Frank H. Guenther

Professor, Departments of Speech, Language, & Hearing Sciences and Biomedical Engineering, Boston University, 677 Beacon Street, Boston, Massachusetts 02215. Phone: (617) 957-7555. Fax: (617) 859-8976. Email: guenther@bu.edu.

OVERVIEW

I am a computational and cognitive neuroscientist specializing in speech and sensorimotor control. My research combines theoretical modeling with behavioral and neuroimaging experiments to characterize the neural computations underlying these faculties in humans. I also develop brain-computer interfaces to restore synthetic speech and other communication skills to paralyzed individuals. My laboratory's research has been covered extensively in the science and popular media, including television spots on *CNN News*, *PBS News Hour*, and *Fox News*; articles in popular science magazines *Discover*, *Scientific American*, and *Popular Science*; and popular press coverage in *Esquire*, *Wired*, *The Boston Globe*, and *BBC News*.

POSITIONS

- **Professor of Speech, Language, & Hearing Sciences and Biomedical Engineering, Boston University (9/2011 - present)**
  Responsibilities include teaching courses in computational, cognitive, and systems neuroscience, supervising graduate student dissertation research, mentoring undergraduate research assistants, acting as principal investigator on research sponsored by the National Institutes of Health, acting as a co-principal investigator of a multi-institutional NSF Science of Learning grant (CELEST) and an NSF Autism Center of Excellence grant (CARE), and acting as an investigator on a number of other research projects. Research areas include neural modeling and functional brain imaging of speech production, speech perception, and communication disorders, as well as neural prosthetics for speech. I am Director of two laboratories at Boston University, the CNS Speech Lab and the Neural Prosthesis Lab, and I am responsible for supervising and mentoring a team of PhD students, postdocs, research scientists, and research faculty.

- **Faculty Member, Harvard University/MIT Speech and Hearing Bioscience and Technology Program (9/1998 – Present)**
  Responsibilities include graduate student dissertation research supervision and occasional teaching in the Harvard/MIT joint program in Speech and Hearing Bioscience and Technology.

- **Research Affiliate, Picower Institute for Learning and Memory, Massachusetts Institute of Technology (2/2011 – Present)**
  Perform collaborative research with Prof. Earl Miller and his laboratory in The Picower Institute for Learning and Memory. This effort fuses our computational research into neural processing and brain-machine interfacing with the primate electrophysiology program headed by Dr. Miller.

- **Visiting Scientist, Massachusetts General Hospital (6/2003 – Present)**
  Perform magnetic resonance imaging (MRI) research at the Athinoula A. Martinos Center for Biomedical Imaging in Charlestown, MA.

- **Associate Director, Graduate Program for Neuroscience, Boston University (1/2010 – 8/31/2013)**
  Responsibilities included oversight of the Charles River Campus component of the university-wide Graduate Program for Neuroscience. This program unites faculty from the University's Medical School, College of Arts and Sciences, College of Engineering, and College of Health and

Rehabilitation Sciences into a single program that provides training in all aspects of neuroscience, including coursework in molecular, cellular, systems, cognitive, and computational neuroscience.

- **Founding Director, Computational Neuroscience PhD Program, Boston University (1/2010 – 8/2013)**
  Responsibilities included directing curriculum development, admissions, and first-year student advising. This program unites computational faculty from a number of current and former departments within the university (including Cognitive & Neural Systems, Mathematics, Biomedical Engineering, Psychology, and Biology) to form one of the largest and most accomplished computational neuroscience faculties in the world.

- **Research Affiliate, Research Laboratory of Electronics, Massachusetts Institute of Technology (4/1997 – 6/2011)**
  Performed collaborative research with Dr. Joseph Perkell and other members of the Speech Communication Group in the Research Laboratory of Electronics. This collaborative effort fused my theoretical work with the experimental program headed by Dr. Perkell.

- **Assistant /Associate/Full Professor of Cognitive & Neural Systems, Boston University (9/1992 – 8/2011)**
  Responsibilities included teaching graduate-level courses in the Department of Cognitive and Neural Systems, supervising graduate student dissertation research, and performing research sponsored by the National Institutes of Health, National Science Foundation, Alfred P. Sloan Foundation, and Air Force Office of Scientific Research. Research involved studies of speech communication, adaptive sensorimotor control, spatial representation, and autonomous robot navigation.

- **Research Fellow, Boston University (9/1989 – 8/1992)**
  Performed NSF-supported research on adaptive sensorimotor control with Professors Stephen Grossberg and Daniel Bullock. Projects included neural modeling of spatial representation and inverse kinematics transformations for targeted arm movements. Emphasis was on autonomous learning and motor equivalence properties such as tool use and the ability to overcome constraints on the limb.

- **Engineer, Raytheon Company (9/1987 – 8/1989)**
  Performed specification, design, layout, and testing of VLSI chips and circuits. Wrote modeling software and application programs in C and PASCAL.

