

Jude Francis Mitchell, Ph.D.
Curriculum Vitae
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Research and Teaching Interests

Neurophysiology, Animal Behavior, Psychophysics, Neural Modeling, Statistics and Methodology

Education

- 1996-2002 University of California at San Diego, Department of Cognitive Science
San Diego, CA**
Ph.D., Cognitive Science
- 1990-1994 Harvard University
Cambridge, MA**
B.S., Electrical Engineering

Awards and Support

- 2012-2013 Kavli Institute Innovative Research Grant, Lead-PI, \$30,000
Developing marmosets as a model for visual neuroscience,
with an eye towards primate optogenetics.
- 2010-2012 Swartz Foundation Grant, Fellowship Recipient, \$55,000
Normalization Circuits and Spiking Models of Attention
- 2003-2005 NIH Training Fellowship in Cognitive Neuroscience, UCSD
Neuronal Mechanisms of Spatial Attention in the Macaque
- 1996-1999 NSF Graduate Student Fellowship, UCSD
Neuronal Models of Saccade Planning and Spatial Working Memory

Patent

Patent No. 61/727,599. *Electrode and method of use*. Filed November 17, 2013.

Research Experience

- 2013-2014 Salk Institute Innovations Grant, Staff Scientist, The Salk Institute
Collaborating with Dr. Ed Callaway at Salk and Dr. Cory Miller at UCSD.
Development of optogenetics in the marmoset to study visual processing
- Can we distinguishing neuronal identity using optogenetic stimulation?
 - Can optogenetic stimulation modulate choice behavior in the marmoset?

- 2012-2013 Kavli Innovations Grant, Staff Scientist, The Salk Institute for Biological Studies
Collaborating with Dr. Cory Miller, Psychology Dept., UCSD
The marmoset as a model for primate optogenetics and visual neuroscience
- How do head-restrained marmosets perform in visual behavioral tasks?
- 2010-2011 Staff Scientist, The Salk Institute for Biological Studies
Computational models of selective attention
- What gives rise to correlated activity in recurrent networks?
- 2006-2010 Senior Research Associate, The Salk Institute for Biological Studies
Neural mechanisms of spatial attention
- How does attention alter variability of neuronal responses?
- How does attention modulation differ by cell class and laminar position?
- 2002 - 2006 Post-doctoral training at the Salk Institute with John Reynolds
Collaborating with Gene Stoner, Salk Institute, and with Steve Hillyard, UCSD
Object-based attention in visual psychophysics and ERP
- How does selection of a surface improve perception of its features?
- What stages of visual processing are modulated by surface selection?
- 1996 - 2002 Doctoral Thesis at UCSD with David Zipser
Neural network modeling of target selection and saccade planning
- How do oculomotor areas coordinate activity in target selection?
- 1994 - 1995 Analysis of semi-periodic signals in noisy time-series
Brigham Women's Hospital, Richard Kronauer and Emery Brown
- Programming maximum likelihood regressions on semi-periodic sleep data.
- 1992 - 1994 Multi-compartment models of single neurons
Electrical Engineering Dept, Harvard University, Richard Kronauer
- Programming a graphical user interface (GUI) and numerical methods to
construct and simulate multi-compartment Hodgkin-Huxley neuron models.

Teaching Experience

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| 2002 | Course Instructor | Cognitive Science Dept, UCSD |
| | | Neural networks and models of cognition |
| 2000–2001 | Course Instructor | Cognitive Science Dept, UCSD |
| | | Introduction to probability and statistics |
| 1999 | Teaching Assistant | Cognitive Science Dept, UCSD |
| | | Neurobiology of cognition |
| 1998-1999 | Teaching Assistant | Cognitive Science Dept, UCSD |
| | | Research seminar in neural networks |
| 1996-1998 | Teaching Assistant | Cognitive Science Dept, UCSD |
| | | Introduction to experimental design and statistics |

Consulting Experience

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| 2011 | Brain Corporation, Inc., Eugene Izhikevich | San Diego, CA |
| | | Consulting for the development of biologically realistic models of vision. |

Manuscript Review

Nature
Nature Neuroscience
Neuron
PLoS Computational Biology
PLoS Biology
Neural Computation
Cerebral Cortex

