: new tricks for an old structure." *Nature Neuroscience*, 18: 324-325. doi: [10.1038/nn.3949](https://doi.org/10.1038/nn.3949)
11. **Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2014). "Neurons in the monkey amygdala detect eye-contact during naturalistic social interactions." *Current Biology*, 24: 2459-2464. doi: [10.1016/j.cub.2014.08.063](https://doi.org/10.1016/j.cub.2014.08.063)
12. **Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2011). "Videos of conspecifics elicit interactive looking patterns and facial expressions in monkeys." *Behavioral Neuroscience*, 125: 639-652. doi: [10.1037/a0024264](https://doi.org/10.1037/a0024264)
13. **Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2010) "Response characteristics of basolateral and centromedial neurons in the primate amygdala." *J Neurosci*, 30: 16197-207. doi: [10.1523/JNEUROSCI.3225-10.2010](https://doi.org/10.1523/JNEUROSCI.3225-10.2010)
14. Laine, C.M., Spitler, K.S., **Mosher, C.P.**, & Gothard, K.M. (2009) "Behavioral triggers of skin conductance responses and their neural correlates in the primate amygdala." *J Neurophysiol*, 101: 1749-1754. doi: [10.1152/jn.91110.2008](https://doi.org/10.1152/jn.91110.2008)

In preparation:

- Young, M.E., Spencer-Salmon, C., **Mosher, C.P.**, Tamang, S., Rajan, K., Rudebeck, P.H., “Temporally specific sequences of neural activity across interconnected corticolimbic structures during reward anticipation.” *BioRxiv*. doi: <https://doi.org/10.1101/2020.12.17.423162>
- Zheng, J., Schjoten, A.G.P., Yebra, M., **Mosher, C.P.**, Kalia, S., Valiante, T.A., Mamelak, A.N., Kreiman, G., Rutishauser, U. *BioRxiv*. doi: <https://doi.org/10.1101/2021.01.16.426538>
- Perich, M.G., Arlt, C., Soares, S., Young, M.E., **Mosher, C.P.**, Minxha, J., Carter, E., Rutishauser, U., Rudebeck, P.H., Harvey, C.D., Rajan, K. “Inferring brain-wider interactions using data-constrained recurrent neural network models.” *BioRxiv*. doi: <https://doi.org/10.1101/2020.12.18.423348>

Science editorial writing

1. **Mosher, C.P.** (2015). “How to grow stronger without lifting weights.” *Scientific American: Mind Matters*.

Meeting abstracts

- Mosher, C.P.**, Mamelak, A.N., Malekmohammadi, M., Choi, J.W., Pouratian, N., Rutishauser, U. (2020). “Neurons in dorsal and ventral subthalamic nucleus play distinct roles in action selection and cancellation.” Brain Initiative Investigators Meeting (*Online*).
- Mosher, C.P.**, Wei, Y., Kaminski, J., Nandi, A., Mamelak, A.N., Anastassiou, C.A., & Rutishauser, U. (2019). “Cellular classes in the human brain revealed by heartbeat-related modulation of the extracellular action potential waveform.” Allen Institute Showcase. Seattle, WA.
- Mosher, C.P.**, Wei, Y., Kaminski, J., Nandi, A., Mamelak, A.N., Anastassiou, C.A., & Rutishauser, U. (2019). “Cardiac-related modulation of the extracellular action potential in vivo reveals multiple cells classes in the human hippocampus.” The Society for Neuroscience, Neuroscience Meeting Planner, Chicago IL: Society for Neuroscience.
- Mosher, C.P.**, Wei, Y., Kaminski, J., Nandi, A., Mamelak, A.N., Anastassiou, C.A., & Rutishauser, U. (2019). “Cardiac-related modulation of the extracellular action potential in vivo reveals multiple cells classes in the human hippocampus.” The Society for Neuroscience, Neuroscience Meeting Planner, Chicago IL: Society for Neuroscience.
- Pouratian, N., Rutishauser, U., Aron, A., Malekmohammadi, M., Choi, J.W., Andersen, R., Christopoulos, V., **Mosher, C.P.** (2018). “Spectral-spatial separation of motor conflict and stopping in the basal ganglia-cortical circuits.” The BRAIN Initiative Investigators Meeting. Bethesda, MD.
- Young, M.E., Esannason, K.D., Tamang, S., **Mosher, C.P.**, & Rudebeck, P.H. (2017). “Subcallosal anterior cingulate cortex, ventral striatum, and amygdala encode distinct aspects of reward.” The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Stoll, F.M., **Mosher, C.P.**, Tamang, S., Murray, E.A., & Rudebeck, P.H. (2017). “Amygdala input differentially influences prefrontal local field potential and single neuron encoding of reward-based decisions.” The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Morrow, J.K., **Mosher, C.P.**, & Gothard, K.M. (2017). “Tactile stimulation of the face and body elicit neural activity in the monkey amygdala.” The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Zimmerman, P.E., Morrow, J.K., **Mosher, C.P.**, & Gothard, K.M. (2017). “Neurons in the primate amygdala respond to tactile, auditory, and visual stimuli.” The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Tamang, S., **Mosher C.P.**, Rudebeck, P.H. (2016). “Neural correlates of positive affect in subcallosal

