

Steve Wohn Chul Chang

Yale University
Department of Psychology
Department of Neuroscience
Wu Tsai Institute
Kavli Institute for Neuroscience
Cognitive Science; Child Study Center
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Positions

Associate Professor of Psychology and of Neuroscience (tenured), 7/2022–
Co-Director of Undergraduate Studies (co-DUS) for the Neuroscience Major (NSCI), 7/2021–present
Department of Psychology (primary)
Department of Neuroscience
Wu Tsai Institute
Kavli Institute for Neuroscience
Cognitive Science; Child Study Center
Yale University

Interim Director of Graduate Studies (DGS), Department of Psychology, 1/2023–5/2023
Associate Professor of Psychology and of Neuroscience (on term), 7/2020–6/2022
Assistant Professor of Psychology and Neuroscience, 7/2014–6/2020
Yale University

Vernon B. Mountcastle Distinguished Fellow, 2014–present
Curator-in-Chief of the John F. Fulton Collection
Olschefskie Institute for the Neurobiology of Knowledge

Post-Doctoral Associate, 9/2009–6/2014
Duke University
Advisor: Dr. Michael L. Platt

Post-Doctoral Associate (*in transition*); 5/2009–7/2009
Washington University in St. Louis School of Medicine
Advisor: Dr. Lawrence H. Snyder

Education

Ph.D., Neurosciences, 8/2003–5/2009
Washington University in Saint Louis
Thesis Advisor: Dr. Lawrence H. Snyder
Thesis: Sensorimotor Transformation in the Macaque Parietal Reach Region (Defense: March, 2009)
Committee: Lawrence Snyder, Dora Angelaki, Timothy Holy, Thomas Thach, Kurt Thoroughman, Ralf Wessel, and Steven P. Wise

A.B., Psychology, *magna cum laude*, 8/1999–5/2003
Washington University in St. Louis

Awards & Honors

- Best Poster Award (animal research category) from the lab (Society for Social Neuroscience), 2021
- **SFARI Investigator** (Simons Foundation Autism Research Initiative), 2022–2024
- Research paper from the lab (Dal Monte et al., 2020, Nat. Neurosci.) chosen for the **2021 SANS Innovation Award** from the Social and Affective Neuroscience Society (awarded to the first author, Dr. Dal Monte)
- Secretary-Treasurer, the Society for Social Neuroscience (S4SN), 2021–
- **Elected to the Board of Governors, the Society for Social Neuroscience (S4SN)**, 2019–
- ‘Outstanding Reviewer’, the Journal of Neuroscience, the Society for Neuroscience, 2018
- **Kavli Institute for Neuroscience Member**, Yale University School of Medicine, 2017–
- **Kavli Institute for Neuroscience Steering Committee Member**, Yale University School of Medicine, 2017–2021
- NIMH Travel Award to attend the NIMH BRAINS award ceremony at the Society for Neuroscience Meeting, 2017
- **Early Career Award**, Society for Social Neuroscience (S4SN), 2016
- **Kavli / National Academy of Sciences, Frontiers of Science Fellow**, 2016
- **NIMH Biobehavioral Research Award for Innovative New Scientists (BRAINS)**, 2016–2021
- Junior Faculty Fellowship, Yale University, Fall 2016 & Spring 2017
- Theresa Seessel Endowed Fellowship, Yale University, 2015–2016
- **SFARI Investigator** (Simons Foundation Autism Research Initiative), 2015–2016
- Best Poster Award from the lab (Society for Social Neuroscience), 2015
- Best Poster Award from the lab (Gordon Research Conference – Amygdala), 2015
- **Alfred P. Sloan Research Fellow in Neuroscience**, 2015–2017
- Theresa Seessel Endowed Fellowship, Yale University, 2014–2015
- Faculty Fellowship, Jonathan Edwards College at Yale, 2014–present
- **K99/R00 Pathway to Independence Award** (NIH/NIMH), 2012–2017
- **Society for Neuroscience Nanosymposium abstract selected for SfN pool of newsworthy research**, 2012
- NIH T32 Postdoctoral Training Grant in Fundamental & Translational Neuroscience, 2011–2012
- **Ruth K. Broad Biomedical Research Foundation Postdoctoral Fellowship**, 2010–2011
- **Kauffman Life Science Entrepreneur Fellowship**, 2006
- **Lucille P. Markey Pathway Fellowship** in Human Pathobiology, 2004–2006
- **John A. Stern Undergraduate Research Award** (Washington University in St. Louis), 2003
- **HHMI Undergraduate Research Fellow** (HHMI & Washington University Dept. of Biology), 2002

Papers

Putnam PT, Chang SWC (*in press*) Oxytocin does not stand alone. ***Philosophical Transactions Royal Society London B Biological Sciences***, DOI 10.1098/rstb.2021.0047. (Introduction to the *Theme issue*, S. Chang, P. Putnam (Eds.): *Interplays between oxytocin and other neuromodulators in shaping complex social behaviours*).

Putnam PT, Chang SWC (*in press*) Interplay between the oxytocin and opioid systems in regulating social behavior. ***Philosophical Transactions Royal Society London B Biological Sciences***. (*Theme issue*, S. Chang, P. Putnam (Eds.): *Interplays between oxytocin and other neuromodulators in shaping complex social behaviours*).

Dal Monte O*, Fan S*, Fagan NA, Chu CJC, Zhou MB, Putnam PT, Nair AR, **Chang SWC** (2022) Widespread implementations of interactive social gaze neurons in the primate prefrontal-amygdala networks. ***Neuron***, doi.org/10.1016/j.neuron.2022.04.013. (*, co-first authors)

Meisner O, Nair A, **Chang SWC** (*in press*) Amygdala connectivity and implications for social cognition and disorders. Chapter in ***The Temporal Lobe***, Eds. Miceli, Bartolomeo, and Navarro (Elsevier), 187.

Nair AR, **Chang SWC** (2022) Social neuroscience: Staying bonded over oxytocin and endocannabinoids. *Current Biology*, 32, PR228-231.

Chin R, **Chang SWC**, Holmes AJ (2022) Beyond cortex: the evolution of the human brain. *Psychological Review*, doi.org/10.1037/rev0000361.

Weinberg-Wolf H, Fagan A, Dal Monte O, **Chang SWC** (2022) Increasing central serotonin with 5-HTP disrupts the inhibition of social gaze in non-human primates. *Journal of Neuroscience*, 42, 670-681.

Zoh Y, **Chang SWC***, Crockett MJ* (2021) The prefrontal cortex and (uniquely) human cooperation: a comparative perspective. *Neuropsychopharmacology*, 47, 119-133. (*, co-senior authors)

Fan S, Dal Monte O, **Chang SWC** (2021) Levels of naturalism in social neuroscience research. *iScience*, 24, 102702.

Basile BM*, Joiner JA*, Dal Monte O, Karaskiewicz CL, Lucas DR, **Chang SWC****, Murray EA** (2021) Autonomic arousal tracks outcome salience not valence in monkeys making social decisions. *Behavioral Neuroscience*, 135, 443-452. (*, co-first authors) (**, co-senior authors)

Putnam PT and **Chang SWC** (2021) Toward a holistic view of value and social processing in the amygdala: Insights from primate behavioral neurophysiology. *Behavioural Brain Research*, 411, 113356.

Ben-Haim MS, Dal Monte O, Fagan NA, Dunham Y, Hassin RR*, **Chang SWC***, Santos LR* (2021) Disentangling conscious awareness from non-conscious perception in rhesus monkeys (*Macaca mulatta*). *PNAS* 118, e2017543118. (*, co-senior authors)

- Editors' Choice: Vignieri S (2021) Evolutionary Cognition—I know what I saw. *Science*, 372, 251.
- Dispatch: Hampton RR (2021) Animal consciousness: Should a new behavioral correlate in monkeys persuade agnostics? *Current Biology*, 31, PR801-R803.
- Outlook: Crump A and Birch J (2021) Separating conscious and unconscious perception in animals. *Learning & Behavior*, 49, 347–348.

Putnam PT and **Chang SWC** (2021) Social processing by the primate medial frontal cortex. Chapter in *What does Medial Frontal Cortex Signal during Behavior? Insights from Behavioral Neurophysiology*, Eds. M. Roesch, L. Amarante, M. Laubach & A. Brockett. *International Review of Neurobiology*, 158, 213-248.

Gangopadhyay P*, Chawla M*, Dal Monte O, **Chang SWC** (2021) Prefrontal-amygdala circuits in social decision-making. *Nature Neuroscience*, 24, 5-18. (*, co-first authors)

Lockwood PL, Apps MAJ*, **Chang SWC*** (2020) Is there a 'social brain'? Algorithms and implementations. *Trends in Cognitive Science*, 24, 802-813. (*, equal contributions)

- **Selected among 'Best of Trends' 2020**

Basile BM, Schafroth JL, Karaskiewicz CL, **Chang SWC**, Murray EA (2020) The anterior cingulate cortex is necessary for forming prosocial preferences from vicarious reinforcement in monkeys. *PLoS Biology*, 18, e3000677.

- Primer: Lockwood PL, O'Neill KC, and Apps MAJ (2020) Anterior cingulate cortex: A brain system necessary for learning to reward others? *PLoS Biology*, 18, e3000677

Dal Monte O, Chu CJC, Fagan NA, **Chang SWC** (2020) Specialized medial prefrontal-amygdala coordination in other-regarding decision preference. *Nature Neuroscience*, 23, 565–574.

