

## Xiaomo Chen, Ph.D.

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### Research Interests

Understanding how human cognition emerges from specific neural circuits within the brain is perhaps the greatest challenge of modern biology. My career goal is to elucidate the neural mechanisms underlying cognition, and to translate those discoveries toward the development of techniques to enhance human cognitive functions in both health and disease.

### Education

**Ph.D.**, Psychology and Brain Sciences, Johns Hopkins University 2008-2013  
**M.E.**, Biomedical Engineering, Tsinghua University 2005-2008  
**B.E.**, Biomedical Engineering, Huazhong University of Sci. and Tech. (Summa cum Laude) 2001-2005

### Research Experience

**Department of Neurobiology, Physiology and Behavior, Center for Neuroscience at UC Davis** 2021-present

Role: Assistant professor

Research direction: Investigating neural mechanisms underlying visual cognition and developing neural engineering approaches to enhance these functions.

**Department of Neurobiology at Stanford University** 2019-2021

Role: Principle investigator, NIH K99 Fellow

Project: *Interacting neural mechanism of selective visual attention and value-based learning.*

Mentors: Dr. Tirin Moore, Dr. Krishna Shenoy, and Dr. William T Newsome

**HHMI and Department of Neurobiology at Stanford University** 2014-2019

Role: Postdoctoral fellow

Project: *The causal role of parietal cortex in exogenous and endogenous attention.*

Mentor: Dr. Tirin Moore

**The Zanvyl Krieger Mind and Brain Institute at Johns Hopkins University** 2008-2013

Role: Ph.D. candidate

Projects: *The causal role of medial frontal cortex in value-based decision-making under risk.*

*The functional role of medial frontal cortex in proactive and reactive motor control.*

Mentor: Dr. Veit Stuphorn

**Department of Biomedical Engineering at Tsinghua University** 2005-2008

Role: Master student candidate

Project: *Cortical plasticity in barrel cortex.*

Mentor: Dr. Shangkai Gao

**Department of Biomedical Engineering at Huazhong Univ. of Science and Technology**

Role: Undergraduate Research Assistant (honored) 2004-2005

Projects *Electromagnetic Field Simulation for Transcranial Magnetic Stimulation (TMS) Coil design.*

Mentor: Dr. Jiarui Lin

## Grants

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- K99 Path Way to Independence Award**, NEI 2019-2021  
*Interacting neural mechanisms of selective visual attention and value-based decision-making.*  
Mentors: Dr. Tirin Moore, Dr. Krishna Shenoy, and Dr. William T Newsome
- CoSyNe travel grants** (computational and system neuroscience conference travel grants) 2017

## Publications

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### Manuscripts in Submission and Preparation:

1. Shi Y.\*, **Chen X.\***, Moore T., Engel T. “Columnar modulation of cortical state in prefrontal cortex. ”(in preparation)
2. Zhu S., Xia R., **Chen X.**, Moore T. “Functional Properties of Primate V1 Neurons Across Cortical Layers as Revealed by High-Density Recordings ”(in submission)
3. **Chen X.**, Zhu S., Xia R., Bai K., Weingrtner S., Norcia M. A. Moore T. “Rapid Selectivity to Natural Images Across Layers of Primate V1. ”(in preparation)