- **Teaching and Research Fellow, Princeton University (8/1986 – 6/1987)**
  Served as a teaching/research assistant while obtaining a Masters degree in Electrical Engineering.

EDUCATION

- **PhD, Cognitive and Neural Systems, Boston University (1/1993)**
  Thesis entitled ``Neural models of adaptive sensory-motor control for flexible reaching and speaking." Research focused on biologically inspired models of spatial representation and movement control. Coursework covered the study and mathematical modeling of neural systems, including motor control, reinforcement learning, vision, speech, and memory systems. 4.0/4.0 GPA.

- **MSE, Electrical Engineering, Princeton University (8/1987)**
  Coursework included digital systems design, probability theory, signal processing, computer algorithm theory, and complex analysis. 3.9/4.0 GPA.

- **BS, Electrical Engineering, University of Missouri (5/1986)**
  Ranked 1st in a class of over 500 students in the College of Engineering with a 4.0/4.0 GPA.

AWARDS AND HONORS

- 2014 – Curt von Euler Award and Honorary Lecture, Stockholm University/Karolinska Institute
- 2011 – Top 10 Finalist, G.Tec Annual International Brain-Computer Interface Research Award
- 2009 - Distinguished Lecturer in Cognitive Science, Michigan State University
- 2008 - Elected Fellow of the Acoustical Society of America
- 2007 Editor's Award for top article in speech, *Journal of Speech, Language, and Hearing Research*
- 2007 Editor's Award for top article in hearing, *Journal of Speech, Language, and Hearing Research*
- 2007 Willard R. Zemlin Lecture Award, American Speech-Language-Hearing Association
- 2006 M.D. Steer Distinguished Lecturer, Purdue University
- 2004 Distinguished Lecturer in Speech and Hearing Bioscience and Technology, Harvard/MIT
- 2002 - Nominated for Metcalf Cup and Prize for Excellence in Teaching
- 1998 - Awarded tenure at Boston University
- 1996-2001 - NIH FIRST Award
- 1995-1997 - Alfred P. Sloan Research Fellowship
- 1986 - Summa cum laude, University of Missouri (Valedictorian of College of Engineering)
- 1982-1986 - National Merit Scholar, University of Missouri
- 1982-1986 - Curators Scholar, University of Missouri
- 1982 - Valedictorian, Belton High School, Belton, Missouri

CURRENT RESEARCH GRANTS

- **NIH R01 DC002852, Principal Investigator (8/1/2016-7/31/2021)**
  $1.78 million over five years. Project titled "Neural modeling and imaging of speech." This project continues the development and testing of the DIVA model of speech motor control using a combination of computational modeling, neuroimaging, and behavioral experiments. The DIVA model focuses on the neural mechanisms necessary to learn and produce individual syllabic motor programs. The current funding period focuses on the roles of the cerebellum and basal ganglia in these processes, as well as breakdowns in the readout of speech motor programs that occur in spasmodic dysphonia.

- **NIH R01 DC007683, Principal Investigator (5/1/2016-4/30/2021)**
  $1.74 million over five years. Project entitled "Sequencing and Initiation in Speech Production." This project investigates the neural mechanisms involved in the learning and fluent sequencing of speech motor programs, as well as impairments in this circuitry that underlie stuttering, using a combination of neural modeling and functional magnetic resonance imaging.

- **NIH P50 DC013027, Project PI (Principal Investigator H. Tager-Flusberg; 9/4/2012-8/31/2017)**
  $11.23 million over five years. Project titled "Minimally Verbal Children with ASD: From Basic Mechanisms to Innovative Interventions." This Autism Center of Excellence Award investigates the behavioral and neurological effects of auditory-motor mapping training on minimally verbal children with autism spectrum disorder (ASD). I am PI of Project II, "Inter-regional connectivity in the speech network of minimally verbal children with ASD." This project involves a subcontract with the Athinoula A. Martinos Center for Biomedical Imaging at Massachusetts General Hospital for neuroimaging of children with ASD.

- **NIH P50 DC015446, Investigator (Principal Investigator R. Hillman; 4/1/2017-3/31/2022)**
  Approximately $10 million over five years. Project titled "Clinical Research Center for the Improved Prevention, Diagnosis, and Treatment of Vocal Hyperfunction." The goal of this Clinical

Research Center is to better understand vocal hyperfunction. The proposal includes three core centers and three projects. The aims of Project 2, "Sensorimotor mechanisms of vocal hyperfunction" (C. Stepp, PI), are to determine the functional role of auditory feedback in the vocal control of individuals with vocal hyperfunction and the effect of voice therapy on that control.