- **Winner of the 2021 SANS Innovation Award from the Social & Affective Neuroscience Society**

- Gollwitzer A, Martel C, Bargh JA, **Chang SWC** (2020). Aversion towards simple broken patterns predicts moral judgment. *Personality and Individual Differences*. 160, 109810.
- Fan S*, Weinberg-Wolf H*, Piva M, Dal Monte O, **Chang SWC** (2020) Combinatorial oxytocin neuropharmacology in social cognition. *Trends in Cognitive Science*, 24, 8–12. (*, co-first authors).
- Piva M, Velnoskey K, Jia R, Nair A, Levy I, **Chang SWC** (2019) The dorsomedial prefrontal cortex computes task-invariant relative subjective value for self and other. *eLife*, 8, e44939.
- Weinberg-Wolf H and **Chang SWC** (2019) Differences in how macaques monitor others: does serotonin play a central role? *WIREs Cognitive Science*, 10, wcs.1494.
- Stanton CH, Holmes AJ, **Chang SWC**, Joorman J (2018) From stress to anhedonia: molecular processes through functional circuits. *Trends in Neuroscience*, 42, 23-42.
- Dal Monte O, Fan S, **Chang SWC** (2018) Social subjective value in the primate midbrain. *Nature Neuroscience*, 21, 1298–1299.
- Chang SWC** and Dal Monte O (2018) Shining light on social learning circuits. *Trends in Cognitive Science*, 22, 673–675.
- Weinberg-Wolf H, Fagan NA, Anderson GM, Tringides M, Dal Monte O and **Chang SWC** (2018) The effects of 5-hydroxytryptophan on attention and central serotonin neurochemistry in the rhesus macaque. *Neuropsychopharmacology*, 43, 1589–1598.
- Piva M and **Chang SWC** (2018) An integrated framework for the role of oxytocin in multistage social decision-making. *American Journal of Primatology*, 80, e22735.
- Selected as Top 20 Most-Read/Downloaded Paper in the journal in 2017–2018
- Piva M, Zhang X, Noah A, **Chang SWC**, Hirsch J (2017) Distributed neural activity patterns during human-to-human competition. *Frontiers in Human Neuroscience*, 11, Article, 571.
- Barack DL, **Chang SWC**, Platt ML (2017) Posterior cingulate neurons dynamically signal decisions to disengage during foraging. *Neuron*, 96, 339–347.
- Chang SWC** (2017) An emerging field of primate social neurophysiology: Current developments. *eNeuro*, 4, 0295-17.2017.
- Turrin C, Fagan NA, Dal Monte O, **Chang SWC** (2017) Social resource foraging is guided by the principles of the Marginal Value Theorem. *Scientific Reports*, 7, 11274.
- Joiner JA, Piva M, Turrin C, **Chang SWC** (2017) Social learning through prediction error in the brain. *NPJ Science of Learning*, 2, article 8.
- Dal Monte O*, Piva M*, Anderson KM, Tringides M, Holmes AJ, **Chang SWC** (2017) Oxytocin under opioid antagonism leads to supralinear enhancement of social attention. *Proceedings of National Academy of Sciences*, 114, 5247–5252. (*, co-first authors).
- Dal Monte O*, Piva M*, Morris JA, **Chang SWC** (2016) Live interaction distinctively shapes social gaze dynamics in rhesus macaques. *Journal of Neurophysiology*, 116, 1626–1643. (*, co-first authors).
- Ebner NC, Bailey PE, Horta M, Joiner JA, and **Chang SWC** (2016) Multidisciplinary perspective on prosociality in aging. *Chapter in Social Cognition: Development Across the Life Span*, Eds. Sommerville and Decety (Psychology Press | Taylor and Francis Group).

Apps MAJ, Rushworth MFS, **Chang SWC** (2016) The anterior cingulate gyrus and social cognition: tracking the motivation of others. *Neuron*, 90, 692–707.

Chang SWC, Calton JL, Lawrence BM, Dickinson AR, Snyder LH (2016) Region-specific summation patterns inform the role of cortical areas in selecting motor plans. *Cerebral Cortex*, 26, 2154–2166.

Chang SWC, Fagan NA, Toda K, Utevsky AV, Pearson, JM, Platt ML (2015) Neural mechanisms of social decision-making in the primate amygdala. *Proceedings of National Academy of Sciences*, 112, 16012–16017.

Du E and **Chang SWC** (2015) Neural components of altruistic punishment. *Frontiers in Neuroscience*, 9, Article 26.

Chang SWC and Platt ML (2014) Amygdala: Eyes Wide Open. *Current Biology*, 24, R1000–10002.

Chang SWC and Isoda M (2014) Toward a better understanding of social learning, social deciding, and other-regarding preferences. *Frontiers in Neuroscience* (editorial to Research Topic), 8:362.

Pedersen CA, **Chang SWC** and Williams CL (2014) Evolutionary perspectives on the role of oxytocin in human social behavior, social cognition and psychopathology. *Brain Research (Special Issue: Oxytocin and Social Behavior)*, 1580, 1–7.

Chang SWC and Platt ML (2014) Oxytocin and social cognition in rhesus macaques: Implications for understanding and treating human psychopathology. *Brain Research (Special Issue: Oxytocin and Social Behavior)*, 1580, 57–68.

Brent LJN, **Chang SWC**, Gariépy JF, and Platt ML (2014) The neuroethology of friendship. *Annals of the New York Academy of Sciences, The Year in Cognitive Neuroscience*, 1316, 1–17.

Chang SWC (2013) Coordinate transformation approach to social interactions. *Frontiers in Neuroscience*, 7, Article 147.

Gariépy JF, **Chang SWC** and Platt ML (2013) Brain games: Toward a neuroecology of social behavior. *Behavioral Brain Science (Invited commentary)*, 36, 424–5.

Chang SWC, Brent LJN, Adams GK, Klein JT, Pearson JM, Watson KK, and Platt ML (2013) Neuroethology of primate social behavior. *Proceedings of National Academy of Sciences*, 110, 10387–10394.

Chang SWC, Gariépy JF and Platt ML (2013) Neuronal reference frames for social decisions in primate frontal cortex. *Nature Neuroscience*, 16, 243–250.

Chang SWC, Barack DL and Platt ML (2012) Mechanistic classification of neural circuit dysfunctions: Insights from neuroeconomics research in animals. *Biological Psychiatry*, 72, 101–106.

Chang SWC and Snyder LH (2012) The representations of reach endpoints in posterior parietal cortex depend on which hand does the reaching. *Journal of Neurophysiology*, 107, 2352–2365.

Chang SWC, Barter JW, Ebitz RB, Watson KK and Platt ML (2012) Inhaled oxytocin amplifies both vicarious reinforcement and self reinforcement in rhesus macaques (*Macaca mulatta*). *Proceedings of National Academy of Sciences*, 109, 959–964.

- Featured highlight: by Katherine Whalley (2012) Social neuroscience: Oxytocin boosts social awareness. *Nature Reviews Neuroscience*, 13, 72.

Chang SWC, Winecoff AA, and Platt ML (2011) Vicarious reinforcement in rhesus macaques (*Macaca mulatta*). **Frontiers in Neuroscience**, 5, Article 27.

Chang SWC and Snyder LH (2010) Idiosyncratic and systematic aspects of spatial representations in the macaque parietal cortex. **Proceedings of National Academy of Sciences**, 107, 7951–7956.

Churchland MM, Yu BM, Cunningham JP, Sugrue LP, Cohen MR, Corrado GS, Newsome WT, Clark AM, Hosseini P, Scott BB, Bradley DC, Smith MA, Kohn A, Movshon JA, Armstrong KM, Moore T, **Chang SWC**, Snyder LH, Lisberger SG, Priebe NJ, Finn IM, Ferster D, Ryu, SI, Santhanam G, Sahani M, and Shenoy KV (2010) Stimulus onset quenches neural variability: a widespread cortical phenomenon. **Nature Neuroscience**, 13, 369–378.

Chang SWC, Papadimitriou C, and Snyder LH (2009) Using a compound gain field to compute a reach plan. **Neuron**, 64, 744–755.

- Preview: Blohm G and Crawford JD (2009) Fields of gain in the brain. **Neuron**, 64:598–600.

Chang SWC, Dickinson AR and Snyder LH (2008) Limb-specific representations of reaching in the posterior parietal cortex. **Journal of Neuroscience**, 28, 6128–6140.

Chang SWC and Abrams RA (2004) Hand movements deviate toward distracters in the absence of response competition. **Journal of General Psychology: Special Issue on Movement, Attention, and Perception**, 131, 328–344.

Preprint / Under Review

Fortier AV*, Meisner OC*, Nair AR, **Chang SWC** (*in revision*) Prefrontal circuits guiding social preference: Implications in Autism Spectrum Disorder (*, co-first authors)

Graves KN*, Rubien-Thomas E*, Streete DA, **Chang SWC** (2021) Knowledge is em(power)ing: Historically underrepresented groups benefit from exposure to information about advanced degrees in psychology. **PsyArXiv**, doi.org/10.31234/osf.io/mqdw9. (*, co-first authors)

Research Support

Ongoing

Simons Foundation Autism Research Initiative (SFARI)
875855

Role: PIs (Chang, Nandy, Jodi)
2/1/2022–1/31/2024

Enhancing Reciprocal Cooperation through Prefrontal Microstimulation

The goal of this project is to determine the fundamental dependencies of neural activity in the prefrontal cortex to mutual and altruistic cooperation and to directly test if and how we can promote or suppress reciprocal cooperation by way of distinct microstimulation protocols. The overarching goal is to determine the effects of causal brain stimulation with precise, naturalistic, behavioral data in order to facilitate future translational efforts in leveraging brain stimulations to promote reciprocal social interactions in individuals with ASD.

