

# BIJAN PESARAN

## General Information

Nationality: British Citizen  
US Permanent Resident

## Contact Information

Address: 4 Washington Pl. Rm 809  
Center for Neural Science  
New York University  
New York, NY 10003  
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## Research Interests

Investigating brain circuits underlying behavior. Developing techniques to analyze neural activity and behavior. Developing new technologies to treat brain disorders.

## Education

1996 – 2002      PhD. Physics.  
California Institute of Technology. Pasadena, CA.  
Advisor: Partha P. Mitra  
*Analysis of neuronal dynamics in behaving animals*  
1992 – 1995      BA (Hons.) Physics and Theoretical Physics.  
Cambridge University. Cambridge, UK

## Professional Experience

2013 – present      C V Starr Visiting Scholar  
Princeton Neuroscience Institute, Princeton University, NJ  
2012 - present      Associate Professor of Neural Science  
Center for Neural Science. New York University. New York, NY  
2006 - 2012      Assistant Professor of Neural Science  
Center for Neural Science. New York University. New York, NY  
2002 - 2005      Postdoctoral Research Fellow.  
Division of Biology. California Institute of Technology. Pasadena, CA.  
Advisor: Richard A. Andersen  
*Cortical mechanisms of hand-eye coordination*  
1995 - 1999      Senior Technical Associate. Theoretical Physics Research.  
Bell Labs, Lucent Technologies. Murray Hill, NJ.

## Honors and Awards

2010      NSF CAREER Award  
2008      McKnight Scholar Award  
2007      Alfred P. Sloan Research Fellowship

2006	James D. Watson Program Investigator Award
2004	Burroughs Wellcome Fund Career Award in the Biomedical Sciences
1997	National Science Foundation Graduate Research Fellowship
1997	Sloan Center for Theoretical Neurobiology Fellowship
1995	Royal Society Summer Research Fellowship
1994	Nuffield Foundation Summer Research Fellowship
1993	Scholar, Clare College, Cambridge University, UK.
1991	National Merit Scholar

## Publications

### Journal articles

- Banerjee A, Dean HL, **Pesaran B.** (2012) Parametric models to relate spike train and LFP dynamics with neural information processing. *Front Comput Neurosci.* 6:51.
- Madlon-Kay S, **Pesaran B,** Daw ND. (2012) Action selection in multi-effector decision making. *Neuroimage.* 70C:66-79.
- Dean HL, Hagan MA, **Pesaran B.** (2012) Only coherent spiking in posterior parietal cortex coordinates looking and reaching. *Neuron.* 73(4):829-841
- Hagan MA, Dean HL, **Pesaran B.** (2012) Spike-field activity in parietal area LIP during coordinated reach and saccade movements. *J Neurophysiol.* 105(5): 1275-90.
- Gunduz A, Brunner P, Daitch A, Leuthardt EC, Ritaccio AL, **Pesaran B,** Schalk G. (2012) Decoding covert spatial attention using electrocorticographic (ECoG) signals in humans. *Neuroimage.* 60(4):2285-93.
- Markowitz DA, Wong YT, Gray CM, **Pesaran B.** (2011) Optimizing the decoding of movement goals from local field potentials in Macaque cortex. *J Neurosci.* 31(50):18412-22.
- Gunduz A, Brunner P, Daitch A, Leuthardt EC, Ritaccio AL, **Pesaran B,** Schalk G. (2011) Neural correlates of visual-spatial attention in electrocorticographic signals in humans. *Front Hum Neurosci.* 5:89
- Markowitz DA, Wong YT, Shewcraft RA, **Pesaran B.** (2011) Competition for visual selection in the oculomotor system. *J Neurosci.* 31(25):9298-306.
- Dean HL, Marti D, Tsui E, Rinzel JL, **Pesaran B.** (2011) Reaction time correlations during eye-hand coordination: Behavior and modeling. *J Neurosci.* 31(7):2399-412.
- Lee B, **Pesaran B,** Andersen RA. (2011) Area MSTd neurons compensate for visual stimuli in eye coordinates during fixation and pursuit. *J Neurophysiol.* 105(1):60-8.

