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# CURRICULUM VITAE

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LEE M. MILLER

## Personal Information

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## Areas of Interest

### **Auditory Perception and Speech Recognition**

I study the neural bases of auditory perception and speech recognition. My neuro-engineering research uses techniques such as EEG, functional MRI, and machine learning to translate fundamental scientific results into real-world solutions for people with hearing loss. Among our current projects are a patent-pending brain-based hearing loss diagnostic, an investigation into the auditory-visual brains of children with cochlear implants, and a wearable "attentional prosthesis" with mobile app that will help listeners understand speech in noisy environments.

## Education

### Education and Training

1994-2001	University of California, San Francisco & Berkeley, CA, PhD, Bioengineering (systems neuroscience) (PI: Christoph Schreiner)
1993-1994	Philipps-Universitat, Marburg, Germany, Fulbright Fellowship in Physics (Quantum Chaos)
1989-1993	Duke University, Durham, NC, BS, Physics, summa cum laude

## Employment

### Employment History

7/2019-present	University of California, Davis, CA, Professor
7/2010-6/2019	University of California, Davis, CA, Assoc. Professor
8/2011-1/2012	University of Lausanne, Lausanne, Switzerland, Visiting Professor
7/2004-6/2010	University of California, Davis, CA, Asst. Professor

6/2001-6/2004	University of California, Berkeley, CA, Postdoctoral fellow
8/1993-8/1994	Philipps-Universitat, Marburg, Germany, Fulbright Fellow (Physics)

## Grants and Contracts

### Grants Active

07/01/2015 - 06/30/2020	Grant #R01-DC014767, \$1,892,955, Co-Principal Investigator, Determinants of Cross Modal Plasticity in Children with Cochlear Implants, Corina (Principal Investigator), NIH/NIDCD, Percentage Effort=17%
12/01/2014 - 11/30/2019	Grant #R01- DC013543, \$1,887,337, Co-Investigator, Audiovisual integration for spoken language in adverse listening situations, Shahin (Principal Investigator), NIH/NIDCD, Percentage Effort=12.5%
5/01/2018 - 04/30/2019	\$58,861, Principal Investigator, Audio-Visual Augmented Reality to Enhance Speech Perception, Google Faculty Research Award
1/1/2018 - 06/30/2019	Grant #HAA-258799-18, \$75,000, Collaborator, Tools for Listening to Texts-in-Performance, Macarthur (Principal Investigator), National Endowment for the Humanities (NEH): Digital Humanities Advancement Grant
10/18/2018 - 06/15/2019	\$5,000, Principal Investigator, Audio-Visual Augmented Reality to Enhance Speech Perception, Google Cloud Research Credits

## Honors & Awards

1993	Graduation with Distinction in Physics, summa cum laude. Duke Univ., Durham, NC
1993-1994	Fulbright Research Fellowship in Physics. Marburg, Germany
1994-1999	Whitaker Foundation Graduate Fellowship in Biomedical Engineering
1996	Full scholarship to Summer Research Seminar "Mind, Body, Brain" with Professor of Philosophy John Searle. Univ. Calif., Berkeley
1998	National Science Foundation travel grant to NATO Advanced Studies Institute on Computational Hearing. Barga, Italy
2002	National Science Foundation travel grant to NATO Advanced Studies Institute on Dynamics of Speech Production and Perception. Barga, Italy
2002-2004	National Institutes of Health, Ruth L. Kirschstein National Research Service Award, through the National Institute on Deafness and other Communication Disorders

2003	Award for outstanding scientific contribution to the International Conference on Auditory Cortex: Toward a synthesis of human and animal research. Magdeburg, Germany
2007	Chair of "Auditory Cortex" Session, Society for Neuroscience Annual Meeting
2011	Swiss National Science Foundation (SNSF) International Short Visit award
2012	Academic Senate Research Travel Award (to Lausanne, Switzerland)