NIH/NIMH
Role: PIs (Chang, Nandy, Jodi)

R21 MH126072
2/1/2022–1/31/2024

Neural Investigations into Cooperative Social Interactions in Marmoset Dyads

The goal of this proposal is to study the behavioral and neural bases of cooperation using innovative experimental approaches in freely moving marmosets by capitalizing on the behavioral ethology of marmosets.

Yale Wu Tsai Institute
Role: PIs (Chang, Nandy, Jadi)
Postdoctoral Fellowship slot awarded to PIs
6/1/2022–5/31/2025

Toward the Neural Bases of Cooperative Social Interactions

The goal of this proposal is to support a newly hired Wu Tsai Institute postdoctoral fellow who will perform integrative research to determine the neuronal correlates of mutual and altruistic cooperation in the prefrontal cortex of marmosets combined with the state-of-the-art behavioral tracking, electrophysiology, and computational modeling.

NIH/NIMH
Role: PI
R01 MH120081
8/14/2019–5/31/2024

Behavioral and Neural Bases of Combining Oxytocin and Naloxone for Optimally Enhancing Interactive Social Attention

The goal of this proposal is to determine a set of optimal doses for this combinatorial intervention and investigate how it leads to a greater enhancement of social processing in key brain regions using a non-human primate model of live social gaze interaction.

Completed

NIH/NIMH
Role: PI
R01 MH110750
7/01/2016–12/31/2021

Toward A Macaque Model of Social Brain Dysfunction in Real-Life Social Interactions

The goal of this project is to capitalize on the neuronal coordination between the anterior cingulate cortex and the basolateral amygdala to causally induce social dysfunction in macaque models of social behavior.

Kavli Foundation
Innovative Research Award
Role: PIs, Nandy, Jadi, Chang
4/01/2019–6/30/2020

A Paradigm Shift in the Study of Complex Social Cognition

The goal of this project is to develop novel methods and use those new approaches to understand behavioral and neural bases of complex and dynamic social interactions in groups of marmoset monkeys.

NIH/NIMH R00 Pathway to Independence
Role: PI
R00 MH099093
8/1/2014–12/31/2017

Role of Oxytocin in the Amygdala-Prefrontal Network during Social Decision-Making

The goal of this project is to investigate the mechanisms underlying oxytocin-mediated neural processing across amygdala and prefrontal neurons in social decision-making.

Alfred P. Sloan Fellowship in Neuroscience
Role: PI
FG-2015-66028
9/15/2015–9/14/2017

Not specific to any project.

NIH/NIMH

Role: PI

R21 MH107853

9/25/2015–7/31/2017

Neural Mechanisms of Reward-Guided Reciprocity

The goal of this project is to develop a turn-taking dictator game in rhesus monkeys in order to investigate neuronal signatures of reciprocity in the anterior cingulate cortex (ACC).

Simons Foundation

Role: Co-I, PI: Platt

304935

9/1/2014–8/31/2017

Safety, Efficacy, and Basis of Oxytocin and Brain Stimulation Therapy in ASD

The goal of this project is to determine the effectiveness, safety, and basis of both transcranial magnetic stimulation (TMS) and inhaled OT to improve social function in rhesus macaques.

Theresa Seessel Fund

Role: PI

12/1/2015–11/30/2016

Yale University's Endowed Fellowship for supporting a postdoctoral fellow. Not specific to any project.

Simons Foundation (SFARI)

Role: PI

365029

6/1/2015–5/31/2016

Optimizing Social Effects of Oxytocin with Opioid Blocker

The goal of this project is to explore whether concurrently enhancing oxytocin and attenuating opioids, using opioid blocker, would significantly boost prosocial behaviors compared to delivering either chemical alone.

Theresa Seessel Fund

Role: PI

11/1/2014–10/31/2015

Yale University's Endowed Fellowship for supporting a postdoctoral fellow. Not specific to any project.

NIH/NIA R24

Research Network on Decision Neuroscience and Aging (SRNDNA)

Role: PI

R24 AG039350

9/1/2014–2/28/2015

The Role of Oxytocin in Prosocial Decision Making in Aging across Humans and Monkeys

The goal of this project is to investigate how the neuropeptide oxytocin modulates prosocial behaviors in aging, comparatively across both rhesus macaques and humans.

NIH/NIMH K99 Pathway to Independence

Role: PI

K99 MH099093

9/1/2012–6/30/2014

Role of Oxytocin in the Amygdala-Prefrontal Network during Social Decision-Making

The goal of this project is to undergo extensive training in neuroendocrinology, and study the mechanisms underlying oxytocin-mediated neural processing across amygdala and prefrontal neurons in social decision-making.

Department of Defense (Army)

**PI: Platt, Role: Key Postdoc
W81XWH-11-1-0584
7/1/2011–6/30/2014**

Neural Basis of Empathy and Its Dysfunction in Autism Spectrum Disorders (ASD)

Autism Research Program Idea Development Award

The goal of this project is to determine the role of orbitofrontal cortex in vicarious experience.

**NIH/NIMH
PI: Platt, Role: Key Postdoc
R01 MH095894
2/21/2012–6/30/2014**

Neuronal Basis of Vicarious Reinforcement Dysfunction in Autism Spectrum Disorder

The goal of this project is to understand the role of prefrontal cortex in mediating vicarious reinforcement during social reward allocation decisions.

**Duke Department of Neurobiology
Role: Awarded Fellow
NIH/NINDS T32 NS051156
6/1/2011–5/31/2012**

Neural Basis of Other-Regarding Preference

Postdoctoral Training Award in Fundamental & Translational Neuroscience

The goal of this project is to understand the role of anterior cingulate cortex and orbitofrontal cortex during social reward allocation decisions.

**Ruth K. Broad Biomedical Research Foundation
Role: Awarded Fellow
6/1/2010–5/31/2011**

Neural Basis of Empathy and its Dysfunction in Neuropsychiatric Disorders

The goal of this project is to develop a nonhuman primate model of social decision-making and collect pilot behavioral and neurophysiological data.

Sponsor Role

**NSF GRFP
(Role: Mentor; Fellow: Olivia Meisner)
9/01/2021–8/31/2024**

Understanding the Neural Mechanisms of Cooperation through Innovations

The goal of this fellowship is to support Olivia Meisner to successfully carry out her Ph.D. project and to develop her professional career as a young neuroscience investigator.

**NSERC PGSD
(Role: Mentor; Fellow: Matthew Piva)
NSERC PGSD3-471313-2015
9/01/2015–8/31/2018**

Neural Mechanisms of Reward-Guided Reciprocity in Rhesus Macaques

The goal of this fellowship is to support Matthew Piva to successfully carry out his Ph.D. project and to develop his professional career as a young neuroscience investigator.

**Yale
(Role: Mentor; Fellow: Mackenzie Smith)
Science, Technology & Research Scholars (STARS) Program
6/1/2016–8/1/2016**

Yale
(Role: Mentor; Fellow: Jason Morris)
Timothy Dwight Richter Fellowship for Undergraduate Research
6/1/2015–8/1/2015

Patent

Chang, SWC, Dal Monte O, and Piva M. Oxytocin and Opioid Antagonists for Treatment of Social Dysfunction Disorders. The U.S. Patent and Trademark Office, U.S. Patent No. 11160843, Application No. 16/398,744, Issued 11/02/2021.

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Invited Talks

“Reference frames for social decision outcomes by primate frontal cortex”
National Institute of Mental Health, 9/17/2012

“Social decision-making in monkeys: from other-regarding preferences to oxytocin to neuronal encoding by the frontal cortex”
University of Wisconsin Madison, Dept of Psychology, 12/03/2012

“Social decision-making in monkeys: from other-regarding preferences to oxytocin to neuronal encoding by the frontal cortex”
Yale University, Dept of Psychology, 1/16/2013

“Social decision-making in monkeys: from other-regarding preferences to oxytocin to neuronal encoding by the frontal cortex”
Oregon National Primate Center, Division of Neuroscience, 02/04/2013

“Social decision-making in monkeys: from other-regarding preferences to oxytocin to neuronal encoding by the frontal cortex”
University of Massachusetts Amherst, Dept of Psychology, 02/14/2013

“Making social decisions: Tales from the primate amygdala”
Yale University, Current Work in Behavior, Genetics, and Neuroscience, 03/28/2014

“Focal infusion of oxytocin in the primate amygdala promotes prosocial behavior”
SRNDNA workshop on advancing cross-species collaborations focused on decision making & aging, 05/26/2014

“Neurobiology of primate prosocial behavior”
Yale NeuroDay, Yale University, 8/15/2014

“Neurobiology of primate prosocial behavior”
Yale University, Dept. of Neurobiology Seminar, 8/28/2014

“Monkey see, monkey donate: neurobiology of primate prosocial behavior”
Yale University, Biological Anthropology Colloquium, 12/4/2014

“Neurobiology of primate prosocial behavior”
Columbia University, University Seminar on Cognitive and Behavioral Neuroscience, 09/18/2014

“Studying primate prosocial behaviors in individual neurons”
University of Rhode Island, Neuroscience Program Colloquium, 11/03/2014

“Neurobiology of reward processing across self and other”
Yale University Biological Sciences Training Program, 03/30/2015

“Using oxytocin in rhesus macaques to improve complex social cognition”
NIH workshop: Oxytocin in Intellectual and Developmental Disabilities (IDD): Research Gaps and Opportunities, 04/21/2015

“Neurobiological mechanisms of primate prosocial behavior”
Emory University, The Mechanisms of Learning Forum, 04/24/2015 (student-invited)

“Using live social interactions to study neural mechanisms of prosocial behavior in monkeys”
Dartmouth College, Social Brain Sciences Talk Series, 05/14/2015

“Studying the social brain using dyadic interactions in monkeys”
University College London, Online talk series”, 06/11/2015