### Peer-review publications and manuscripts under revision:

1. **Chen X.\***, Zirnsak M.\*, Vega G., Govil E., Lomber S., Moore T. (2020) “Parietal cortex regulates visual salience and salience-driven behavior.” *Neuron*, 106: 1-11.
2. **Chen X.**, Zirnsak M., Vega G., Moore T. (2020) “Primate prefrontal neurons selectively signal the reward value of prior actions.” *Progress of Neurobiology*, 101881
3. Shi Z.\* **Chen X.\***, Zhao C., He H., Stuphorn V., Wu D. (2020) “Multi-view broad learning system for primate oculomotor decision decoding.” *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 1558-0210
4. Weingrtner S. **Chen X.**, Akcakaya M., Moore T. (2019) “Online Spike recovery for high-density electrode recordings using greedy compressed sensing.” *IEEE EMBS Conference on Neural Engineering*, 273. (Best Paper Award Finalist)
5. **Chen X.**, Zirnsak M., Moore T. (2018) “Dissonant representations of visual space in prefrontal cortex during eye movements.” *Cell Reports*, 22(8): 2039-2052.
6. **Chen X.**, Stuphorn V. (2018) “Inactivation of medial frontal cortex changes risk preference.” *Current Biology*, 28(19): 3114-3122.
7. **Chen X.**, Stuphorn V. (2015) “Sequential selection of economic good and action in medial frontal cortex of macaques during value-based decisions.” *eLife*, 4:e09418.
8. **Chen X.**, Mihalas S., Neibur E., Stuphorn V. (2013) “Mechanisms underlying the influence of saliency on value-based decisions.” *Journal of Vision*, 13(12):18.
9. **Chen X.**, Scangos K.W., Stuphorn V. (2010) “Supplementary motor area exerts proactive and reactive control of arm movements.” *Journal of Neuroscience*, 30(44): 14657-14675.
10. **Chen X.**, Qian Z., Gao S., Hong B. (2007) “In vivo extracellular neural recording for the study of cortical plasticity.” *Acta Physiologica Sinica*, 59(6): 851-857.
11. **Chen X.**, Hong B., Gao S. (2007) “Neural population decoding and its application in brain-computer interfaces.” *Beijing Biomedical Engineering*, 26(3): 330-333. (Listed in China Academic Journal Database but not in PubMed/Google Scholar)
12. **Chen X.**, Lin J. (2006) “Research on modeling electromagnetic field for transcranial magnetic stimulation system design.” *Beijing Biomedical Engineering*, 25(5): 503-506. (Listed in China Academic Journal Database but not in PubMed/Google Scholar)

13. **Chen X.**, Lin J. (2005) “Research advances on wearable biosensors system.” *Foreign Medical Sciences (Biomedical Engineering Fascicle)*, 28(3): 138:142. (Listed in China Academic Journal Database but not in PubMed/Google Scholar)

\*co-first authors

### Book and Book Chapters:

1. Stuphorn V., **Chen X.** “An introduction to neuroscientific methods: single-cell recordings.” In: An introduction to model-based cognitive neuroscience, 2015, pp 113-137, Springer Publications, New York, NY.
2. Lin J., Xu B., **Chen X.** “Biomedical Digital Signal Processing Workbook.” (reference manual of Biomedical Digital Signal Processing written by Willis J. Tompkins), 2007, Huazhong Univ. of Sci. and Tech. Publications, Wuhan, China. (main text in Chinese)

### Conference and Invited Talks

1. **Chen, X.**, Bai K., Zhu S., Xia R., Kong N., Weingrtner S., Norcia M. A. Moore T (2021) “Rapid Sensitivity to Natural Images within Columns of Primate Cortex.” Poster presented at Computational and system neuroscience annual meeting (CoSyNe), Online, USA.
2. **Chen, X.** (2020) “Neural circuits for cognitive control in the primate brain.” Center for Neuroscience, UC Davis, Davis, USA. (**Invited talk**)
3. **Chen, X.** (2020) “Parietal Cortex Regulates Visual Saliency and Saliency-Driven Behavior (and beyond).” Department of Psychology, Stanford, Stanford, USA. (**Invited talk**)
4. **Chen, X.** (2020) “Neural circuits for cognitive control in the primate brain.” College of Optometry, University of Houston, Houston, USA. (**Invited talk**)
5. **Chen, X.** (2020) “Neural circuits for cognitive control in the primate brain.” Department of Neuroscience, The University of Texas at Austin, Austin, USA. (**Invited talk**)
6. **Chen, X.** (2020) “Neural circuits for cognitive control in the primate brain.” Department of Psychology, Vanderbilt University, Nashville, USA. (**Invited talk**)
7. **Chen, X.** (2019) “Neural circuits for cognitive control in the primate brain.” Department of Neuroscience, University of Pittsburgh, Pittsburgh, USA. (**Invited talk**)
8. **Chen, X.**, M. Zirnsak, T. Moore (2018) “Reward representation in primate prefrontal and visual cortex during value-based learning.” Nanosymposium talk presented at Society for Neuroscience Annual Meeting (SFN), San Diego, USA.
9. **Chen, X.**, M. Zirnsak, T. Moore (2017) “Perturbation of visual saliency representation in prefrontal cortex following reversible inactivation of parietal cortex inactivation on saliency-driven eye movements.” Poster presented at Computational and system neuroscience annual meeting (CoSyNe), Chicago, USA. (**travel grant awarded**)
10. **Chen, X.**, M. Zirnsak, T. Moore (2016) “Effects of parietal inactivation on saliency-driven eye movements.” Poster presented at Society for Neuroscience Annual Meeting (SFN), San Diego, USA.
11. **Chen, X.**, M. Zirnsak, T. Moore (2016) “Presaccadic changes in local field potential derived receptive fields within the frontal eye field.” Poster presented at Vision Sciences Society annual meeting (VSS), St. Pete Beach, FL. USA.
12. **Chen, X.**, M. Zirnsak, T. Moore (2015) “Changes in local field potential-derived receptive fields within the frontal eye field before eye movement.” Nanosymposium talk presented at Society for Neuroscience Annual Meeting (SFN), Chicago, USA.