COMPLETED RESEARCH GRANTS

- **NSF SMA-0835976, Co-Principal Investigator (3/01/2010-02/28/2015)**
  $20.8 million over five years. Project titled "CELEST: A center of excellence for learning in education, science, and technology." The primary goal of CELEST was to carry out state-of-the-art research and technology projects involving the neuroscience of learning. CELEST involved researchers from Boston University, MIT, Harvard University, and Brandeis University. In addition to acting as one of three co-PIs and mentor to several graduate students on the project, my investigative role involved the development of neural prostheses for restoring speech communication to profoundly paralyzed individuals.

- **NIH R01 DC002852, Principal Investigator (2/1/2001-7/31/2016)**
  $5.3 million over fifteen years. Project titled "Neural modeling and imaging of speech." This project continued the development and testing of the DIVA model of speech motor control using a combination of computational modeling, neuroimaging, and behavioral experiments.

- **NIH R01 DC007683, Principal Investigator (5/1/206-4/30/2016)**
  $3.3 million over ten years. Project titled "Sequencing and Initiation in Speech Production." This project investigated the neural mechanisms involved in the learning and fluent sequencing of speech motor programs, as well as impairments in this circuitry that underlie stuttering, using a combination of neural modeling and functional magnetic resonance imaging.

- **Dynavox Mayer-Johnson, Principal Investigator (5/1/2010 – 6/13/2011)**
  $75,000 over one year. Project titled "Constructing an electroencephalography-based brain-computer interface for augmentative communication." The goal of this project was to develop a robust EEG-based BCI for individuals suffering from profound paralysis or locked-in syndrome utilizing a number of different computational techniques to optimize ease of use and speed of performance.

- **NIH R01 DC03007, Investigator (12/1/2006 – 11/30/2011)**
  $2.8 million over five years. MIT/BU collaborative project titled "Effects of hearing status on adult speech production" (J. Perkell, Principal Investigator). My role on the project involves the definition and refinement of a theoretical framework that accounts for the results of kinematic, acoustic, and neuroimaging studies of speech in hearing impaired individuals, as well as the design and interpretation of experiments to test this framework.

- **NSF SBE-0354378, Governing Board Member and Investigator (10/1/2004– 09/30/2010)**
  $20 million over five years. Project titled "CELEST: A center of excellence for learning in education, science, and technology." This project was the largest of four NSF Science of Learning Centers chosen from the initial pool of over 100 applications.

- **NIH R01 DC01925, Investigator (12/1/1998 – 11/31/2008)**
  $3.6 million over five years. MIT/BU collaborative project titled "Constraints and strategies in speech production" (J. Perkell, Principal Investigator). Application received the highest score in a pool of approximately 140 applications (percentile rank of 0.7%). Prof. Guenther's role on the project involves the definition and refinement of a theoretical framework that accounts for kinematic, acoustic, and neuroimaging measures of speech in neurologically normal individuals, as well as the design and interpretation of experiments to test this framework.

- **NIH F32 DC006782, Principal Investigator (6/1/2004 – 5/31/2007)**
  $133,000 over three years. Postdoctoral training grant funding Dr. Kevin Reilly. The goal of this project was to identify brain networks involved in the acquisition and representation of a novel sensorimotor mapping involving the speech articulators using a combination of neural modeling and fMRI experiments.
- **NIH FIRST Award, R29 DC02852, Principal Investigator (2/1/1996-1/31/2001)**
  $578,000 over five years. Project titled ``Neural network modeling of speech production." Application received the second highest score in a pool of approximately 120 applications (percentile rank of 1.7%).
- **Alfred P. Sloan Foundation Research Fellowship, Principal Investigator (9/1/1995-8/31/1997)**
  $30,000 over two years. One of fifteen awardees nationwide in neuroscience.

BOOKS

- Guenther, F.H. (in press). *Neural Control of Speech*. Cambridge, MA: MIT Press.