- Banerjee A, Dean HL, **Pesaran B**. (2010) A likelihood method for computing selection times in spiking and local field potential activity. *J Neurophysiol.* 104(6):3705-20.
- Pesaran B**, Nelson MJ, Andersen RA. (2010) A relative position code for saccades in dorsal premotor cortex. *J Neurosci.* 30(19):6527-37.
- Gershman S, **Pesaran B**, Daw N. (2009) Human reinforcement learning subdivides structured action spaces by learning effector-specific values. *J Neurosci.* 29(43):13524-31.
- Pesaran B**, Nelson MJ, Andersen RA. (2008) Free choice activates a decision circuit between frontal and parietal cortex. *Nature.* 453(7103):406-409.
- Lee B, **Pesaran B**, Andersen RA. (2007) Translation speed compensation in MSTd. *J Neurosci.* 27(10):2582-91.
- Pesaran B**, Nelson MJ, Andersen RA. (2006) Dorsal premotor cortex encodes the relative position of the hand, eye and goal before reaches. *Neuron.* 51:125-134.
- Bokil H, **Pesaran B**, Andersen RA, Mitra PP. (2006) A framework for the detection and classification of events in neural activity. *IEEE Trans Biomed Eng.* 53(8):1678-1688.
- Scherberger H, Fineman I, Musallam S, Dubowitz DJ, Bernheim KA, **Pesaran B**, Corneil BD, Gillikan B, Andersen RA. (2003) Magnetic resonance image-guided implantation of chronic recording electrodes in the macaque intraparietal sulcus. *J Neurosci Methods.* **130**:1-8
- Shenoy KV, Meeker D, Cao S, Kureishi S, **Pesaran B**, Buneo C, Batista AP, Mitra PP, Burdick JW, Andersen RA. (2003) Neural prosthetic control signals from plan activity. *Neuroreport.* **14**:591-596.
- Pesaran B**, Pezaris J, Sahani M, Mitra PP, Andersen RA. (2002) Temporal structure in neuronal activity during working memory in macaque parietal cortex. *Nature Neurosci.* **5**:805-811.
- Tchernikovski O, Nottebohm F, Ho CE, **Pesaran B**, Mitra PP. (2000) A procedure for an automated measurement of song similarity. *Animal Behaviour.* **59**:1167-1176.
- Mitra PP, **Pesaran B**. (1999) Analysis of dynamic brain imaging data. *Biophys J.* **76**:691-708.
- Fee MS, Shraiman B, **Pesaran B**, Mitra PP. (1998) The role of nonlinear dynamics of the syrinx in the vocalizations of a songbird. *Nature.* **395**:67-71.
- Precht J, Cohen LB, **Pesaran B**, Mitra PP, Kleinfeld D. (1997) Visual stimuli induce waves of electrical activity in turtle cortex. *Proc Natl Acad Sci. USA.* **94(14)**:7621-7626.

## Peer-reviewed Conference Proceedings

Wong YT, Vigeral M, Putrino D, Pfau D, Merel J, Paninski L, **Pesaran B**. Decoding arm and hand movements across layers of the macaque frontal cortices. *Conf Proc IEEE Eng Med Biol Soc*. 1757-60.

Putrino D, Wong YT, Vigeral M, **Pesaran B**. (2012) Development of a closed-loop feedback system for real-time control of a high-dimensional Brain Machine Interface. *Conf Proc IEEE Eng Med Biol Soc*. 4567-70.

Wong YT, Hagan MA, Markowitz DA, **Pesaran B**. (2011) Tracking reaches in three-dimensions. *Conf Proc IEEE Eng Med Biol Soc*. 5440-3.

Markowitz DA, Wong YT, Gray CM, **Pesaran B**. (2011) Optimizing the decoding of movement goals from local field potentials in Macaque cortex. *IEEE-EMBS Conference on Neural Engineering*.