[Travel Cancelled] TBD
RIKEN Brain Science Institute, Japan, 7/22

[Travel Cancelled] TBD
Osaka University, Japan, 7/24

“Value-mirroring by the primate amygdala neurons in social decisions”
Gordon Research Conference: Amygdala in Health and Disease, Easton, MA, 08/04/2015

“Neurobiology of primate social interactions”
Bard College, 12/03/2015

“Value processing and gaze dynamics during social interactions”
National Institute of Mental Health, 3/25/2016

“Context-dependent social gaze dynamics between pairs of rhesus macaques”
University of Rochester Center for Visual Science (CVS) Symposium, “Future of Attention”, 06/04/2016

“Live Interaction distinctively shapes primate social gaze dynamics (and their pharmacology)”
International Congress of Psychology, “The Value of Eye-to-Eye Contact in Studying the Social Brain”.
Yokohama, Japan, 07/27/2016 (Talk instead given by postdoc, Dr. Olga Dal Monte)

Chair’s introductory talk on the session “Social Decision Making / Behavioral Economics”
6th Indonesian-American Kavli Frontiers of Science symposium (US National Academy of Sciences plus Indonesian Academy of Sciences), Malang, Indonesia, 08/04/2016

“Supralinear enhancements of social gaze dynamics with oxytocin under opioid antagonism”
University of Connecticut, Behavioral Neuroscience Seminar, 10/27/2016

“Supralinear modulating social gaze dynamics with oxytocin under opioid antagonism”
Society for Social Neuroscience (S4SN) Early Career Award Talk, 11/11/2016

“Neuronal synchrony between the anterior cingulate cortex and the amygdala in prosocial decision-making”
Society for Neuroscience Symposium talk - Neural basis of social rewards and group decisions: from scanners to real-world, 11/16/2016

- “Oxytocin under opioid antagonism leads to supralinear enhancement of social attention”
Mount Sinai Icahn School of Medicine, Friedman Brain Institute, 2/22/2017
- “Oxytocin and opioid modulation of social attention in rhesus macaques”
Yale Biological Anthropology Neuroendocrinology Seminar, 3/28/2017
- “Neuronal coupling between the anterior cingulate cortex and the amygdala reflects social decision outcomes”
Social and Affective Neuroscience Society (SANS) meeting; Anchor talk, Los Angeles, CA, 3/2017
- “Optimizing social effects of oxytocin with opioid antagonists”
Simons Foundation Autism Research Initiative (SFARI) meeting, New York, NY, 4/3/2017
- “Neuronal coupling between the anterior cingulate cortex and the amygdala underlies social behavior”
Yale Department of Neuroscience Annual Retreat, Jiminy Peak, MA, 4/29/2017
- “Establishing neural principles of dynamic and interactive social behaviors”
Cognitive Neuroscience Society (CNS) 2018, Symposium: *Opportunities and Challenges for the Next 25 Years of Cognitive Neuroscience*, Boston, MA, 3/25/2018
- “Coordination between the primate prefrontal cortex and amygdala during real-life social interactions”
Columbia University, Department of Psychiatry, NY Psychiatric Institute, 4/18/2018
- “Oxytocin in the primate amygdala: its impacts on social decisions and neural synchrony”
Yale Child Study Center, Research in Progress Series, 5/7/2018
- “Coupling between the anterior cingulate cortex and the amygdala in primate social cognition”
Johns Hopkins University, Bodian Seminar, Krieger Mind/Brain Institute, 5/14/2018
- “Monkeys thinking about other monkeys: a neurobiological perspective”
At the summer course on “The Other-Minds Problem: Animal Sentience and Cognition”
Cognitive Sciences Institute, Université du Québec à Montréal, Montréal, Québec, Canada, 7/6/2018
- “Coupling between the anterior cingulate cortex and the amygdala in primate social cognition”
6th Workshop on the Computational Properties of Prefrontal Cortex (CPPP), Vanderbilt University, 10/12/2018
- “The coordinated interplay between prefrontal areas and amygdala in social gaze dynamics and decision-making”
German Primate Center (Deutsches Primatenzentrum) Colloquium talk, Goettingen, Germany, 3/21/2019
- “The coordinated interplay between prefrontal areas and amygdala in social gaze dynamics and decision-making”
German Neuroscience Society Meeting, Symposium: Neural mechanisms of social decision-making, Goettingen, Germany, 3/22/2019
- “Neurobiological principles underlying social decision in the primate brain”
2018 Kavli Summer Institute in Cognitive Neuroscience. “Computational Social Neuroscience”
At University of California Santa Barbara, Santa Barbara, CA, 07/01/2019 – 07/05/2019
- “Specialized amygdala-medial prefrontal coordination in social decision-making and social gaze interaction”
Gordon Research Conference: Amygdala Function in Emotion, Cognition and Disease. At Stonehill College, Easton, MA, 08/04/2019 – 08/09/2019

“Investigating prefrontal and amygdalar mechanisms underlying real-life social behaviors in the primate brain”

NYU Leon Levy Symposium, NYU Neuroscience Institute / NYU Langone, *Neural and behavioral responses to naturalistic stimuli*.
NY, New York, 08/15/2019

“Neural mechanisms of spontaneous social gaze interactions in the amygdala and prefrontal cortex”
Meeting of the European Brain Behavior Society (EBBS), *New perspectives on amygdala function across species*.

Prague, Czech Republic, 09/21/2019 – 09/24/2019 (Talk instead given by postdoc, Dr. Olga Dal Monte)

“Prefrontal and amygdalar mechanisms of primate social cognition”

S4SN Awardees: Where Are They Now, and What Are They Working On?

10th Anniversary Society for Social Neuroscience Meeting

Chicago, IL, 10/19/2019

“Neural mechanisms guiding social decision-making and social gaze interaction in the primate prefrontal-amygdala circuits”

Conte Center for Translational Social Neuroscience, Emory University

Atlanta, GA, 1/16/2020

“Neural encoding and oscillatory coupling underlying spontaneous social gaze interaction in the amygdala-prefrontal network”

12th FENS Forum of Neuroscience (virtual), Symposium (co-Chair), “Neural mechanisms underlying social interactions in human and non-human primates

Glasgow, United Kingdom, 7/13/2020

“Prefrontal and amygdalar correlates of self-other monitoring in spontaneous social gaze interaction”

Annual Pavlovian Society Meeting (virtual), A symposium on “Cross-species perspectives on social learning”, Burlington, VT, 9/11/2020

[Meeting postponed due to Covid-19]

TBD

“Comparative Neurobiology of Higher Cognitive Functions” Workshop, School of Neuroscience at the “Ettore Majorana” Erice Centre, Sicily, Italy, 9/25–9/30/2020

“Prefrontal and amygdalar substrates of live social gaze interaction”

Netherlands Institute for Neuroscience, Neuroscience Seminar, Amsterdam, Netherlands, 1/22/2021

“Prefrontal and amygdalar foundations of live social gaze interaction”

Neuroscience and Cognitive Science (NACS) Colloquium talk, University of Maryland, College Park, Maryland, 3/5/2021

“Social decision making and social gaze interaction in the primate prefrontal-amygdala circuits”

Experimental Psychology Society, a special symposium on Inference of Others’ Minds, a special session for honoring Dr. Matthew Rushworth’s EPS Award

Virtual, 4/14/2021

“Real-life social gaze interaction in the prefrontal-amygdala networks”

Harvard University, Department of Psychology Cognition, Brain, and Behavior Seminar

Virtual, 10/21/2021

“Widespread social gaze signals in the primate prefrontal cortex during live social gaze interaction”

Society for Neuroscience (SfN) Minisymposium, “Neurophysiology of social behaviors: from information gathering to interaction”, Washington, DC, 11/13–11/17/2021

“Neural substrates of real-life social gaze interaction in the prefrontal-amygdala networks”
University of California San Diego (UCSD) Psychology Colloquium talk
Virtual, 12/2/2021

“Widespread implementations of interactive social gaze neurons in the primate prefrontal-amygdala networks”
Wu Tsai Institute Winter Conference, Integration
Virtual, 1/11/2022

“Brain mechanisms underlying real-life social interaction”
Yale University, Current Work in Social Psychology, 04/18/2022

“Social decision making and social gaze interaction in the primate prefrontal-amygdala circuits”
Simian Collective (SimCo), Invited Talk, at the Salk Institute for Biological Studies, La Jolla, CA,
5/4/2022-5/5/2022

“Neuronal bases for the combinatorial effect of oxytocin and naloxone on social attention”
International Workshop on “Oxytocin and vasopressin: from brain modulation, to epigenetic regulation and clinical applications”
School of Neuroscience at the “Ettore Majorana” Erice Centre, Erice, Sicily, Italy,
5/28/2022-6/2/2022

“Prefrontal-amygdala circuits in primate social interaction”
Columbia University Neuroscience Seminar, Zuckerman Mind Brain Behavior Institute, the Doctoral Program in Neurobiology and Behavior, and the Columbia Translational Neuroscience Initiative
Virtual, 6/14/2022

“Prefrontal and amygdalar mechanisms of primate social interaction”
Keystone Symposia on *Neurocircuitry of Social Behavior*
Organized by: Hee-Sup Shin, Larry Young, Hailan Hu and Carmen Sandi
Daejeon, South Korea, 9/5/2022

“TBD”
Translational Neuroscience Seminar
Department of Neuroscience and Friedman Brain Institute, Icahn School of Medicine at Mount Sinai, NY,
NY, 3/23/2023