REFEREED JOURNAL PUBLICATIONS

- Bullock, D., Greve, D., and Guenther, F.H. (1992). Do reaches in the dark shed sufficient light on internal representations? Commentary to Flanders, M., Helms Tillery, S.I., and Soechting, J.F., Early stages in a sensorimotor transformation, *Behavioral and Brain Sciences*, **15(**2), pp. 330-332.
- Bullock, D., Grossberg, S., and Guenther, F.H. (1993). A self-organizing neural model of motor equivalent reaching and tool use by a multijoint arm. *Journal of Cognitive Neuroscience*, **5**, pp. 408-435.
- Greve, D., Grossberg, S., Guenther, F.H., and Bullock, D. (1993). Neural representations for sensory-motor control, I: Head-centered 3-D target positions from opponent eye commands. *Acta Psychologica*, **82**, pp. 115-138.
- Grossberg, S., Guenther, F.H., Bullock, D., and Greve, D. (1993). Neural representations for sensory-motor control II: Learning a head-centered visuomotor representation of 3-D target positions. *Neural Networks*, **6**, pp. 43-67.
- Guenther, F.H., Bullock, D., Greve, D., and Grossberg, S. (1994). Neural representations for sensory-motor control, III: Learning a body-centered representation of 3-D target position. *Journal of Cognitive Neuroscience*, **6**, pp. 341-358.
- Guenther, F.H. (1994). A neural network model of speech acquisition and motor equivalent speech production. *Biological Cybernetics*, **72**, pp. 43-53.
- Guenther, F.H. (1995). Speech sound acquisition, coarticulation, and rate effects in a neural network model of speech production. *Psychological Review*, **102**, pp. 594-621.
- Guenther, F.H., and Gjaja, M.N. (1996). The perceptual magnet effect as an emergent property of neural map formation. *Journal of the Acoustical Society of America*, **100**, pp. 1111-1121.
- Perkell, J.S., Matthies, M.L., Lane, H., Guenther, F.H., Wilhelms-Tricarico, R., Wozniak, J., and Guiod, P. (1997). Speech motor control: Acoustic segmental goals, saturation effects, auditory feedback and internal models. *Speech Communication*, **22**, pp. 227-250.
- Cameron, S., Grossberg, S., and Guenther, F.H. (1998). A self-organizing neural network architecture for navigation using optic flow. *Neural Computation*, **10**, pp. 313-352.

- Guenther, F.H. (1998). An account of the locus equation phenomenon based on speech movement planning. Commentary to Sussman, H.M., Fruchter, D., Hilbert, J., and Sirosh, J., Linear correlates in the speech signal: The orderly output constraint. *Behavioral and Brain Sciences*, **21**, pp. 268-269.
- Guenther, F.H., Hampson, M., and Johnson, D. (1998). A theoretical investigation of reference frames for the planning of speech movements. *Psychological Review*, **105**, pp. 611-633.
- Guenther, F.H., Espy-Wilson, C.Y., Boyce, S.E., Matthies, M.L., Zandipour, M., and Perkell, J.S. (1999). Articulatory tradeoffs reduce acoustic variability during American English /r/ production. *Journal of the Acoustical Society of America*, **105**, pp. 2854-2865.
- Guenther, F.H., Husain, F.T., Cohen, M.A., and Shinn-Cunningham, B.G. (1999). Effects of categorization and discrimination training on auditory perceptual space. *Journal of the Acoustical Society of America*, **106**, pp. 2900-2912.
- Guenther, F.H. (2000). An analytical error invalidates the ``depolarization'' of the perceptual magnet effect. *Journal of the Acoustical Society of America*, **107**, pp. 3576-3580.
- Callan, D.E., Kent, R.D., Guenther, F.H., and Vorperian, H.K. (2000). An auditory-feedback-based neural network model of speech production that is robust to developmental changes in the size and shape of the articulatory system. *Journal of Speech, Language, and Hearing Research*, **43**, pp. 721-736.
- Perkell, J.S., Guenther, F.H., Lane, H., Matthies, M.L., Perrier, P., Vick, J., Wilhelms-Tricarico, R., and Zandipour, M. (2000). A theory of speech motor control and supporting data from speakers with normal hearing and profound hearing loss. *Journal of Phonetics*, **28**, pp. 233-272.
- Micci Barreca, D., and Guenther, F.H. (2001). A modeling study of potential sources of curvature in human reaching movements. *Journal of Motor Behavior*, **33**, pp. 387-400.
- Guenther, F.H., and Bohland, J.W. (2002). Learning sound categories: A neural model and supporting experiments. *Acoustical Science and Technology*, **23**(4), pp. 213-220. Japanese-language version appeared in *Journal of the Acoustical Society of Japan*, **58**(7), pp. 441-449, July 2002.
- Nieto-Castanon, A., Ghosh, S.S., Tourville, J.A., and Guenther, F.H. (2003). Region-of-interest based analysis of functional imaging data. *NeuroImage*, **19**, pp. 1303-1316.
- Guenther, F.H., Nieto-Castanon, A., Ghosh, S.S., and Tourville, J.A. (2004). Representation of sound categories in auditory cortical maps. *Journal of Speech, Language, and Hearing Research*, **47**(1), pp. 46-57.
- Max, L., Guenther, F.H., Gracco, V.L., Ghosh, S.S., and Wallace, M.E. (2004). Unstable or insufficiently activated internal models and feedback-biased motor control as sources of dysfluency: A theoretical model of stuttering. *Contemporary Issues in Communication Science and Disorders*, **31**, pp. 105-122.
- Perkell, J.S., Guenther, F.H., Lane, H., Matthies, M.L., Stockmann, E., Tiede, M., and Zandipour, M. (2004). The distinctness of speakers' productions of vowel contrasts is related to their discrimination of the contrasts. *Journal of the Acoustical Society of America*, **116**(4) Pt. 1, pp. 2338-2344.
- Perkell, J.S., Matthies, M.L., Tiede, M., Lane, H., Zandipour, M., Marrone, N., Stockmann, E., and Guenther, F.H. (2004). The distinctness of speakers' /s-sh/ contrast is related to their auditory discrimination and use of an articulatory saturation effect. *Journal of Speech, Language, and Hearing Research*, **47**, pp. 1259-1269.
- Lane, H., Denny, M., Guenther, F.H., Matthies, M.L., Menard, L., Perkell, J.S., Stockmann, E., Tiede, M., Vick, J., and Zandipour, M. (2005). Effects of bite blocks and hearing status on vowel production. *Journal of the Acoustical Society of America*, **118**, pp. 1636-1646.