### **Book Chapters**

**Pesaran B**, Sornborger AT, Nishimura N, Kleinfeld DK, Mitra PP. (2005) Analysis of dynamic optical imaging data. In: *Imaging living cells*. Eds. Konnerth A and Yuste R. CSHL Press.

Andersen RA, Meeker D, **Pesaran B**, Breznen B, Buneo C, Scherberger H. (2003) Sensory-motor transformations in the posterior parietal cortex. In: *The new cognitive neurosciences*. Ed. Gazzaniga MS. MIT Press.

### **Reviews**

**Pesaran B**. (2010) Neural correlations, decisions and actions. *Curr Opin Neurobiol*. 20(2):166-171

**Pesaran B**, Kleinfeld D. (2009) Enter the ratrix. *Proc Natl Acad Sci U S A*. 106(46):19209-19210

**Pesaran B**. (2009) Uncovering the mysterious origin of local field potentials. *Neuron*. 61(1):1-2

**Pesaran B**, Movshon JA. (2008) What to do or how to do it? *Neuron*. 58(3):301-303

**Pesaran B**, Musallam S, Andersen RA. (2006) Cognitive neural prosthetics. *Curr Biol*. 16: R77-R80

Andersen RA, Musallam S, **Pesaran B**. (2004) Selecting signals for neural prosthetics. *Curr Opin Neurobiol*.14(6):720-726

Andersen RA, Burdick JW, Musallam S, **Pesaran B**, Cham JG. (2004) Cognitive neural prosthetics. *Trends Cog Sci*. **8**:486-493

## Invited Talks

- 2013 Conference on Brain Dynamics, Boston MA (upcoming)
- 2013 Gordon Research Conference on Eye Movements, Easton, MA (upcoming)
- 2013 IEEE EMBC, Osaka, Japan (upcoming)
- 2013 Bodeian Seminar, Johns Hopkins University, Baltimore, MD (upcoming)
- 2013 Neuroscience Seminar, Universite de Montreal, Montreal Canada (upcoming)
- 2013 Neuroscience Seminar, State University of New York, Stony Brook, NY (upcoming)
- 2013 Neuroscience Seminar, Georgia Health Sciences University, Augusta GA
- 2012 DARPA ReNET Meeting, New Orleans, LA
- 2012 Brain Dynamics and Decision Making Conference, Ascona, Switzerland
- 2012 Frontiers in Applied and Computational Mathematics Conference, New Jersey Institute of Technology, Newark, NJ
- 2012 Systems Neuroscience Seminar, Northwestern School of Medicine, Evanston, IL
- 2011 DARPA ReNET Meeting, Austin, TX
- 2011 Neuroscience Symposium, Rutgers University, NJ
- 2011 Conference on Motor Control, Janelia Farm, MD
- 2011 McKnight Conference, Aspen, CO
- 2011 IEEE-EMBS Neural Engineering Conference, Cancun, Mexico
- 2011 Neuroscience Institute Retreat, New York University Medical Center, Mohonk, NY
- 2011 Neuroscience Seminar, Laboratory of Neuropsychology, NIMH, Bethesda, MD
- 2010 Neuroscience Colloquium, SUNY-College of Optometry, New York, NY
- 2010 Neuroscience Colloquium, CUNY-Queens College, New York, NY
- 2010 Skirball Institute Retreat, New York University Medical Center, Cranwell MA
- 2010 Computational Neuroscience Seminar, Yale University, New Haven, CT
- 2010 Neural Prosthesis Seminar, Cleveland FES Center, Cleveland, OH
- 2010 AREADNE, Santorini, Greece
- 2010 Swart Foundation Annual Meeting, Yale University, New Haven, CT
- 2010 Cognitive Neuroscience Society Symposium presentation, Montreal, Canada
- 2010 Computational Neuroscience Seminar, University of Chicago, Chicago, IL
- 2010 Conference on Neurocognitive Networks, Florida Atlantic University, Boca Raton, FL
- 2010 Neuroscience Seminar, Wadsworth Center, Albany, NY
- 2009 Signals and systems conference, Asilomar, CA
- 2009 Neuroscience Colloquium, New York University Medical Center, New York, NY
- 2009 Science Focus Day, Center for Neural Science, New York University, New York, NY
- 2008 Neuroeconomics Seminar, New York University, New York, NY
- 2008 Japanese-American Kavli Frontiers of Science participant, Irvine, CA
- 2008 Society for Neuroscience Short Course on Neural Signal Processing, Washington, DC
- 2008 MSTP Seminar, New York University Medical Center, NY
- 2007 NIPS Workshop "Large Scale Brain Dynamics", Whistler, Canada
- 2007 Mathematics Seminar, New Jersey Institute of Technology, Newark, NJ
- 2007 Graduate School of Neurosciences, Autumn School, Wildbad Kreuth, Germany
- 2007 Department of Mathematics, Indian Institute of Science, Bangalore, India
- 2007 School of Cognitive Sciences, IPM, Tehran, Iran
- 2007 Center for Vision Research Conference, York University, York, Canada

