

# Liberty S. Hamilton

## Curriculum Vitae

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### Current Position

2014–present **Postdoctoral Fellow**, *Department of Neurosurgery, University of California, San Francisco, San Francisco, California, Laboratory of Dr. Edward F. Chang.*

### Education

2008–2013 **PhD, Neuroscience**, *University of California, Berkeley, Berkeley, California, Laboratory of Dr. Shaowen Bao.*

Dissertation title: Modulation and manipulation of sound representation in the auditory cortex.

2002–2006 **BA, Neuroscience**, *Scripps College, Claremont, California.*

*Cum laude.* Additional concentrations in Spanish and Music (piano performance).

### Research Positions

2014–present **Postdoctoral Fellow**, *University of California, San Francisco, San Francisco, CA. Laboratory of Dr. Edward F. Chang.*

- Experience with acquisition and analysis of chronic and intraoperative intracranial recordings (electrocorticography or ECoG) from human patients with intractable epilepsy.
- Using computational models to describe representation of acoustic and phonetic features in the human auditory cortex as well as their spatial topography.
- Investigating neuronal dynamics underlying auditory working memory using electrocorticography.

2008–2013 **Graduate Student Researcher**, *University of California, Berkeley, Berkeley, CA. Laboratory of Dr. Shaowen Bao.*

- Used optogenetics and computational models (linear regression, Ising/maximum entropy models) to describe how neurons communicate in networks in the auditory cortex.
- Compared selectivity of neurons to natural and artificial sound stimuli using spectrotemporal receptive field and classical receptive field models.
- Used multidimensional scaling, discriminant function analysis, and linear regression to describe which physical properties of sound are related to the perception of musical timbre.

2006–2008 **Staff Research Associate**, *Laboratory of Neuro Imaging at UCLA (LONI), Los Angeles, CA. Laboratory of Dr. Katherine Narr.*

- Analysis of structural MRI, functional MRI, and DTI data in patients with schizophrenia, bipolar disorder, autism, depression, and diabetes.
- fMRI and DTI analysis in FSL, SPM5, MNI tools, and using in-house software (Automated Image Registration, LONI pipeline)

### Honors and awards

2015 **Swartz Fellow** representative from UCSF for Swartz Computational Meeting 2015.

- 2014 **Ruth L. Kirschstein National Research Service Award** (NRSA F32 – 1F32DC014192-01). Project title: The spatiotemporal dynamics of cortical speech representation. (\$154,662 for three years of research. Impact score: 10.)
- 2014 **Cosyne Travel Fellowship**. Computational and Systems Neuroscience Conference, Salt Lake City, Utah. February 2014. (\$500)
- 2012 **Society for Neuroscience Student Travel Award**, Society for Neuroscience Meeting 2012, New Orleans, Louisiana. (\$1000)
- 2011 **Graduate Division Travel Fellowship**, University of California, Berkeley (\$500) for FENS - IBRO SfN-sponsored school in Bertinoro, Italy - "Causal Neural Circuits".
- 2010 **Gatsby Travel Fellowship**, Gordon Research Conference, Sensory Coding & the Natural Environment (\$500)
- 2009-2012 **National Science Foundation Graduate Fellowship** (\$30,000/year + \$1000 international travel allowance.)
- 2002-2006 **James E. Scripps Scholarship** (Half tuition merit scholarship, approx \$15,000/year.)
- 2002-2006 **Scripps College National Merit Scholarship** (\$2000/year.)

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## Citation index

- 2015 Google scholar h-index: 17. <http://scholar.google.com/citations?user=hCOVXMkAAAAJ> as of Oct. 12, 2015

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## Peer-Reviewed Publications

Pirnia T, Woods RP, **Hamilton LS**, Lyden H, Joshi SH, Asarnow RF, Nuechterlein K, Narr KL (2015). Hippocampal dysfunction during declarative memory encoding in schizophrenia and effects of genetic liability. *Schizophrenia Research*. 161(2-3):357-366.

**Hamilton LS**, Sohl-Dickstein J, Huth AG, Carels VM, Deisseroth K, Bao S (2013). Activation of an inhibitory network enhances feedforward functional connectivity in auditory cortex. *Neuron* 80:4 1066-1076.