Selected Media on Our Work

- **Yale News** (May 10, 2022)
“When eyes meet, neurons start to fire”
- **Yale Daily News** (April 12, 2021)
“Yale study explores visual consciousness in rhesus monkeys”
- **Yale News** (Mar 29, 2021)
“Monkeys experience the visual world the same way people do”
- **BrainPost** (Mar 3, 2020)
“Distinct patterns of cortico-limbic connectivity underlie social concern for others”
- **Psychology Today** (Feb 25, 2020)
“The Neuroscience of Generosity”
- **New Haven Register** (Feb 24, 2020)

- “Yale study: Why monkeys choose to drink alone”
- **Yale News** (Feb 24, 2020)
“Why monkeys choose to drink alone”
- **Yale News** (June 14, 2019)
“Same brain region weighs decisions made for others as well as for self”
- **NIH News** (Nov 12, 2017)
“NIMH Biobehavioral Research Awards for Innovative New Scientists (BRAINS) Awards Ceremony”
- **Penn Today** (Oct 13, 2017)
“Researchers discover which brain region motivates behavior change”
- **PNAS Press Release** (May 1, 2017)
“Oxytocin and Opioid Systems in Social Interaction”
- **Yale News** (May, 1, 2017)
“Combination approach may help combat autism”
- **Yale News** (May 18, 2016)
“Research note: Brain area crucial to ability to assess motives of others”
- **Yale Scientific Magazine** (April 5, 2016)
“What Makes Us Generous? The Neuroscientist’s Take”
- **Slate** (Mar 17, 2016)
“Yale vs. Duke Is the Most Annoying Matchup in NCAA Tournament History”
- **Daily Mail** (Dec 16, 2015)
“Are you a Scrooge? Researchers pinpoint ‘generous’ center of the brain”
- **VICE Magazine - Motherboard** (Dec 15, 2015)
“How your brain determines if you're a Santa or Scrooge”
- **World Economic Forum** (Dec 16, 2015)
“What’s happening in your brain when you decide to be generous?”
- **Yale News** (Dec 15, 2015)
“To give or not to give: Value assessment arises in tiny area of the brain”
- **Skeptically Speaking** (Mar 1, 2013)
“The altruism equation”
- **NBC News** (Dec 28, 2012)
“Scientists identify unselfish brain cells in monkeys”
- **Scientific American** (Dec 26, 2012)
“Monkey brain area keeps count of kindnesses”
- **Nature-Asia Highlights** (Dec 24, 2012)
“Social rewards in the brain”
- **Nature News** (Dec 23, 2012)
“Monkey brain area keeps count of kindnesses”
- **National Geographic** (Dec 23, 2012)
“Generosity and the social brain, one neuron at a time”
- **Society for Neuroscience Press Room: The Social Brain** (Oct 16, 2012)
“New Findings Illuminate Basis in Brain for Social Decisions, Reactions”
- **Biological Psychiatry** (July 24, 2012)
“Classifying Neural Circuit Dysfunctions Using Neuroeconomics”
- **National Geographic, Daily News** (Jan 9, 2012)
“Exposure to ‘Love Hormone’ Increases Prosocial Behavior in Monkeys”
- **US News (HealthDay)** (Jan 10, 2012)
“Monkeys Treated With ‘Love Hormone’ Show More Kindness”
- **ScienceNews** (April 7, 2012)
“Furry Friends Forever”
- **abc News** (Jan 11, 2012)
“A Love Drug? Oxytocin Hormone Makes Mothers Kinder”

Selected Media Commentary on Other’s Work

- **New York Times**, “Opioids Feel Like Love. That’s Why They’re Deadly in Tough Times.”, 12/6/2021
- **PNAS Front Matter**, “Brain scans and behavior suggest oxytocin can change perceptions of fairness”, 4/6/2019
- **The Scientist**, “Oxytocin makes time fly”, 8/1/2018
- **MIT News**, “Brain Circuit Helps Us Learn by Watching Others”, 5/3/2018
- **The Scientist**, “Specialized Neurons Encode Social Learning in Humans”, 9/6/2016
- **New York Times**, “The Look of Love is in the Dog’s Eyes”, 4/16/2015
- **Chemical and Engineering News** by the American Chemical Society, “Oxytocin Promotes Social Behaviors by Tuning Brain Circuits”, 4/15/2015
- **Nature News**, “Monkey Brains Wired to Share”, 2/25/2014

Teaching

Yale University

- **Cognitive Neuroscience** (PSYC 335/NSCI 340) (Fall or Spring 2017 –)
- **Systems Neuroscience** (PSYC 411/611/NSCI 445/NSCI 611b) (Fall or Spring 2015 –)
- **Neuroscience of Social Interaction** (PSYC 449/649/NSCI 449) (Fall 2021 –)
- **Foundations of Neuroscience: Biological Bases of Human Behavior** (PSYC 530; INP 530; core neuroscience course in psychology): Sections on 1) Principles of sensorimotor systems and 2) Learning and neural control systems (annually, Fall 2017 – Spring 2022), *Course head* on Fall of 2018.
- **Foundations of Systems Neuroscience** (INP 703; core INP course): Sections on 1) *Posterior Parietal Cortex. Multisensory Integration*, 2) *Subcortical affective circuits*, and 3) *Social cognition, communication and autism* (Spring 2018 – every Spring)
- **Neurobiology of Cortical Systems** (NBIO 532): Section on *Prefrontal cortex and Social Cognition* (Spring 2015, Fall 2016); Section on *Long-Range Interactions of Cortical Circuits* (Spring 2020)
- **Principles of Neuroscience** (INP 701): Section on *Neurobiology of social cognition* (Fall 2020)
- **Developing and Writing Fellowship Proposals** (INP 542) (Fall 2021)
- **Statistics and Data Analysis in Neuroscience** (INP/NBIO 599): Sections on 1) *Hypothesis testing and 2) Model comparisons* (Spring 2017)
- **Computational Modeling & Analysis in Neuroscience** (NSCI 588a) (Fall 2015): Section on *Behavioral Data Analysis: Visualization of Choice Data*
- Current works in Behavior, Genetics, and Neuroscience (PSYC 704) (Fall 2014 – Spring 2016) (Talk Series)
- Research Topics: Neuroscience of Social Behavior (PSYC 752) (Fall 2014 – every semester) (Open lab meeting)
- *Guest lectures*: Intro to Psychology (PSYC 100), Fall 2016; Neuroeconomics for Economists (ECON 422), Fall 2017.

Duke University

- **Special Topics in Neuroscience: Social Neurosciences** (NEURO/PSY 390S) (Spring 2014)
- *Guest lecture*: Behavioral Neuroendocrinology (NEURO 366S/PSY 376S) (10/30/2012)
- Organizer & moderator: *Neuropeptides, Cognition, and Clinical Implications* (2012–14)

Washington University in St. Louis

- Teaching Assistantship (as a grad student): *Neural Sciences* (Bio 554; Spring 2005)
- Teaching Assistantship (as an undergrad student): *Sensation & Perception* (Psych 330; Fall 2001)

Reviewer / Editorial / Program Committee / Board Roles / Chair Roles

- **Board of Governors / Steering Committees**
Board of Governors: The Society for Social Neuroscience (S4SN) (2019–)
Steering Committee: Kavli Institute for Neuroscience, Yale University (2017–2020)

- **Institute Reviewer**
National Institute for Physiological Sciences (NIPS)
- **Grant Reviewer**
National Institute of Health CSR (NIH)
National Institute of Mental Health (NIH/NIMH)
National Institute of Child Health and Human Development (NIH/NICHHD)
National Science Foundation (NSF)
Wellcome Trust
Medical Research Council (MRC)
Biotechnology and Biological Sciences Research Council (BBSRC)
Human Frontiers Science Program (HFSP)
Fonds de recherche du Québec – Nature et technologies
Leibniz Association
Yale-NUS
- **Editorial Boards / Editorial Roles**
Editorial boards
Social Neuroscience
Frontiers in Integrative Neuroscience

Guest associate editor/Guest editor
Frontiers in Neuroscience (completed in 2014)
“Neural basis of social learning, social deciding, and other-regarding preferences”

Special issue in *Brain Research* (completed in 2014)
“Oxytocin and human social behavior, social cognition and psychopathology”

Special issue in *Philosophical Transactions of the Royal Society B* (to be completed in 2022)
“Interplays between oxytocin and other neuromodulators in shaping complex social behaviors”
- **Ad Hoc Editor**
Proceedings of National Academy of Sciences (PNAS)
eLife
- **Peer Manuscript Reviewer**
Nature, Science, Nature Neuroscience, Neuron, Cell, eLife, Nature Reviews Neuroscience, Proceedings of National Academy of Sciences, Journal of Neuroscience, PLoS Biology, Current Biology, Cerebral Cortex, Neuropsychopharmacology, Trends in Cognitive Sciences, Trends in Neurosciences, Perspectives in Psychological Sciences, Nature Communications, Journal of Neurophysiology, Science Advances, Progress Psychoneuroendocrinology, Neuropharmacology, Progress in Neurobiology, European Journal of Neuroscience, Social Cognitive and Affective Neuroscience, Behavioral Brain Research, Behavioral Neuroscience, Royal Society Proceedings of the Royal Society B, Philosophical Transactions of the Royal Society B, Psychological Review, Schizophrenia Research, Frontiers Journals, Journal of Neuroscience Methods, Scientific Reports, Journal of Neuroendocrinology, Neuroscience Research, WIREs Cognitive Science, F1000
- **Program Committees**
2022 Simian Collective (SimCo) (conference on Primate Neuroscience), the Salk Institute for Biological Studies
2016, 2017, 2018, 2019 Society for Social Neuroscience (S4SN)
2016 Society for Neuroeconomics,
2012 D-Cides (Duke Center for Interdisciplinary Decision Sciences) Regional Conference