- Nieto-Castanon, A., Guenther, F.H., Perkell, J.S., and Curtin, H. (2005). A modeling investigation of articulatory variability and acoustic stability during American English /r/ production. *Journal of the Acoustical Society of America*, **117**, pp. 3196-3212.
- Horwitz, B., Husain, F.T., and Guenther, F.H. (2005). Auditory object processing and primate biological evolution. Commentary on Arbib, M.A., From monkey-like action recognition to human language: An evolutionary framework for neurolinguistics, *Behavioral and Brain Sciences*, **28**, p. 134.
- Guenther, F.H., Ghosh, S.S., and Tourville, J.A. (2006). Neural modeling and imaging of the cortical interactions underlying syllable production. *Brain and Language*, **96**, pp. 280-301. PMCID: PMC1473986
- Guenther, F.H. (2006). Cortical interactions underlying the production of speech sounds. *Journal of Communication Disorders*, **39**, pp. 350-365.
- Bohland, J.W. and Guenther, F.H. (2006). An fMRI investigation of syllable sequence production. *NeuroImage*, **32**, pp. 821-841.
- Perkell, J.S., Denny, M., Lane, H., Guenther, F.H., Matthies, M.L., Tiede, M., Vick, J., Zandipour, M., and Burton, E. (2007). Effects of masking noise on vowel and sibilant contrasts in normal-hearing speakers and postlingually deafened cochlear implant users. *Journal of the Acoustical Society of America*, **121**, pp. 505-518.
- Lane, H, Denny, M., Guenther, F.H., Hanson, H., Marrone, N., Matthies, M.L., Perkell, J.S., Burton, E., Tiede, M., Vick, J., and Zandipour, M. (2007). On the structure of phoneme categories in listeners with cochlear implants. *Journal of Speech, Language, and Hearing Research*, **50**, pp. 2-14.
- Lane, H., Matthies, M.L., Denny, M., Guenther, F.H., Perkell, J.S., Stockmann, E., Tiede, M., Vick, J., and Zandipour, M. (2007). Effects of short- and long-term changes in auditory feedback on vowel and sibilant contrasts. *Journal of Speech, Language, and Hearing Research*, **50**, pp. 913-927.
- Villacorta, V.M., Perkell, J.S., and Guenther, F.H. (2007). Sensorimotor adaptation to feedback perturbations of vowel acoustics and its relation to perception. *Journal of the Acoustical Society of America*, **122**, pp. 2306-2319.
- Tourville, J.A., Reilly, K.J., and Guenther, F.H. (2008). Neural mechanisms underlying auditory feedback control of speech. *NeuroImage*, **39**, pp. 1429-1443. PMCID: PMC3658624
- Loui, P., Guenther, F.H., Mathys, C., and Schlaug, G. (2008). Action-perception mismatch in tone-deafness. *Current Biology*, **18**, pp. R331-R332. PMCID: PMC2791531
- Ghosh, S.S., Tourville, J.A., and Guenther, F.H. (2008). A neuroimaging study of premotor lateralization and cerebellar involvement in the production of phonemes and syllables. *Journal of Speech, Language, and Hearing Research*, **51**, pp. 1183-1202. PMCID: PMC2652040
- Matthies, M.L., Guenther, F.H., Denny, M., Perkell, J.S., Burton, E., Vick, J., Lane, H., Tiede, M., Zandipour, M. (2008). Perception and production of /r/ allophones improve with hearing from a cochlear implant. *Journal of the Acoustical Society of America*, **124**, pp. 3191-3202. PMCID: PMC2677359
- Wright, D.L., Robin, D.A., Rhee, J.-H., Vaculin, A., Jacks, A., Guenther, F.H., and Fox, P.T. (2009). Using the self-select paradigm to delineate the nature of speech motor programming. *Journal of Speech, Language, and Hearing Research*, **52**, pp. 755-765. PMCID: PMC 4655590
- Terband, H., Maassen, B, Guenther, F.H., and Brumberg, J. (2009). Computational neural modeling of speech motor control in childhood apraxia of speech. *Journal of Speech, Language, and Hearing Research*, **52**, pp. 1595-1609. PMCID: PMC2959199
- Guenther, F.H., Brumberg, J.S., Wright, E.J., Nieto-Castanon, A., Tourville, J.A., Panko, M., Law, R., Siebert, S.A., Bartels, J.L., Andreasen, D.S., Ehirim, P., Mao, H., and Kennedy, P.R. (2009). A wireless

brain-machine interface for real-time speech synthesis. *PLoS ONE*, **4**(12), pp. e8218+. PMCID: PMC2784218