Elliott TM, **Hamilton LS**, Theunissen FE (2013). Acoustic structure of the five perceptual dimensions of timbre in orchestral instrument tones. *Journal of the Acoustical Society of America* 133:1 (389-404).

Clark KA, Nuechterlein KH, Asarnow R, **Hamilton LS**, Phillips O, Hageman N, Woods R, Alger JR, Toga A, Narr KL. (2011). Mean diffusivity and fractional anisotropy as indicators of disease and genetic liability to schizophrenia. *J Psychiatr Res*. 2011 Jul; 45(7):980-8.

Ajilore O, Narr K, Rosenthal J, Pham D, **Hamilton L**, Watari K, Elderkin-Thompson V, Darwin C, Toga A, Kumar A (2010). Regional cortical gray matter thickness differences associated with type 2 diabetes and major depression. *Psychiatry Res*. 2010 Nov 30; 184(2):63-70. Epub 2010 Sep 15.

Yang Y, Nuechterlein KH, Phillips O, **Hamilton LS**, Subotnik KL, Asarnow RF, Toga AW, Narr KL (2010). The contributions of disease and genetic factors towards regional cortical thinning in schizophrenia: the UCLA family study. *Schizophr Res*. 2010 Nov;123(2-3):116-25.

**Hamilton LS**, Altshuler LL, Townsend J, Bookheimer SY, Phillips OR, Fischer J, Woods RP, Mazziotta JC, Toga AW, Nuechterlein KH, Narr KL (2009). Alterations in Functional Activation in Euthymic Bipolar Disorder and Schizophrenia During a Working Memory Task. *Human Brain Mapping* 2009 Dec;30(12):3958-69.

Narr KL, Szeszko PR, Lencz T, Woods RP, **Hamilton LS**, Phillips O, Robinson D, Burdick KE, Derosse P, Kucherlapati R, Thompson PM, Toga AW, Malhotra AK, Bilder RM (2009). DTNBP1 is associated with imaging phenotypes in schizophrenia. *Human Brain Mapping* 2009 Nov;30(11):3783-94.

Luders E, Sánchez FJ, Gaser C, Toga AW, Narr KL, **Hamilton LS**, Vilain E (2009). Regional gray matter variation in male-to-female transsexualism. *NeuroImage* 2009 Jul 15;46(4):904-7. Epub 2009 Mar 31.

Narr KL, Hageman N, Woods RP, **Hamilton LS**, Clark K, Phillips O, Shattuck DW, Asarnow RF, Toga AW, Nuechterlein KH (2009). Mean diffusivity: A biomarker for CSF-related disease and genetic liability effects in schizophrenia. *Psychiatry Research: Neuroimaging*. 2009 Jan 30; 171(1): 20-32.

Phillips OR, Nuechterlein KH, Clark KA, **Hamilton LS**, Asarnow RF, Hageman NS, Toga AW, Narr KL (2009). Fiber Tractography Reveals Disruption of Temporal Lobe White Matter Tracts in Schizophrenia. *Schizophrenia Research*. 107(1):30-8.

**Hamilton LS**, Levitt JG, O'Neill J, Alger JR, Luders E, Phillips OR, Caplan R, Toga AW, McCracken J, Narr KL (2008). Reduced white matter integrity in attention-deficit hyperactive disorder. *Neuroreport*. 2008 Nov 19; 19(17):1705-8.

Luders E, Narr KL, **Hamilton LS**, Phillips OR, Thompson PM, Valle JS, Del-Homme M, Strickland T, McCracken JT, Toga AW, Levitt JG (2009). Decreased Callosal Thickness in Attention-Deficit/Hyperactivity Disorder. *Biological Psychiatry*. 2009 Jan 1; 65(1): 84-88.

Coscia DM, Narr KL, Robinson DG, **Hamilton LS**, Sevy S, Burdick KE, Gunduz-Bruce H, McCormack J, Bilder RM, Szeszko PR (2008). Volumetric and shape analysis of the thalamus in first-episode schizophrenia. *Hum Brain Mapp*. 2008 Jun 20.

Luders E, Narr KL, Bilder RM, Szeszko PR, Gurbani MN, **Hamilton L**, Toga AW, Gaser C (2007). Mapping the Relationship between Cortical Convolution and Intelligence: Effects of Gender. *Cerebral Cortex* 2008 Sep;18(9):2019-26.