2006 Center for Theoretical Neuroscience, Columbia University, New York, NY  
 2006 Dynamical Neuroscience Symposium, Society for Neuroscience Meeting, Atlanta GA  
 2006 Neuroscience Seminar, Princeton University, Princeton, NJ  
 2006 Computational and Systems Neuroscience Meeting, Park City UT  
 2005 Neuroeconomics Seminar, New York University, NY  
 2005 Gatsby Computational Neuroscience Unit, London, UK  
 2005 Gordon Research Conference on Neuroethology, Oxford University, Oxford, UK  
 2005 Center for Neural Science, New York University, New York, NY  
 2005 Department of Physiology and Biophysics, University of Washington, Seattle, WA  
 2005 Picower Center for Learning and Memory, Massachusetts Institute of Technology, MA  
 2004 Computational and Systems Neuroscience Meeting, Cold Spring Harbor, NY  
 2004 Institute of Neurology, University College, University of London, UK  
 2003 Brain-Computer Interface Symposium, Society for Neuroscience, New Orleans, LA  
 2003 Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, MA  
 2003 Sloan-Swartz Center for Theoretical Neurobiology Meeting, Salk Institute, CA  
 2003 Psychology Seminar, Princeton University, Princeton NJ  
 2003 Center for Learning and Memory, University of California, Irvine  
 2001 Neyman Seminar, Department of Statistics, University of California, Berkeley, CA

## Teaching Experience

2011 Special Topics: Sensory-Motor Integration, Center for Neural Science, New York  
 2010,1012 Special Topics: Neuronal Dynamics, Center for Neural Science, New York  
 2008-11 Behavioral Integrative Neuroscience, Center for Neural Science, New York  
 University  
 2007 Statistical Analysis and Modeling of Neural Data, Center for Neural Science,  
 New York University  
 2008 – 2011 Behavior and Cognition, Psychology, New York University  
 2006 - 2011 Sensory and Motor Systems, Center for Neural Science, New York University  
 2010 Course Lecturer. CNCT, University of Michigan, Ann Arbor, MI.  
 1997 - 2011 Course Lecturer. Neuroinformatics. Marine Biology Laboratories. Woods Hole,  
 MA.  
 2002 Course Lecturer. Biology 15. Topics in Biology. Caltech, Pasadena, CA.  
 1998 - 99 Teaching Assistant. Applied Physics 77. Applied Physics Lab. Caltech,  
 Pasadena, CA  
 1997 - 99 Teaching Assistant. Physics 2. Quantum Mechanics. Caltech. Pasadena, CA

## Committee Service

Ilan Dinstein Thesis committee (NYU Center for Neural Science)  
 Jacqueline Fulvio Thesis committee (NYU Psychology)  
 Nick Gustafson Thesis committee (NYU Center for Neural Science)  
 Akiko Ikkai Thesis committee (NYU Psychology)  
 Brian Quinn Thesis committee (NYU Center for Neural Science)  
 Riju Srimal Thesis committee (NYU Psychology)  
 Kyeong Jin Tark Thesis committee (NYU Psychology)