- Brumberg, J.S., Nieto-Castanon, A., Kennedy, P.R., and Guenther, F.H. (2010). Brain-computer interfaces for speech communication. *Speech Communication.* **52**, pp. 367-379. PMCID: PMC2829990
- Peeva, M.G., Guenther, F.H., Tourville, J.A., Nieto-Castanon, A., Anton, J.-L., Nazarian, B., and Alario, F.-X. (2010). Distinct representations of phonemes, syllables, and supra-syllabic sequences in the speech production network. *NeuroImage*, **50**, pp. 626-638. PMCID: PMC2840383
- Bohland, J.W., Bullock, D., and Guenther, F.H. (2010). Neural representations and mechanisms for the performance of simple speech sequences. *Journal of Cognitive Neuroscience*, **22**, pp. 1504-1529. PMCID: PMC2937837
- Brumberg, J.S. and Guenther, F.H. (2010). Development of speech prostheses: Current status and recent advances. *Expert Review of Medical Devices*, **7**, pp. 667-679. PMCID: PMC2953242
- Cai, S., Ghosh, S.S., Guenther, F.H., and Perkell, J.S. (2010). Adaptive auditory feedback control of the production of formant trajectories in the Mandarin triphthong /iau/ and its pattern of generalization. *Journal of the Acoustical Society of America*, **128**, pp. 2033-2048. PMCID: PMC2981117
- Civier, O., Tasko, S.M., and Guenther, F.H. (2010). Overreliance on auditory feedback may lead to sound/syllable repetitions: Simulations of stuttering and fluency-inducing conditions with a neural model of speech production. *Journal of Fluency Disorders*, **35**, pp. 246-279. PMCID: PMC2939043
- Golfinopoulos, E., Tourville, J.A., and Guenther, F.H. (2010). The integration of large-scale neural network modeling and functional brain imaging in speech motor control. *NeuroImage*, **52**, pp. 862-874. PMCID: PMC2891349
- Ghosh, S.S., Matthies, M.L., Maas, E., Hanson, H., Tiede, M., Menard, L., Guenther, F.H., Lane, H., and Perkell, J.S. (2010). An investigation of the relation between sibilant production and somatosensory and auditory acuity. *Journal of the Acoustical Society of America*, **128**, pp. 3079-3087. PMCID: PMC3003728
- Patel, R., Niziolek, C., Reilly, K.J., and Guenther, F.H. (2011). Prosodic adaptations to pitch perturbation in running speech. *Journal of Speech, Language, and Hearing Research*, **54**, pp. 1051-1059. PMCID: PMC3352853
- Golfinopoulos, E., Tourville, J.A., Bohland, J.W., Ghosh, S.S., Nieto-Castanon, A., and Guenther, F.H. (2011). fMRI investigation of unexpected somatosensory feedback perturbation during speech. *NeuroImage*, **55**, pp. 1324-1338. PMCID: PMC3065208
- Brumberg, J.S., Wright, E.J., Andreasen, D.S., Guenther, F.H., and Kennedy, P.R. (2011). Classification of intended phoneme production from chronic intracortical microelectrode recordings in speech motor cortex. *Frontiers in Neuroscience*, **5**, Article 65. PMCID: PMC3096823
- Cai, S., Ghosh, S.S., Guenther, F.H., and Perkell, J.S. (2011). Focal manipulations of formant trajectories reveal a role of auditory feedback in the online control of both within-syllable and between-syllable speech timing. *Journal of Neuroscience*, **31**, pp. 16483-90. PMCID: PMC2981117
- Tourville, J.A. and Guenther, F.H. (2011). The DIVA model: A neural theory of speech acquisition and production. *Language and Cognitive Processes*, **26**, pp. 952-981. PMCID: PMC3650855
- Guenther, F.H. and Vladusich, T. (2012). A neural theory of speech acquisition and production. *Journal of Neurolinguistics*. **25**, pp. 408-422. PMCID: PMC3375605
- Cai, S., Beal, D.S., Ghosh, S.S., Tiede, M.K., Guenther, F.H., and Perkell, J.S. (2012). Weak responses to auditory feedback perturbation during articulation in persons who stutter: Evidence for abnormal auditory-motor transformation. *PLoS ONE*, **7**, pp. e41830+. PMCID: PMC3402433