- anterior cingulate cortex and amygdala." The Society for Neuroscience, Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Mosher C.P.**, Tamang, S., Murray, E.A., & Rudebeck, P.H. (2015). "Effects of amygdala lesions on local field potentials in the primate prefrontal cortex during a reward-guided task." The Society for Neuroscience, Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience.
- Mosher, C.P.**, Zimmerman, P.E., Gothard, Fuglevand, A.J., & Gothard, K.M. (2013). "Single unit activity in the monkey amygdala during the production of facial expressions." Gordon Research Conference: Amygdala in Health and Disease. Easton, MA.
- Gothard, K.M., Zimmerman, P.E., & **Mosher, C.P.** (2013). "Neurons in the monkey amygdala detect eye-contact during naturalistic social interactions." Gordon Research Conference: Amygdala in Health and Disease. Easton, MA.
- Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2012). "Eye contact, a fundamental building block of social behavior, engages single unit activity in the monkey amygdala." Organization for Computational Neurosciences. Decatur, GA.
- Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2012). "Tactile stimulation of the face activates single units in the monkey amygdala." Organization for Computational Neurosciences. Decatur, GA.
- Zimmerman, P.E., **Mosher, C.P.**, & Gothard, K.M. (2012). "Looking at the eyes engages single unit activity in the primate amygdala during naturalistic social interactions." The Society for Neuroscience, Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience.
- Gothard, K.M., Zimmerman, P.E., & **Mosher, C.P.** (2012). "Single unit activity in the primate amygdala discriminates social stimuli in a complex scene." The Society for Neuroscience, Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience.
- Fuglevand, A.J., Zimmerman, P.E., **Mosher, C.P.**, & Gothard, K.M. (2012). "Single unit activity in the primate amygdala during the production of facial expressions." The Society for Neuroscience, Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience.
- Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2010). "Dissociation of attention and emotion-related neural activity in the nuclei of the primate amygdala." The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Gothard, K.M., Zimmerman, P.E., Stib, M.T., Farshad, K.M., & **Mosher, C.P.** "Gaze following and anticipation of monkeys viewing videos with social content." The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Zimmerman, P.E., **Mosher, C.P.**, Farshad, K.M., Stib, M.T., & Gothard, K.M. "Individual differences in habituation of visual exploration and facial expression reciprocation in monkeys looking at videos with social content." The Society for Neuroscience, Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Mosher, C.P.**, Zimmerman, P.E., & Gothard, K.M. (2008). "State-dependent modulation of neural activity in the monkey amygdala; single unit and EEG activity during social stimulation and sleep." Neuroscience Meeting Planner. Washington DC: Society for Neuroscience.
- Mosher, C.P.**, Brooks, K.N., Spitler, K.M., Zimmerman, P.E., Wilder, T., & Gothard, K.M. (2006). "Enhanced skin conductance responses elicited by facial expressions with averted gaze in Rhesus macaques." Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience.

Non-scientific publications:

- Mosher, C.P.** (2008). "Ammachi." *Persona Magazine of Art and Literature: Celebrating 30 Years of Excellence*. Sacha Meschkow (Editor), 30: 72-78.

OPEN-SOURCE RESOURCES

GitHub (@cpmosh)

Cell Classifier: A tool for classifying neuron types based on the extracellular action potential waveform (related to *Mosher et al., 2020*), <https://github.com/rutishauserlab/cellclassifier>

Open Science Framework OSF

Data for: Distinct roles of dorsal and ventral subthalamic neurons in action selection and cancellation (related to *Mosher et al., 2021*), <https://osf.io/jd5uc/>

ADVISORS and COLLABORATORS

Ueli Rutishauser, Caltech and Cedars-Sinai Medical Center, Los Angeles, CA

Adam Mamelak, Cedars-Sinai Medical Center, Los Angeles, CA

Chrystal Reed, Cedars-Sinai Medical Center, Los Angeles, CA

Nader Pouratian, The University of California Los Angeles, CA

Peter Rudebeck, Mount Sinai Hospital, New York, NY

Costas Anastassiou, The Allen Institute for Brain Science, Seattle, WA

Katalin Gothard, The University of Arizona, Tucson, AZ

Andrew Fuglevand, The University of Arizona, Tucson, AZ

MENTORING

Programs

Mahider Gessesse, California Institute of Technology, Los Angeles, CA
SURF Program mentor (2020)

As a senior lab member

Sarita Tamang, Mt. Sinai Hospital, New York, NY

Jeremiah K. Morrow, The University of Arizona, AZ

Michelle Mangana-Mendoza, The University of Arizona, AZ

Kayven Farshad, The University of Arizona, Tucson, AZ

Miranda Andersen, The University of Arizona, Tucson, AZ

Susma Ghimere, The University of Arizona, Tucson, AZ

Gabby Lacy, The University of Arizona, Tucson, AZ

RELATED SKILLS

Certifications

Facial Action Coding System, Certified by Paul Ekman Group

Graduate Certificate in Statistics

Software Proficiencies

MatLab, Psychtoolbox, Qualtrics, Neurobehavioral Systems Presentation, MonkeyLogic, iMotions, CED Spike 2, Plexon, AlphaOmega Neuro Omega, Neuralynx, CorelDraw, Adobe Illustrator, Adobe Premiere, Microsoft Office

Hardware Proficiencies

5th February, 2021

EyeTracking (ISCAN, Arrington), Acute Single Unit Recording (Thomas Eckhorn Drive, NAN), Data Acquisition (CED 1401, Neuralynx), Skin Conductance (PsychLab, BioPac, Shimmer, CED Skin Conductance Unit), EKG Photoplethysmography and Electromyography (Grass Amplifier, BioPac), Local Field Potential (Neuralynx)

Languages: Spanish (intermediate-advanced)