Stephanie Lazzaro Thesis committee (NYU Center for Neural Science)  
Hadley Tassinari Thesis committee (NYU Psychology)

2009 - 2010 New York University Langone Medical Center CTSI Scientific Review Committee  
2009 - 2011 New York University Committee on Student Discipline  
2011 New York University Sub-committee on Academic Integrity  
2009 – 2011 New York University Deans Undergraduate Research Fund Committee  
2011 BCI Conference Steering Committee  
2006 - 2008, 2011 COSYNE Conference Program Committee

## Teaching Service

**Center for Neural Science Rotation students:** Stephanie Lazzaro, Deep Ganguli, Maureen Hagan, Basma Radwan, Sara Steele, Ryan Shewcraft  
**Center for Neural Science Undergraduate Thesis:** Rana Mady, Boris Revechkis, Margaret Fabiszak, Eugene Novikov  
**SURP Undergraduate Students:** Bridget diPrisco, Peter Bowling, Ben Poole

## Reviewer Service

Nature, Nature Neuroscience, Neuron, Proceedings of the National Academy of Science U S A, Journal of Neuroscience, Journal of Neurophysiology, Current Biology, Journal of Neuroscience Methods, Journal of Physiology, Journal of Neural Engineering, PLOS Biology, IEEE Transactions on Biomedical Engineering, IEEE TNRSE, NSF Bio-DSPP Panel, NSF CRCNS Panel, NSF CogNeuro Panel, ARO Panel, NIH NRSA Panel.

## Patents

**Pesaran B** and Andersen RA (2010) Prosthetic devices and methods and system related thereto.  
**Pesaran B** and Andersen RA (2010) Prosthetic devices and methods and system related thereto.  
**Pesaran B**, Mitra PP and Andersen RA (2005) A neural prosthetic using temporal structure in the local field potential.  
**Pesaran B**, Andersen RA, Shenoy KV, Meeker D, Cao S, Burdick JW and Mitra PP (2005) Cognitive state machine for prosthetic systems.  
**Pesaran B**, Mitra PP and Andersen RA (2002) A neural prosthetic using temporal structure in the local field potential.  
**Pesaran B**, Fee MS, Ho CE, and Mitra PP (2001) Speech processing technique for use in speech recognition and speech coding.

## Current research support

**DARPA Re-NET Program (PI Pesaran)** 10/1/11 – 9/30/14  
“Reliable, high-bandwidth cortical control of unconstrained, many-degree-of-freedom movement”

**NIMH R01 CRCNS Program (PI Dr Nathaniel Daw, Co-PI Pesaran)** 9/1/09-8/31/14

“Reinforcement learning in multi-dimensional action spaces”	
<b>NSF CAREER Award (PI Pesaran)</b>	6/1/10-5/31/15
“Neural circuit mechanisms of coordinated eye and hand movements”	
<b>NIDCD R03 (PI Pesaran)</b>	12/1/09-11/31/13
“Auditory-articulatory representations for speech production”	
<b>Burroughs-Wellcome Fund Career Award (PI Pesaran)</b>	9/1/04-9/1/13
“Cortical mechanisms for hand-eye coordination”	
<b>Previous research support</b>	
<b>Sloan Research Fellowship (PI Pesaran)</b>	9/1/07-8/31/12
<b>McKnight Scholar Award (PI Pesaran)</b>	6/1/08-5/31/12
“Deciding where to look and where to reach”	
<b>NIH NCRR SIG (PI Glimcher. Co-I Pesaran)</b>	5/1/07-4/31/08
“An image-guided neurosurgical workstation”	
<b>James D. Watson Program Investigator Award (PI Pesaran)</b>	3/1/07-2/28/09
“Optimizing brain-computer interfaces for clinical applications”	