- Mody, M., Manoach, D.S., Guenther, F.H., Tenet, K., Bruno, K.A., McDougle, C.J., and Stigler, K.A. (2013). Speech and language in autism spectrum disorder: A view through the lens of behavior and brain imaging. *Neuropsychiatry*, **3**, pp. 223-232.
- Niziolek, C. and Guenther, F.H. (2013). Vowel category boundaries enhance cortical and behavioral responses to speech feedback alterations. *Journal of Neuroscience*, **33**, pp. 12090-12098. PMCID: PMC3713738
- Civier, O., Bullock, D., Max, L., and Guenther, F.H. (2013). Computational modeling of stuttering caused by impairments in a basal ganglia thalamo-cortical circuit involved in syllable selection and initiation. *Brain and Language*, **126**, pp. 263-278. PMCID: PMC377536
- Peeva, M.G., Tourville, J.A., Agam, Y., Holland, B., Manoach, D.S., and Guenther, F.H. (2013). White matter impairment in the speech network of individuals with autism spectrum disorder. *NeuroImage: Clinical*, **3**, pp. 234-241. PMCID: PMC3815014
- Guenther, F.H. (2014). Auditory feedback control is involved at even sub-phonemic levels of speech production. *Language, Cognition and Neuroscience*, **29**, pp. 44-45. PMCID: PMC3979636
- Cai, S., Beal, D.S., Ghosh, S.S., Guenther, F.H., and Perkell, J.S. (2014). Impaired timing adjustments in response to time-varying auditory perturbation during connected speech production in persons who stutter. *Brain and Language*, **129**, pp. 24-29. PMCID: PMC3947674
- Stephen, E.P., Lepage, K.Q., Eden, U.T., Brumberg, J.S., Guenther, F.H., and Kramer, M.A. (2014). Assessing dynamics, spatial scale, and uncertainty in task-related brain network analyses. *Frontiers in Computational Neuroscience*, **8**, article 31. PMCID: PMC3958753
- Terband, H., Maassen, B., Guenther, F.H., and Brumberg, J. (2014). Auditory-motor interactions in pediatric motor speech disorders: Neurocomputational modeling of disordered development. *Journal of Communication Disorders*, **47**, pp. 17-33. PMCID: PMC3971843
- Cai, S., Tourville, J.A., Beal, D.S., Perkell, J.S., Guenther, F.H., and Ghosh, S.S. (2014). Diffusion imaging of cerebral white matter in persons who stutter: Evidence for network-level anomalies. *Frontiers in Human Neuroscience*, **8**, article 54. PMCID: PMC3920071
- Segawa, J.A., Tourville, J.A., Beal, D.S., and Guenther, F.H. (2015). The neural correlates of speech motor sequence learning. *Journal of Cognitive Neuroscience*, 27, pp. 819-831. PMCID: PMC4344924
- Galbraith, BV, Guenther, FH, and Versace, M (2015). A neural network-based exploratory learning and motor planning system for co-robots. *Frontiers in Neurobotics*, **9**, article 7.
- Maas, E., Mailend, M., and Guenther, F.H. (2015). Feedforward and feedback control in apraxia of speech (AOS): Effects of noise masking on vowel production. *Journal of Speech, Language, and Hearing Disorders*, **58**, pp. 185-200. PMCID: PMC4398652
- Patel, R., Reilly, K.J., Archibald, E., Cai, S., and Guenther, F.H. (2015). Responses to intensity-shifted auditory feedback during running speech. *Journal of Speech, Language, and Hearing Research*, **58**, pp. 1687-1694. NIHMSID: NIHMS735867
- Cler M.J., Nieto-Castanon A., Guenther F.H., Fager, S., and Stepp C.E. (2016). Surface electromyographic control of a novel phonemic interface for speech synthesis. *Augmentative and Alternative Communication*, **32**, pp. 120-130. NIHMSID: NIHMS802522
- Sitek, K.R., Cai, S., Beal, D.S., Perkell, J.S., Guenther, F.H., and Ghosh, S.S. (2016). Decreased cerebellar-orbitofrontal connectivity correlates with stuttering severity: Whole-brain functional and structural connectivity associations with persistent developmental stuttering. *Frontiers in Human Neuroscience*, **10**, article 190.
- Daliri, A., Wieland, E.A., Cai, S., Guenther, F.H., and Chang, S. (in press). Auditory-motor adaptation is reduced in adults who stutter but not in children who stutter. *Developmental Science*.

- Jia, N., Brincat, S.L., Salazar-Gómez, A.F., Panko, M., Guenther, F.H., and Miller, E.K. (in press). Decoding of intended saccade direction in an oculomotor brain-computer interface. *Journal of Neural Engineering*.
- Abur D.A., Lester-Smith R.A., Daliri A., Lupiani A.A., Guenther F.H., Stepp C.E. (submitted). Sensorimotor adaptation of voice fundamental frequency in Parkinson's disease. *Journal of Speech, Language, and Hearing Research*.