Ballmaier M, Narr KL, **Hamilton L**, Kumar A (2008). Hippocampal Morphology and Distinguishing Late-Onset From Early-Onset Elderly Depression. *Am J Psychiatry* 2008 Feb; 165(2): 229-37.

**Hamilton LS**, Narr KL, Luders E, Szeszko PR, Thompson PM, Bilder RM, Toga AW (2007). Asymmetries of cortical thickness: effects of handedness, sex, and schizophrenia. *Neuroreport*. 18(14): 1427-1431.

Luders E, Narr KL, Bilder RM, Thompson PM, Szeszko PR, **Hamilton L**, Toga AW (2007). Positive correlations between corpus callosum thickness and intelligence. *Neuroimage*. 37(4): 1457-1464.

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## Publications submitted or in preparation

**Hamilton LS**, Edwards E, Hullett P, Schreiner C, Chang EF. The functional organization of speech representation in the human superior temporal gyrus (in preparation)

**Hamilton LS**, Sohl-Dickstein J, Bao S. Experience-dependent modulation of functional connectivity in the auditory cortex (in preparation)

Hullett P, **Hamilton LS**, Mesgarani N, Schreiner C, Chang EF. Modulotopic organization of human superior temporal gyrus for speech processing. (in revision)

Muller LN, **Hamilton LS**, Edwards E, Bouchard K, Chang EF. Spatial resolution dependence on spectral frequency in human electrocorticography. (submitted)

Cheung C, **Hamilton LS**, Johnson K, Chang EF. The auditory representation of speech sounds in human motor cortex (in preparation)

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## Conference Abstracts

Muller L, Chang E, Edwards E, **Hamilton L**, Bouchard K (2015). Spatial resolution dependence on spectral frequency in human electrocorticography: implications for device neurotechnology. Society for Neuroscience 2015, Chicago, IL.

**Hamilton LS**, Edwards E, Chang EF (2015). Multi-scale functional parcellation of cortex by unsupervised activation clustering. Computational and Systems Neuroscience (Cosyne) 2015, Salt Lake City, UT.

**Hamilton LS**, Chang EF (2014). Functional organization of speech perception in the human superior temporal gyrus. 5th International Conference on Auditory Cortex, Magdeburg, Germany. September 2014.

**Hamilton LS**, Sohl-Dickstein J, Bao S (2014). Sensitive periods for functional connectivity in auditory cortical circuits. *Frontiers in Systems Neuroscience*. Conference abstract: Computational and systems neuroscience 2014, Salt Lake City, UT.

**Hamilton LS**, Sohl-Dickstein J, Huth AG, Bao S (2012). Optogenetic stimulation of an inhibitory network enhances feedforward connectivity in auditory cortex. Society for Neuroscience 2012, New Orleans, Louisiana. (Selected for SfN Student Travel Award)

**Hamilton LS**, Davis M, Oldfield C, Bao S (2011). Representation of conspecific vocalizations in mouse auditory cortex. Society for Neuroscience 2011, Washington, D.C.

**Hamilton LS**, Yang S, and Bao S (2011). The role of perisomatic inhibition in cortical processing of natural sounds. FENS-IBRO SfN-sponsored school: Causal Neuroscience - Manipulating Neural Circuits. Bertinoro, Italy.

**Hamilton LS**, Elliott TM, and Theunissen F (2010). The perceptual dimensionality of timbre. Gordon Research Conference: Sensory Coding & the Natural Environment 2010, Lewiston, Maine.

**Hamilton LS** and Bao S (2010). Top-down influences on intensity coding in primary auditory cortex. *Frontiers in Systems Neuroscience*. Conference Abstract: Computational and Systems Neuroscience 2010, Salt Lake City, UT. doi: 10.3389/conf.fnins.2010.03.00129

Elliott T, **Hamilton L**, and Theunissen F (2009). Spectrotemporal Modulations Underlying Timbre Perception. Society for Neuroscience 2009, Chicago, IL.