## Publications

### Journals

2000	<b>Miller LM</b> , Schreiner CE. Stimulus-based state control in the thalamocortical system. <u>The Journal of Neuroscience</u> , 20(18): 7011-7016.
2001	<b>Miller LM</b> , Escabí MA, Read HL, Schreiner CE. Functional convergence of response properties in the auditory thalamocortical system. <u>Neuron</u> , 32(1): 151-160.
2001	<b>Miller LM</b> , Escabí MA, Schreiner CE. Feature selectivity and interneuronal cooperation in the thalamocortical system. <u>The Journal of Neuroscience</u> , 21(20): 8136-8144.
2002	<b>Miller LM</b> , Escabí MA, Read HL, Schreiner CE. Spectrotemporal receptive fields in the lemniscal auditory thalamus and cortex. <u>The Journal of Neurophysiology</u> , 87(1): 516-527.
2003	Escabí MA, <b>Miller LM</b> , Read HL, Schreiner CE. Naturalistic auditory contrast improves spectrotemporal coding in the cat inferior colliculus. <u>The Journal of Neuroscience</u> , 23(37): 11489-11504.
2004	Sun FT, <b>Miller LM</b> , D'Esposito M. Measuring interregional functional connectivity using coherence and partial coherence analyses of fMRI data. <u>Neuroimage</u> , 21(2): 647-658.
2005	Curtis CE, Sun FT, <b>Miller LM</b> , D'Esposito M. Coherence between fMRI time-series distinguishes two spatial working memory networks. <u>Neuroimage</u> , 26(1): 177-183.
2005	<b>Miller LM</b> , D'Esposito M. Perceptual fusion and stimulus coincidence in the cross-modal integration of speech. <u>The Journal of Neuroscience</u> , 25(25): 5884-5893.
2005	Escabi MA, Nassiri R, <b>Miller LM</b> , Schreiner CE, Read HL. The contribution of spike threshold to acoustic feature selectivity, spike information content, and information throughput. <u>The Journal of Neuroscience</u> , 25(41): 9524-9534.

- 2005 **Miller LM**, Sun FT, Curtis CE, D'Esposito M. Functional interactions between oculomotor regions during prosaccades and antisaccades. Human Brain Mapping, 26(2): 119-127.
- 2005 Sun FT, **Miller LM**, D'Esposito M. Measuring temporal dynamics of functional networks using phase spectrum of fMRI data. Neuroimage, 28(1): 227-237.
- 2005 Winer JA, **Miller LM**, Lee CC, Schreiner CE. Auditory thalamocortical transformation: structure and function. Trends in Neurosciences, 28(5): 255-263.
- 2006 Sun FT, **Miller LM**, Rao AA, D'Esposito M. Functional connectivity of cortical networks involved in bimanual motor sequence learning. Cerebral Cortex, 17(5): 1227-1234.
- 2007 Shahin AJ, Roberts LE, **Miller LM**, McDonald KL, Alain C. Sensitivity of EEG and MEG to the N1 and P2 auditory evoked responses modulated by spectral complexity of sounds. Brain Topography, 20(2): 55-61.
- 2008 Shahin AJ, Roberts LE, Chau W, Trainor LJ, **Miller LM**. Music training leads to the development of timbre-specific gamma band activity. Neuroimage, 41(1): 113-122.
- 2008 Read HL, **Miller LM**, Schreiner CE, Winer JA. Two thalamic pathways to primary auditory cortex. Neuroscience, 152(1): 151-159.
- 2008 Bishop CW, **Miller LM**. A multisensory cortical network for understanding speech in noise. Journal of Cognitive Neuroscience, 21(9): 1790-1804.
- 2009 Shahin AJ, Bishop CW, **Miller LM**. Neural mechanisms for illusory filling-in of degraded speech. Neuroimage, 44(3): 1133-1143.
- 2009 Shahin AJ, Picton TW, **Miller LM**. Brain oscillations during semantic evaluation of speech. Brain and Cognition, 70(3): 259-266.
- 2009 Shahin AJ, **Miller LM**. Multisensory integration enhances phonemic restoration. The Journal of the Acoustical Society of America, 125(3): 1744-1750.
- 2009 **Miller LM**, Recanzone GH. Populations of auditory cortical neurons can accurately encode acoustic space across stimulus intensity. Proceedings of the National Academy of Sciences of the United States of America, 106(14): 5931-5935.
- 2009 Hill KT, **Miller LM**. Auditory attentional control and selection during cocktail party listening. Cerebral Cortex, 20(3): 583-590.