- **Chair Roles for Conference Events**
Chair, Society for Neuroscience Nanosymposium: “Neural Basis of Decision Making”, *New Orleans, LA, 2012*
Chair, Kavli Frontiers of Science symposium (Indonesian-American), *2016*
Co-Chair, Symposium, “Neural mechanisms underlying social interactions in human and non-human primates,” Federation of European Neuroscience Societies (FENS) Forum, Virtual, *2020*
Chair, Society for Neuroscience (SfN)-sponsored *Social Neuroscience Social, San Diego, CA, 2022*
- **Conference Talk/Poster Reviewer**
2016 Society for Neuroeconomics
2017 Cosyne (Computational and Systems Neuroscience),
2019 Reinforcement, Learning and Decision-Making (RLDM)
- **Scientific Advisory Board**
Pastorus, Inc. (oxytocin therapeutics company) (*2021–*)

University Services

- Graduate Program Advisory Committee, Dept. of Psychology, Yale University (*multiple years*)
- **Neuroscience Major Curriculum Committee**, Dept. of Psychology, Yale University (*2015–2017*)
- Teaching Fellow Allocation Committee, Dept. of Psychology, Yale University (*2015*)
- College advisor, Jonathan-Edward College, Yale University (*2015–present*)
- Department website improvement Committee, Dept. of Psychology, Yale University (*2015*)
- Senior Faculty Search Committee, Dept. of Psychology, Yale University (*Cognitive area & Open area, 2015*)
- Junior Faculty Search Committee, Child Study Center, Yale University School of Medicine (*Systems Biology, 2015*)
- Faculty Search Committee, Dept. of Neuroscience, Yale University (*2016*)
- **Development of a team-taught core neuroscience graduate course**, Dept. of Psychology, Yale University (*2017*)
- Committee on the policy and protocols for safe participation by undergraduates in nonhuman primate (NHP) research, Yale University (*2017*)
- Committee on lecturer reappointment, Dept. of Psychology, Yale University (*2017*)
- **Working Group on Neuroscience Major**, Yale University (*2016–2017*)
- Faculty Search Committee, Dept. of Psychology, Yale University (*2017*)
- Provost’s Committee on the Office of Cooperative Research (OCR) (*2017*)
- Faculty Search Committee, Dept. of Neuroscience, Yale University (*2017*)
- **Interdepartmental Neuroscience Program Admissions Committee**, Yale University School of Medicine (*2017–present*)
- Co-organizer for the new Yale Neuroscience Major Associated Talk Series (*2018*)
- Yale College Executive Committee (*2018–2019*)
- Faculty Search Committee, Dept. of Neuroscience, Yale University (*2018*)
- **Yale Neuroscience Institute Space Steering Committee** for Department of Psychology (*2020*)
- Chair of the Colloquium Committee Department of Psychology (*2021–22*)
- **Wu Tsai Institute at Yale Working Group on Neurocognition and Behavior** (*2021–*)
- The Neuroscience Track Advisor in the Yale Department of Psychology (*Fall 2021–*)
- **Co-Director of Undergraduate Studies (DUS) for the Yale Neuroscience Major** (*Fall 2021–*)
- Interim Director of Graduate Studies (DGS), Department of Psychology (*Spring 2023*)

Diversity, Equity, and Inclusion Efforts

Diversity, Equity, Inclusion Statement: *I greatly value and strive to enhance diversity, equity, and inclusion in my scientific work and our research environment.*

- Department of Psychology Diversity Committee Faculty Member (2017–2020)
- One of the advisors to UR Psychiatry Resident on Assistant Professor track and working toward a Diversity Supplement (2019–)
- Serving as a letter writer for NIH diversity research award applications
- Serving as a faculty mentor toward documenting the success of the summer URM program hosted by the Department of Psychology
- Hosting of NIH BP-ENDURE student for summer research (2021)
- Yale Department of Psychology's Committee on Racial Equity and Justice (CREJ) (2021–)

Trainees & Mentoring

Primary Advisor Role

Associate Research Scientist

- Amrita Nair (3/2014–present)

Post-Docs

- Weikang Shi (6/2022–present)
- Philip Putnam (12/2019–present)
- Amrita Nair (3/2014–present)
- Olga Dal Monte (3/2015–1/2019)
- Chengchi Chu (1/2018–9/2020)
- Moshe Shay Ben-Haim (with Profs. Laurie Santos, Ran Hassin, Yarrow Dunham) (2017–2019)
- Weston Pack (9/2014–1/2016)

Graduate Students

- Matthew Piva (Interdepartmental Neuroscience Program) (8/2014–10/2018)
 - *PhD Thesis (defended on 10/25/2018 with Distinction): Neurobiological bases of social cognition: Investigations from macaques to humans at multiple levels of neuroscience*
- Jessica Joiner (Psychology) (8/2014–7/2019)
 - *PhD Thesis (defended on 7/8/2019): Social information processing in rhesus macaques*
- Courtney Turrin (Psychology) (8/2015–5/2017; Masters)
- Kayla Velnoskey (Psychology) (8/2016–9/2017; Masters)
- Hannah Weinberg-Wolf (Psychology) (8/2015–5/2021)
 - *PhD Thesis (defended on 2/4/2021): Serotonin and social competency*
- Siqi Fan (Psychology) (8/2017–present)
- Prabaha Gangopadhyay (Psychology) (9/2019–present)
- Megha Chawla (Psychology) (9/2019–present)
- Olivia Meisner (Interdepartmental Neuroscience Program) (5/2020–present)
- Jamie Masthay (Psychology) (8/2022–present)
- Sylvia Blackmore (Psychology) (8/2022–present)

Undergraduate Students with Senior Thesis / Supervised

- Nicholas Fagan (Psychology/Neuroscience) (8/2014–5/2015)
 - *Thesis: Neuronal correlates of social decisions in the primate amygdala*
- Doug Streat (Psychology/Neuroscience) (1/2015–5/2016)
 - *Thesis: Dose-response investigation of oxytocin and naloxone as modulators of social attention in non-human primates*
- Jason Morris (Psychology/Neuroscience) (1/2015–5/2017)
 - *Thesis: Oxytocin driven modulation of neuronal connectivity between the anterior cingulate cortex and the amygdala during social decision making.*
- Marios Tringides (Molecular Cellular Development Bio/Neuroscience) (8/2014–5/2017)
 - *Thesis: Genetic investigations into the causal role of serotonin in social gaze dynamics*
- Angelica Fuentes (Cognitive Science) (12/2014–5/2017)

- *Thesis: Effects of pharmacological manipulations on natural social interaction in rhesus macaques: a pilot investigation*
- Spencer Birney (Cognitive Science) (1/2017–5/2018)
- Kacey Fang (Cognitive Science) (9/2016–5/2019)
 - *Thesis: All the lonely people: the relationship of loneliness and social isolation to age-related changes in brain structure*
- Cameron Martel (Cognitive Science) (2/2018–5/2020)
 - *Thesis: Text mining based analysis of the behavioral functions of serotonin receptor subtypes*
- Emma Kirby (Cognitive Science) (9/2018–5/2021)
 - *Thesis: Individual differences in prosocial attitudes and risk-taking for shared outcomes*
- Alejandro Jaco (Cognitive Science) (9/2018–5/2021)
 - *Thesis: Subjective valuation of shared losses and rewards*
- Beamlak Ashenafi (Neuroscience) (1/2020–5/2021)
 - *Thesis: Investigations into the roles of excitatory and inhibitory neurons in representing social information in the primate brain*
- Abigail Fortier (Psychology and Molecular, Cellular, Developmental Biology) (6/2020-5/2021)
 - *Thesis: PFC social preference circuits in ASD*
- Michael Zhou (Neuroscience, Statistics) (2019–5/2022)
 - *Thesis: Microstimulation to the primate prefrontal cortex leads to increased social gaze behavior*
- Shamauri Rivera (NIH Blueprint-ENDURE program) (summer 2021)

Other Selected Professional Activities

- Visuomotor Journal Club Organizer, Washington University, 2006–2008
- Social Neuroscience Journal Club Organizer, Duke University, 2010–2011
- Center for Neuroeconomics Retreat Committee, Duke University, 2010
- Society for Neuroscience *NeurOnLine*; Role: “Champion” in Motor Systems Neuroscience Online Community, 2011–2013
- Guest speaker at the Sonoma Academy, Santa Rosa, CA, 11/2013, 8/2015
- **Discussion Leader & Career Panelist**, Gordon Research Seminar: Amygdala in Health and Disease, 2015
- Organizer (with Keise Izuma), Japan Neuroscience Society symposium: “Advances in the study of the social brain”, 2015
- Early Career Reviewer (ECR) Program (NIH/NIMH), 2014–2016
- Organizer, Yale Neuroeconomics Forum, 2016–2018
- Discussion Faculty on *Research with Animals* in Neuroethics Interdepartmental Neuroscience Program course, Yale University, 2/2017
- Faculty Advisor, Yale Undergraduate Research Journal (YURJ), 2020–
- Blogger, “*The Science of Connection: How the brain computes social choices*”, **Psychology Today**, 2020–
- Faculty Member, Neuroscience / Cognitive Neuroscience, *Faculty Opinions* (previously known as *Faculty of 1000, F1000Prime*), 2021–
- Associated Faculty Member, the MacBrain Resource Center (MBRC) at Yale University, non-human primate brain tissue resources, 2022–

Professional Memberships

- Society for Neuroscience member, 2003–present
- Society for Social Neuroscience member, 2012–present
- Society for Neuroeconomics member, 2011–2015
- Association for Psychological Science, 2016
- German Neuroscience Society, FENS, 2019
- Pavlovian Society, 2020

Meeting Abstracts

Nov, 2022

Society for Neuroscience (SfN)