Theunissen F, Elliott T and **Hamilton L** (2009). Spectrotemporal Modulations Underlying Speech and Timbre Perception. *Frontiers in Systems Neuroscience*. Conference Abstract: Computational and systems neuroscience 2009, Salt Lake City, UT. doi: 10.3389/conf.neuro.06.2009.03.234

Luders E, Narr KL, **Hamilton LS**, Phillips OR, Thompson PM, Valle JS, DelHomme M, McCracken JT, Toga AW, Levitt JG (2008). Decreased Corpus Callosum Thickness in Attention Deficit / Hyperactivity Disorder (ADHD). 14th Annual Meeting of the Organization for Human Brain Mapping, Melbourne, Australia.

Narr KL, Szeszko PR, Lencz T, Woods RP, **Hamilton LS**, Phillips O, Robinson D, Burdick KE, DeRosse P, Kucherlapati R, Thompson PM, Toga AW, Malhotra AK, Bilder RM (2008). Dysbindin is Associated with Imaging Phenotypes in Schizophrenia. 14th Annual Meeting of the Organization for Human Brain Mapping, Melbourne, Australia.

Ajilore O, Narr K, **Hamilton L**, Rosenthal J, Pham D, Kumar A (2007). Detection of gray matter changes in type 2 diabetes and major depression using cortical pattern matching. 37th Annual Meeting of the Society for Neuroscience, November 3-7, 2007, San Diego, California, USA Society for Neuroscience, Program No. 450.4.

Ajilore O, Pham D, Rosenthal J, Narr K, **Hamilton L**, Watari K, Elderkin-Thompson V, Darwin C, Kumar A. Detection of cortical gray matter thickness changes in patients with type 2 diabetes and major depression. 46th Annual Meeting of the American-College-Neuropsychopharmacology, December 8-13, Boca Raton, Florida, USA. Neuropsychopharmacology.

Luders E, Narr KL, Bilder RM, Szeszko P, Gurbani MN, **Hamilton L**, Toga AW, Gaser C (2007). Positive correlations between corpus callosum thickness and intelligence. 13th Annual Meeting of the Organization for Human Brain Mapping, Chicago, IL.

Narr KL, Hageman N, **Hamilton L**, Gurbani M, Woods RP, Asarnow RF, Shattuck D, Toga AW, Nuechterlein KH (2007). Mean diffusivity: A biomarker for CSF-related disease and genetic liability effects in schizophrenia. 13th Annual Meeting of the Organization for Human Brain Mapping, Chicago, IL, June.

Narr KL, Woods RP, **Hamilton L**, Gurbani M, Kaplan J, Asarnow RF, Mazziotta JC, Toga AW, Nuechterlein KH (2006). Atlas-based fMRI studies in schizophrenia using a standardized task battery. 2007 International Congress on Schizophrenia Research. Colorado Springs, Colorado.

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## Talks

- 2015 **Neuropsychology colloquium, VA Hospital, Martinez**. "Feature representation in human auditory cortex during natural speech perception". October 27, 2015, Martinez, CA.
- 2015 **Swartz Computational Neuroscience Conference**. "Feature representation in human primary and secondary auditory cortex during natural speech perception". August 2015, Janelia Research Campus, Ashburn, VA.
- 2014 **5th International Conference on Auditory Cortex - Towards a Synthesis of Human and Animal Research**. "Speech representation in human speech cortex during perception and production". September 2014, Magdeburg, Germany.

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## Teaching experience

- 2010-2011 **Graduate Student Instructor**, *University of California, Berkeley*, Berkeley, CA.
  - "Intro to Brain, Mind, and Behavior" - Prof. David Presti (Spring 2010).
  - "Intro to Neurobiology" - Profs. Yang Dan, Ehud Isacoff, and John Ngai: Upper division undergraduate neuroscience course (Spring 2011).

## Service

2015-present **Reviewer**, *Journal of Neuroscience*.

2015-present **Reviewer**, *Brain Research*.

2014-present **Reviewer**, *Human Brain Mapping*.

2012-2013 **Design Team**, *Berkeley Science Review*, University of California, Berkeley.

- Created layouts including photos and infographics for student-run science magazine using Adobe Creative Suite
- Created accompanying interactive web graphics using JavaScript d3.js.

2011-2012 **Student representative for Neuroscience Admissions Committee**, *Helen Wills Neuroscience Institute*, University of California, Berkeley.

- Read and ranked >300 applications submitted to the graduate program in Neuroscience at UC Berkeley
- Solicited feedback from students during interviews and reported back to faculty committee