- 2010 Shahin AJ, Trainor LJ, Roberts LE, Backer KC, **Miller LM**. Development of auditory phase-locked activity for music sounds. Journal of Neurophysiology, 103(1): 218-229.
- 2010 Kerlin JR, Shahin AJ, **Miller LM**. Attentional gain control of ongoing cortical speech representations in a "cocktail party" The Journal of Neuroscience, 30(2): 620-628.
- 2010 Backer KC, Hill KT, Shahin AJ, **Miller LM**. Neural time course of echo suppression in humans. The Journal of Neuroscience, 30(5): 1905-1913.
- 2011 Read HL, Nauen DW, Escabí MA, **Miller LM**, Schreiner CE, Winer JA. Distinct core thalamocortical pathways to central and dorsal primary auditory cortex. Hearing Research, 274(1-2): 95-104.
- 2011 Bishop CW, London S, **Miller LM**. Visual influences on echo suppression. Current Biology, 21(3): 221-225.
- 2011 Hill KT, Bishop CW, Yadav D, **Miller LM**. Pattern of BOLD signal in auditory cortex relates acoustic response to perceptual streaming. BMC Neuroscience, 12(1): 85.
- 2011 Bishop CW, **Miller LM**. Speech cues contribute to audiovisual spatial integration. PLoS ONE, 6(8): e24016.
- 2011 Shahin AJ, Kerlin JR, Bhat J, **Miller LM**. Neural restoration of degraded audiovisual speech. NeuroImage, 60(1): 530-538.
- 2012 Campbell T, Kerlin JR, Bishop CW, **Miller LM**. Methods to Eliminate Stimulus Transduction Artifact From Insert Earphones During Electroencephalography. Ear and Hearing, 33(1): 144-150.
- 2012 Hill KT, Bishop CW, **Miller LM**. Auditory grouping mechanisms reflect a sound's relative position in a sequence. Frontiers in Human Neuroscience, 6: 158.
- 2012 Bishop CW, London S, **Miller LM**. Neural time course of visually enhanced echo suppression. Journal of Neurophysiology, 108(7): 1869-1883.
- 2013 London S, Bishop CW, **Miller LM**. Spatial attention modulates the precedence effect. Journal of Experimental Psychology: Human Perception and Performance, 38(6): 1371-79.
- 2013 Da Costa S, Van der Zwaag W, **Miller LM**, Clarke S, Saenz M. Tuning in to sound: frequency-selective attentional filter in human primary auditory cortex. The Journal of Neuroscience, 33(5): 1858-63.
- 2013 **Miller LM**. Shaken, not stirred: emergence of neural selectivity in a "cocktail party" Neuron, 77(5): 806-809.

- 2014 Bishop CW, Yadav D, London S, **Miller LM**. The effects of preceding lead-alone and lag-alone click trains on the buildup of echo suppression. The Journal of the Acoustical Society of America, 136(2): 803-17.
- 2015 Bhat J, **Miller LM**, Pitt MA, Shahin AJ. Putative mechanisms mediating tolerance for audiovisual stimulus onset asynchrony. Journal of Neurophysiology, 113(5): 1437-1450.
- 2016 Van Diepen R, **Miller LM**, Mazaheri A, Geng J. The role of alpha activity in spatial and featured-based attention. eNeuro, 3(5): 0204-0216.
- 2018 MacArthur MJ, Zellou G, **Miller LM**. Beyond Poet Voice: Sampling the (Non-) Performance Styles of 100 American Poets. Journal of Cultural Analytics.
- 2018 Anderson MH\*, Yazel BW\*, Stickle MPF, Espinosa Iñiguez FD, Gutierrez NG, Slaney M, Joshi SS, **Miller LM**. Towards mobile gaze-directed beamforming: a novel neuro-technology for hearing loss. Proc IEEE Engineering in Medicine and Biology Society Conference 2018.

### **Journals In Press**

- 2019 Backer KB, Kessler AS, Lawyer LA, Corina DP, **Miller LM**. A Novel EEG Paradigm to Simultaneously and Rapidly Assess the Functioning of Auditory and Visual Pathways. \*\* IN PRESS \*\*

### **Book Chapters**

- 2001 **Miller LM**, Escabí MA, Schreiner CE: Synchronous oscillations in the thalamocortical system and the effects of naturalistic ripple stimuli, S. Greenberg and M. Slaney, (ed), Computational Models of Auditory Function, IOS Press, 253-264.
- 2009 **Miller LM**: Speech Perception: Physiological, E. Bruce Goldstein, (ed), Encyclopedia of Perception, Sage Publications, Inc., London; Thousand Oaks, CA; New Delhi; Singapore.
- 2015 **Miller LM**: Neural mechanisms of attention to speech, Hickok G and Small S, (ed), Neurobiology of Language, Elsevier.

### **Alternative Media**

- 2016 Macarthur MJ, **Miller LM**: Vocal Deformation and Performative Speech, or In Different Voices, Sounding Out! Sound Studies Blog.
- 2018 Macarthur MJ, **Miller LM**: After Scansion: Visualizing, Deforming, and Listening to Poetic Prosody, Arcade (Colloquy Series).
- 2018 **Miller LM**: Vocal Analysis Tools, github.com.

## **Presentations**

2003                      How experience affects the brain, Univ. of the Pacific Family Camp, Graeagle, CA.

## **Patents Filed**

2015                      Miller, LM Moore, BDM Bishop, CW. Frequency-multiplexed speech: hierarchical neural characterization of continuous speech processing (provisional patent filed 2014/07).  
U.S. Patent Application PCT/US15/40629 filed Jul 15, 2015

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