Invited Presentations

- 2013 – Transgenic models of the human brain. Cricks-Jacobs Symposium, La Jolla, CA
- *Active vision in marmosets: a New World for visual neuroscience.*
- 2013 – Invited seminar, Dr. Erika Sasaki and Dr. Hideyuki Okano, Keio University, Japan
- *Mechanisms of attention and the marmoset as a model for visual neuroscience*
- 2013 – Attention and Learning Neuroscience Satellite Meeting, La Jolla, CA
- *Neural mechanisms of spatial attention: reductions of ongoing cortical activity*
- 2013 – Physiology Dept. Seminar, Monash University, Melbourne, Australia
- *Active vision in marmosets: a New World for visual neuroscience*
- 2013 – Neuroscience Dept. Seminar, Duke Medical School, Durham, NC
- *Active vision in marmosets: a New World for visual neuroscience*
- 2013 - Gordon Research Conference, Stonehill College, Easton, MA
- *The role of attention feedback in sensory processing.*
- 2013 – Neuroscience/psychology seminar, University of Arizona, Tucson, AZ.
- *Neural mechanisms of attention.*
- 2013 – Psychology seminar series, Psychology Dept, UCSD, La Jolla, CA.
- *The marmoset as a primate model for visual neuroscience.*
- 2013 – Neuroscience special seminar, Psychology Dept, Vanderbilt U., Nashville, TN.
- *The role of attention feedback in sensory processing.*
- 2013 – Neurobiology seminar series, Zilke Institute, USC, Los Angeles, CA.
- *The role of attention feedback in sensory processing.*
- 2012 – Swartz foundation retreat, La Jolla, CA.
- *A network model of attention-dependent reductions of correlated noise.*
- 2012 – Cognitive neuroscience retreat, La Jolla, CA.
- *A network model of attention in macaque area V4.*
- 2012 – Psychology seminar series, Psychology Dept, UCSD, La Jolla, CA.
- *Attention-dependent reductions of correlated noise in macaque area V4.*
- 2012 – Psychology seminar series, Psychology Dept, University of CA, Riverside CA.
- *Signal improvements due to reductions in correlated variability
: spatial attention and fast perceptual learning.*
- 2011 - Neuromorphic engineering summer school, Telluride, CO.
- *Introduction to the visual system, visual search, and top-down attention.*
- *Spatial attention decorrelations intrinsic noise fluctuations*
- 2010 – Qualcomm research center seminar, San Diego, CA
- *Spatial attention decorrelates intrinsic noise and differs between cell classes*
- 2009 – 15th Annual conference on cognitive and neural systems, Boston, MA
- *Spatial attention decorrelates intrinsic noise fluctuations and reduces burst firing*
- 2009 – COSYNE Workshop, Modulation of cortical response by brain state, Snowbird, UT
- *Spatial attention decorrelates intrinsic noise fluctuations improving signal quality*
- 2008 – Psychology seminar series, Psychology Dept, UCSD, La Jolla, CA
- *Attentional modulation differs between cell classes*
- 2007 – Neuroscience seminar series, Neuroscience Dept, UTSA, San Antonio, TX
- *Attentional modulation reduces variability in firing and differs between classes*

Publications in preparation

1. **Mitchell JF** and Reynolds JH. 'A network model of macaque V4 accounts for attention-dependent reductions in noise correlations' (for detail see <http://www.snl.salk.edu/~jude/Swartz.pdf>.)

Publications

1. **Mitchell JF**, Reynolds JH, and Miller CT (in press). 'Active vision in marmosets: a model system for visual neuroscience.' *J Neurosci*.
2. Anderson EB, **Mitchell JF** and Reynolds JH (2013). 'Attention-dependent reductions in burstiness and action potential height in macaque area V4'. *Nature Neurosci*. 16(8):1125-31.
3. Nandy AS, Sharpee T, Reynolds JH, and **Mitchell JF** (2013). 'The fine structure of shape tuning in area V4'. *Neuron* 78(6):1102-15.
4. Sundberg KA, **Mitchell JF**, Gawne TJ and Reynolds JH (2012). 'Attention influences single unit and local field potential response latencies in visual cortical area V4'. *J Neurosci* 32:16040-50.
5. Anderson EB, **Mitchell JF**, and Reynolds JH (2011). 'Attentional modulation of firing rate varies with burstiness across putative pyramidal neurons in macaque visual area V4'. *J Neurosci* 31:10983-92.
6. Ciaramitaro VM, **Mitchell JF**, Stoner GR, Reynolds JH, and Boynton GM (2010). 'Object-based attention to one of two superimposed surfaces alters responses in human early visual cortex'. *J Neurophysiology* 105: 1258-65.
7. **Mitchell JF**, Sundberg KA, and Reynolds JH (2009). 'Spatial attention decorrelates intrinsic activity fluctuations in macaque area V4'. *Neuron* 63:879-888.
8. Sundberg KA, **Mitchell JF**, and Reynolds JH (2009). 'Spatial attention modulates center-surround interactions in macaque visual area V4'. *Neuron* 61:1-12.
9. Khoe W, **Mitchell JF**, Reynolds JH and Hillyard, SA (2008). 'ERP evidence that surface-based attention biases interocular competition during rivalry'. *Journal of Vision*, 8(3):18.1-11.
10. **Mitchell JF**, Sundberg KA, and Reynolds JH (2007). 'Differential attention-dependent response modulation across cell classes in macaque visual area V4'. *Neuron*, 55: 131-141.
11. Khoe W, **Mitchell JF**, Reynolds JH and Hillyard, SA (2005) 'Exogenous attentional selection of transparent superimposed surfaces modulates early event-related potentials'. *Vision Research*, 45(24):3004-14
12. Stoner GR, **Mitchell JF**, Fallah M and Reynolds JH (2005). 'Interacting competitive selection in attention and binocular rivalry'. *Progress in Brain Research*, 14:227-34.
13. **Mitchell JF**, Stoner GR and Reynolds JH (2004) 'Object-based attention in binocular rivalry'. *Nature*, 2004 May; Vol 429:410-413.
14. **Mitchell JF**, Stoner GR, Fallah M, and Reynolds JH (2003) 'Attentional selection of superimposed surfaces cannot be explained by modulation of the gain of color channels.' *Vision Research*. 2003 Jun;43(12):1323-8.
15. **Mitchell JF**, Zipser D (2003) 'Sequential memory-guided saccades and target selection: A neural model of the frontal eye fields.' *Vision Research*. 2003 43:2669-95.

16. **Mitchell JF**, Zipser D (2001) 'A model of visual-spatial memory across saccades.' *Vision Research*. 2001 41:1575-92.
17. Czeisler CA, Duffy JF, Shanahan TL, Brown EN, **Mitchell JF**, Rimmer DW, Ronda JM, Silva EJ, Allan JS, Emens JS, Dijk DJ, Kronauer RE (1999) 'Age-independent stability, precision, and near-24-hour period of the human circadian pacemaker.' *Science*. 1999 284:1-5.
18. Vassilev PM, **Mitchel JF**, Vassilev M, Kanazirska M, Brown EM (1997) 'Assessment of frequency-dependent alterations in the level of extracellular Ca^{2+} in the synaptic cleft.' *Biophysical Journal*. 1997 72:2103-6.