Oxytocin promotes prosocial behavior via amygdala-mediated alterations in ACC neural activity (poster)
Meisner OC, Dal Monte O, Fagan NA, Putnam PT, Chang SWC

Subtle differences in social gaze target discriminability between broad-spiking and narrow-spiking neurons in the primate prefrontal-amygdala circuits (poster)
Gangopadhyay P, Fan D, Dal Monte O, Fagan NA, and Chang SWC

Virtual, Dec, 2021

Society for Social Neuroscience (S4SN)

Neuronal synchronization between the primate anterior cingulate cortex and the amygdala underlying vicarious reward (poster)
Putnam PT, Chu CJC, Fagan NA, Dal Monte O, Chang SWC

A causal role of the primate prefrontal cortex in social gaze monitoring: Evidence from closed-loop microstimulation (poster)

Fan S, Dal Monte O, Fagan NA, Nair AR, Chu CJC, Zhou MB, Putnam PT, Chang SWC

- **Winner of the best poster award** (animal research category) (Society for Social Neuroscience (S4SN), virtual, 12/2021 S4SN)

Extending Fano Factor to naturalistic paradigms: neural variability is suppressed during spontaneous social gaze interactions (poster)
Zhou MB, Fan S, Dal Monte O, Fagan NA, Nair AR, Chu CJC, Chang SWC

Virtual, Nov, 2021

Society for Neuroscience (SfN)

Widespread social gaze signals in the primate prefrontal cortex during live social gaze interaction (Minisymposium talk)
Minisymposium on Neurophysiology of social behaviors: from information gathering to interaction
Chang SWC

Neuronal synchronization between the primate anterior cingulate cortex and the amygdala underlying vicarious reward (poster)
Putnam PT, Chu CJC, Fagan NA, Dal Monte O, Chang SWC

A causal role of the primate prefrontal cortex in social gaze monitoring: Evidence from closed-loop microstimulation (poster)
Fan S, Dal Monte O, Fagan NA, Nair AR, Chu CJC, Zhou MB, Putnam PT, Chang SWC

Extending Fano Factor to naturalistic paradigms: neural variability is suppressed during spontaneous social gaze interactions (poster)
Zhou MB, Fan S, Dal Monte O, Fagan NA, Nair AR, Chu CJC, Chang SWC

Meta-analysis of how sex and dominance interact with social position to affect prosocial behaviors in marmosets (*Callithrix jacchus*) (poster)
Rivera S, Meisner O, Park S, Jadi MP, Nandy AS, Chang SWC

Virtual, Sept, 2021

Society for Neuroeconomics (SNE)

Harm valuation in moral decisions shapes individual differences in two dimensions of utilitarianism (poster)
Zoh Y, Yu H, Contreras-Huerta LS, Prosser AMB, Coll M-P, Apps MAJ, Bird G, Sinnott-Armstrong W, Chang SWC, Crockett MJ

Virtual, 2021

Society for Behavioral Neuroendocrinology (SBN)

Increasing central serotonin with 5-HTP disrupts the inhibition of social gaze in non-human primates (poster)
Weinberg-Wolf H, Fagan NA, Dal Monte O, Chang SWC

Virtual, 2021

**Association for Psychological Science (APS)
Association for Scientific Studies of Consciousness (ASSC)**

Evidence of Conscious Awareness and Non-Conscious Perception in Rhesus Monkeys (*Macaca Mulatta*)
(flash talk/short talk)
Ben-Haim MS, Dal Monte O, Fagan NA, Dunham Y, Hassin RR, Chang SWC, Santos LR

Virtual, 2021

Society for Social Neuroscience (S4SN)

Structured spike sequences in the primate brain during social interactive behaviors (short talk)
Putnam PT, Dal Monte O, Fan S, Chang SWC

Prefrontal and amygdalar substrates of live social gaze interaction (short talk)
Fan S, Dal Monte O*, Chu CJC, Fagan NA, Putnam PT, Chang SWC*
(* , co-first authors)

Increasing central serotonin with 5-Hydroxytryptophan impairs social inhibition by down-regulating arousal and motivational states (short talk)
Weinberg-Wolf H, Fagan NA, Chang SWC

Individual differences in the subjective value of sharing rewards (short talk)
Chawla M, Fagan NA, Jia R, Levy I, Crockett MJ, Chang SWC**
(* , co-senior authors)

Virtual, 2021

Israeli Conference on Cognition Research

Aware humans performance clusters with monkeys performance more than that of unaware humans:
Clustering of individual behavioral data (poster)
Ben-Haim MS, Dal Monte O, Fagan NA, Dunham Y, Hassin RR, Chang SWC, Santos LR

Virtual, 2020

Marmoset Bioscience Symposium

Automatic markerless detection of facial locations and head orientations of a group of freely moving marmosets in 3D space (poster/data blitz)
Xing F, Jadi MP, Chang SWC, Nandy AS

Taipei, Taiwan, 2020

1st Taiwan Society for Neuroscience (TSfN)

Neural mechanism of other-regarding decision and vicarious reward (talk)
Chu C-C, Dal Monte O, Fagan NA, Chang SWC

Virtual meeting, 2020 (due to Covid-19; originally in Cambridge, MA)

International Conference on Computational Social Science (IC2S2)

Text mining based analysis of the behavioral functions of serotonin receptor subtypes (poster)

Martel C, Weinberg-Wolf H, Chen K, Dohmann J, Chang SWC

Virtual meeting, 2020 (due to Covid-19; originally in Glasgow, UK)

Federation of European Neuroscience Societies (FENS) Forum 2020

Neural encoding and oscillatory coupling underlying spontaneous social gaze interaction in the amygdala-prefrontal network

Symposium (co-Chair), "Neural mechanisms underlying social interactions in human and non-human primates

Chang SWC

Chicago, 2019

**Society for Neuroscience (SfN) &
Society for Social Neuroscience (S4SN)**

Neuronal coordination across primate prefrontal regions and the amygdala in spontaneous social gaze interaction (poster, SfN, S4SN)

Fan D, Dal Monte O, Fagan NA, Chu C-C, Chang SWC

Exploring shared neural codes across social gaze and reward value in the primate brain (poster, SfN, S4SN)
Dal Monte O, Fan S, Fagan NA, Chu C-C, Chang SWC

Oscillatory phase-locking within the primate anterior cingulate gyrus and basolateral amygdala in social decision-making (poster, SfN, S4SN)

Chu C-C, Dal Monte O, Fagan NA, Chang SW

Serotonin impairs social avoidance (poster, SfN, S4SN)

Weinberg-Wolf HB, Fagan NA, Chang SW

Individual decision-making underlying the Tragedy of the Commons (poster, SfN, S4SN)

Chawla M, Piva M, Ahammad S, Jia R, Levy I, Chang SW

Prague, 2019

European Brain and Behavioral Society (EBBS)

Neural mechanisms of spontaneous social gaze interaction in medial prefrontal areas and the amygdala (talk)

Dal Monte O, Fan S, Fagan NA, Chu C-C, Chang SW

San Diego, 2018

**Society for Neuroscience (SfN) &
Society for Social Neuroscience (S4SN)**

Causal manipulations of live social gaze by microstimulating the primate prefrontal cortex (poster, SfN, S4SN)

Fan S, Dal Monte O, Fagan NA, Chu C-C, Chang SW

Neural coding of live social gaze interactions (poster, SfN, S4SN)

Dal Monte O, Fan S, Fagan NA, Chu C-C, Chang SW

Tensor component analysis (TCA) of spiking activity related to social gaze dynamics in the prefrontal cortex and the amygdala (poster, SfN, S4SN)

Chu C-C, Dal Monte O, Fan S, Fagan NA, Chang SW

Serotonin modulates impulse control and motivated action (poster, SfN)

Weinberg-Wolf HB, Fagan NA, Dal Monte O, and Chang SW

Representation of subjective value for self and other agents in the dorsomedial prefrontal cortex is consistent across tasks and predicts social attitudes (poster, SfN, S4SN)

Piva M, Velnoskey K, Jia R, Nair A, Levy I, Chang SW

Social curiosity in rhesus monkeys (poster, SfN)
Joiner JA, Fagan NA and Chang SW

Effect of anterior cingulate cortex lesions on social vicarious reinforcement in monkeys (poster, SfN)
Basile BM, Schafroth JL, Karaskiewicz CL, Chang SW, Murray EA

Philadelphia, PA, 2018

Society for Neuroeconomics (SNE)

Representation of subjective value for self and other agents in the dorsal anterior cingulate cortex is consistent across tasks and predicts social attitudes (poster)
Piva M, Velnoskey K, Jia R, Nair A, Levy I, Chang SW

Sicily, Italy, 2018

**Workshop on Understanding the Neuroregulatory Actions
of Oxytocin and its Potential Clinical Applications**

Oxytocin modulates neural synchrony between the anterior cingulate cortex and amygdala for social decisions (talk)
Dal Monte O, Fagan N and Chang SW

Denver, CO, 2018

Computational and Systems Neuroscience (Cosyne)

Oxytocin modulates neural synchrony between the anterior cingulate cortex and amygdala for social decisions (poster)
Dal Monte O, Fagan N and Chang SW

Washington, DC, 2017

**Society for Neuroscience &
Society for Social Neuroscience**

Oxytocin modulates the coupling between the anterior cingulate gyrus and amygdala during prosocial and antisocial decisions (SfN talk, S4SN poster)
Dal Monte O, Fagan N and Chang SW

Serotonergic efficiency underlies causal effect of 5-HTP on Attention (poster, SfN, S4SN)
Weinberg-Wolf H, Fagan N, Dal Monte O, Tringides M, Anderson G and Chang SW