13. M. Zirnsak, **Chen, X.**, T. Moore (2015) “Effects of reversible inactivation of parital cortex on the processing of visual salience in the frontal eye field.” Nanosymposium talk presented at SFN, Chicago, USA.
14. **Chen, X.**, Stuphorn V. (2015) “Dissociation of local field potential and action potential in supplementary eye field during value based decision-making.” Poster presented at SFN, Chicago, USA.
15. **Chen, X.** (2013) “The neuronal mechanism underlying value-based decision making.” Advance Researcher Lecture Series, Johns Hopkins University, Baltimore, USA. (**Invited talk**)
16. **Chen, X.**, Stuphorn V. (2013) “Non-divisive normalization of action value representation in the supplementary eye field.” Poster presented at SFN, San Diego, USA.
17. **Chen, X.**, Mihalas S., Stuphorn V. (2012) “Competition between different action value signals in supplementary eye field during value-based decision making.” Poster presented at SFN, New Orleans, USA.
18. **Chen, X.**, Mihalas S., Neibur E., Stuphorn V., (2011) “Influence of salience on value-based decision-making.” Poster presented at SFN, DC, USA.
19. **Chen, X.**, Mihalas S., Scangos K.W., Stuphorn V. (2010) “Pre-supplementary and supplementary motor cortex exerts both proactive and reactive control of arm movements.” Poster presented at SFN, San Diego, USA.

## **Selected Honors**

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National Institute of Health Path Way to Independence Award	2019
Best paper awards Finalist, IEEE EMBS Conference on Neural Engineering	2019
Selected AAAS member through the AAAS/Science Program for Excellence in Science	2019
Graduate teaching assistant fellowship, Johns Hopkins University	2008-2013
Professional scholarship, Tsinghua University	2005-2008
Best paper awards for young scientist, China BME Joint Annual Conference	2007
Summa cum Laude, Huazhong Univ. of Sci. and Tech.	2005
National Certification of Computer Software: Programmer, China	2004
Distinguished Chinese Students, Hewlett-Packard Scholarship (75 in total in China)	2004

## **Selected Media Coverage**

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<b>NPR All Things Considered</b> <i>In Lab Turned Casino, Gambling Monkeys Help Scientists Find Risk-Taking Brain Area.</i>	Sept., 20, 2018
<b>Washington Post,</b> <i>Gambling monkeys may provide clues to why humans take risks.</i>	Sept., 28, 2018
<b>Scientific American Podcast,</b> <i>”Gambling Brain” Studies Make Clear Why It’s Hard to Stop Rolling the Dice.</i>	Sept., 21, 2018
<b>The Times of London,</b> <i>Monkeys give clue to help for gamblers.</i>	Sept., 21, 2018
<b>Discover,</b> <i>Gambling Monkeys Shed Light on Risky Behavior.</i>	Sept., 20, 2018

## Outreach and Service

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<b>Reviewer</b> for <i>Computational and Systems Neuroscience</i> (Cosyne)	2019-present
<b>Invited speaker</b> for NeuroPixels - Meet The Experts Session (acute macaque) (SFN)	Oct. 2019
<b>Invited speaker</b> for Qian Zheng Memorial (Women in STEM) Scholarship.	Oct. 2019
<b>Student host</b> for Stanford Neurosciences Institute seminar series.	Feb. 2016
<b>Ad Hoc Reviewer</b> for Journal of Neurophysiology, Journal of Neuroscience, PLOS Computational Biology, Frontiers in Systems Neuroscience.	2015-present
<b>Graduate Steering Committee</b>	
Department of Psychology and Brain Sciences, Johns Hopkins University, Baltimore	2009-2012
<b>Teaching Volunteer</b> “ <i>Science Enrichment</i> ” at Village Learning Place, Baltimore	2013 Summer
<b>Teaching Volunteer</b> “ <i>Science Enrichment</i> ” at an elementary school for low-income children, Beijing	2007