Vicarious subjective value representation in the human brain: an fMRI investigation (poster, SfN, S4SN)
Piva M, Velnoskey K, Jia R, Levy I, and Chang SW

Activity in the temporoparietal junction (TPJ) tracks dynamic changes in uncertainty when observing goal-directed action (poster, SfN, S4SN)
Velnoskey K, Chang SW and McCarthy G

Naples, Italy, 2017

Italian Neuroscience Society

Oxytocin differentially couples the anterior cingulate cortex and amygdala for prosocial and antisocial decisions (talk)
Dal Monte O, Fagan N, and Chang SW

Melbourne Beach, FL, 2017

International Conference on Comparative Cognition

A paradoxical pupil size effect in rhesus monkeys performing a social vicarious reinforcement task
Basile B, Karaskiewicz C, Chang SW, and Murray EA

San Diego, CA, 2016

**Society for Neuroscience &
Society for Social Neuroscience**

Neuronal synchrony between the anterior cingulate cortex and the amygdala reflects prosocial decision outcomes

(SfN poster, S4SN talk)

Dal Monte O, Fagan N, Nair A and Chang SW

Social foraging obeys the marginal value theorem in rhesus macaques (poster, SfN, S4SN)

Turrin C and Chang SW

Supralinear effects of combined oxytocin and opioid blockade on contingent social gaze dynamics (poster, SfN, S4SN)

Piva M, Dal Monte O*, Tringides M and Chang SW*

Serotonin promotes sustained attention to viewer-directed social signals (poster, SfN, S4SN)

Weinberg-Wolf H, Fagan N, Dal Monte O and Chang SW

Exploring social curiosity in non-human primates (poster, SfN)

Joiner J and Chang SW

Rochester, NY, 2016

Rochester Center for Visual Science Symposium

It takes two to tango: Combinatorial effects of oxytocin and opioid blockade on contingent social gaze dynamics (poster)

Dal Monte O, Piva M*, Tringides M, Streat D, Morris J and Chang SW*

Chicago, IL, 2015

**Society for Neuroscience
Society for Social Neuroscience**

Seeing eye-to-eye: live gaze interactions in pairs of rhesus macaques robustly capture dominance behavior

Winner of the best poster award (1st place) (poster, SfN, S4SN)

Dal Monte O, Piva M, Joiner JA, Pack WD, Nair AR and Chang SW

Counterbalancing prosocial decisions across egocentric and allocentric reward contexts in rhesus macaques (poster, SfN, S4SN)

Pack WD, Joiner JA and Chang SW

Pupillary correlates of vicarious reward in rhesus macaques (poster, SfN, S4SN)

Joiner JA, Fagan NA, Platt ML and Chang SW

Neural specialization for interpersonal interaction in a competitive gambling task (poster, SfN, S4SN)

Piva M, Zhang X, Noah A, Chang SW, Hirsch J

Easton, MA, 2015

Amygdala in Health & Disease: Gordon Research Conference

Seeing eye-to-eye: live gaze interactions in pairs of rhesus macaques robustly capture dominance behavior

Winner of the best poster award (poster)

Dal Monte O, Piva M, Morris J, and Chang SW

Atlanta, GA, 2015

Mechanisms of Learning Forum (Emory Univ.)

Pupil size reflects social preference and vicarious reward in rhesus macaques. (poster)

Joiner JA, Fagan NA, Platt ML and Chang SW

Washington, DC, 2014

Society for Neuroscience

Local injection of oxytocin into the primate amygdala enhances prosocial motivation. (poster)

Chang SW, Toda K, Utevsky, AV and Platt ML

San Diego, CA, 2013

Society for Neuroscience

Society for Social Neuroscience

Value-dependent scaling of self- and other-referenced decisions by neurons in primate amygdala. (poster, SfN, S4SN)

Chang SW and Platt ML

Princeton, NJ, 2013

Reinforcement Learning & Decision-Making

Value-dependent scaling of self- and other-referenced decisions by neurons in primate amygdala. (poster)

Chang SW and Platt ML

Berkeley, CA, 2013

Society for Experimental Social Psychology (invited symposium talk)

The neuroscience of primate prosociality: self- and other-referenced decisions by reward-sensitive neurons in the primate brain.

Chang SW and Platt ML

New Orleans, LA, 2012

Society for Neuroscience (talk)

Society for Social Neuroscience (contributed talk)

Differential encoding of social decision outcomes by neurons in primate orbitofrontal cortex, dorsal anterior cingulate cortex and anterior cingulate gyrus.

Chang SW, Gariépy JF, and Platt ML

Society for Neuroscience (talk)

Society for Social Neuroscience (poster)

Neural correlates of deceptive tactics in the primate prefrontal cortex.

Gariépy JF, Chang SW, Du E. and Platt ML

Atlanta, GA, 2012

Organization for Computational Neuroscience (poster)

Neuronal reference frames for social decisions in primate prefrontal cortex.

Chang SW, Gariépy JF, and Platt ML

College Park, MD, 2012

International Congress of Neuroethology (poster)

Neural correlates of deceptive tactics in the primate prefrontal cortex.

Gariépy JF, Chang SW, Du E. and Platt ML

Washington, DC, 2011

Society for Neuroscience (talk)

Differential coding of egocentric and allocentric reward outcomes during social interaction in primate ACC and OFC.

Chang SW and Platt ML

Society for Neuroscience (poster)

Oxytocin promotes prosocial decisions in rhesus macaques.

Chang SW, Barter JW, Ebitz RB, Watson KK and Platt ML

Advances in Computational Motor Control X (SfN) (poster)

The representations of reach endpoints in posterior parietal cortex depend on which hand does the reaching.
Chang SW and Snyder LH

Atlanta, GA, 2011

Workshop on the Biology of Prosocial Behavior at Emory University (poster)

Inhaled oxytocin amplifies both vicarious reinforcement and self reinforcement in rhesus macaques (*Macaca mulatta*).

Chang SW, Barter JW, Ebitz RB, Watson KK and Platt ML

Kyoto, Japan, 2011

34th Japanese Society for Neuroscience (talk)

Separate channels for self and other reward in primate prefrontal cortex

Platt ML, Chang SW, Winecoff AA, Barter JW

Salt Lake City, UT, 2011

COSYNE (poster)

Spatial and non-spatial representations in the parietal reach region are systematically organized.

Chang SW and Snyder LH

San Diego, CA, 2010

Society for Neuroscience (poster)

Brain Research meeting:

The Emerging Neuroscience of Autism Spectrum Disorders (poster)

Social Context Gates Other-Regarding Preferences in Rhesus Macaques (*Macaca mulatta*).

Chang SW and Platt ML

Society for Neuroscience (poster)

Spatial reference frame and limb specificity in macaque posterior parietal cortex.

Chang SW and Snyder LH

Salt Lake City, UT, 2010

COSYNE (poster)

Idiosyncratic and systematic features of spatial representations in the macaque PRR.

Chang SW and Snyder LH

Chicago, IL, 2009

Society for Neuroscience (poster)

Equal and opposite eye and hand gain fields for reaching in PRR.

Chang SW, Papadimitriou C, and Snyder LH

Salt Lake City, UT, 2008

COSYNE (poster)

Stimulus onset quenches neural variability: a widespread cortical phenomenon.

Churchland MM, Yu BM, Cunningham JP, Sugrue LP, Cohen MR, Corrado GS, Newsome WT, Clark AM, Hosseini P, Scott BB, Bradley DC, Smith MA, Kohn A, Movshon JA, Armstrong KM, Moore T, Chang SW, Snyder LH, Ryu, SI, Santhanam G, Sahani M, and Shenoy KV

Washington, DC, 2008

Advances in Computational Motor Control VII, ISSN 1944-4001 (SfN) (talk)

Gain fields for the distance between the ocular fixation point and the arm.

Chang SW and Snyder LH

Dynamical Neuroscience XVI:

Neuronal Variability and Its Functional Significance (SfN) (talk)

A widespread stimulus-driven reduction in cortical variability.

Churchland MM, Yu BM, Cunningham JP, Sugrue LP, Cohen MR, Corrado GS, Newsome WT, Clark AM, Hosseini P, Scott BB, Bradley DC, Smith MA, Kohn A, Movshon JA, Armstrong KM, Moore T, Chang SW, Snyder LH, Ryu, SI, Santhanam G, Sahani M, and Shenoy KV

Pittsburgh, PA, 2008

**The 4th International Statistical Analysis of Neuronal Data (SAND) meeting
University of Pittsburgh (Dept. of Statistics)** (talk)

The distance between the (initial) eye and arm position is coded in PPC using a gain field.

Chang SW and Snyder LH

San Diego, CA, 2007

Society for Neuroscience (poster)

Diverse frames of reference in the parietal reach region (PRR).

Chang SW and Snyder LH

Lewiston, ME, 2007

The Gordon Research Conferences, Oculomotor System Biology (poster)

Neurons in the Parietal Reach Region of monkeys plan contralateral but not ipsilateral arm movements.

Chang SW and Snyder LH

Washington, DC, 2005

Society for Neuroscience (talk)

Arm selectivity during reach planning in macaque posterior parietal cortex.

Chang SW, Dickinson AR and Snyder LH

Saint Louis, MO, 2002

2002 HHMI Fellow Symposium at Washington University (talk)

Reaching with the right or the left arm: Neuronal activity in parietal reach region of monkey posterior parietal cortex - How specific are neurons in posterior parietal cortex in sensorimotor transformation?

Chang SW, Dickinson AR and Snyder LH

The Annual Undergraduate "Psymposium" (talk)

Washington University Department of Psychology

Detecting a target versus reaching out to it: The influence of visual detection on reaching.

Chang SW and Snyder LH