BOOK CHAPTERS

- Bullock, D., Grossberg, S., and Guenther, F.H. (1996). Neural network modeling of sensory-motor control in animals. In: Zelaznik, H. (ed.), *Advances in Motor Learning and Control* (pp. 261-292). Champaign, IL: Human Kinetics Press.
- Gaudiano, P., Guenther, F.H., and Zalama, E. (1997). The neural dynamics approach to sensory-motor control: Overview and recent applications in mobile robot control and speech production. In: O. Omidvar and P. van der Smagt (eds.), *Neural Systems for Robotics* (pp. 153-194). San Diego, CA: Academic Press.
- Guenther, F.H., and Micci Barreca, D. (1997). Neural models for flexible control of redundant systems. In: P. Morasso and V. Sanguineti (eds.), *Self-organization, Computational Maps, and Motor Control* (pp. 383-421). Amsterdam: Elsevier-North Holland.
- Guenther, F.H. (2001). Neural networks: Biological models and applications. In N.J. Smelser and P.B. Baltes (eds.), *International Encyclopedia of the Social & Behavioral Sciences* (pp. 10534-10537)**.** Oxford: Pergamon.
- Guenther, F.H. (2003). Neural control of speech movements. In: A. Meyer and N. Schiller (eds.), *Phonetics and Phonology in Language Comprehension and Production: Differences and Similarities* (pp. 209-239). Berlin: Mouton de Gruyter.
- Guenther, F.H., and Perkell, J.S. (2003). A neural model of speech production and its application to studies of the role of auditory feedback in speech. In: B. Maassen, R. Kent, H. Peters, P. Van Lieshout, and W. Hulstijn (eds.), *Speech Motor Control in Normal and Disordered Speech*. Oxford: Oxford University Press.
- Guenther, F.H, Ghosh, S.S., Nieto-Castanon, A., and Tourville, J.A. (2006). A neural model of speech production. In: J. Harrington and M. Tabain (eds.), *Speech Production: Models, Phonetic Processes, and Techniques.* London: Psychology Press.
- Perkell, J.S., Guenther, F.H., Lane, H., Marrone, N., Matthies, M.L., Stockmann, E., Tiede, M., and Zandipour, M. (2006). Production and perception of phoneme contrasts covary across speakers. In: J. Harrington and M. Tabain (eds.), *Speech Production: Models, Phonetic Processes, and Techniques.* London: Psychology Press.
- Guenther, F.H. (2007). Neuroimaging of normal speech production. In R. Ingham (Ed.), *Neuroscience Research in Communication Sciences and Disorders* (pp. 1-51). San Diego: Plural.
- Brumberg, J.S., Guenther, F.H., and Kennedy, P.R. (2013). An auditory output brain-computer interface for speech communication. C. Guger, B.Z. Allison, and G. Edlinger (Eds.), *The State of the Art in BCI Research: 2011* (Chapter 2), pp. 7-14.
- Tourville, J.A., Peeva, M.G., and Guenther, F.H. (2014). Perception-production interactions and their neural bases. In: V. Ferreira, M. Goldrick, and M. Miozzo (eds.), *The Oxford Handbook of Language Production* (Ch. 28). Oxford: Oxford University Press.
- Guenther, F.H., Tourville, J.A., and Bohland, J.W. (2015). Speech production. In A.W. Toga (ed.), *Brain Mapping: An Encyclopedic Reference* (vol. 3, pp. 435-444). Waltham, MA: Academic Press.

- Palumbo, M.L., Mody, M., Klykylo, W.M., McDougle, C.J., and Guenther, F.H. (2015). Neurodevelopmental disorders: Communication disorders. In A. Tasman, J. Kay, J.A. Lieberman, M.B. First and M.B. Riba (eds.), *Psychiatry, 4th Edition* (Chapter 43). Hoboken, NJ: John Wiley & Sons.
- Guenther, F.H., and Hickok, G. (2015). Role of the auditory system in speech production. In G. Celesia and G. Hickok (eds.), *The Human Auditory System: Fundamental Organization and Clinical Disorders*. Oxford: Elsevier.
- Guenther, F.H., and Hickok, G. (2015). Neural models of motor speech control. In G. Hickok and S. Small (eds.), *Neurobiology of Language* (Chapter 58). Waltham, MA: Academic Press.
- Brumberg, J.S., Burnison, J.D., and Guenther, F.H. (2016). Brain-machine interfaces for speech restoration. In P. van Lieshout, B. Maassen, and H. Terband (eds.), *Speech Motor Control in Normal and Disordered Speech: Future Developments in Theory and Methodology* (Ch. 12). Rockville, MD: American Speech-Language-Hearing Association.

CONFERENCE PUBLICATIONS

- Bullock, D., Greve, D., Grossberg, S., and Guenther, F.H. (1992). A head-centered representation of 3-D target location derived from opponent eye position commands. In: *International Joint Conference on Neural Networks, Baltimore, MD, June 1992*, vol. I., pp. 79-85. Piscataway, NJ: Institute of Electrical and Electronics Engineers.
- Bullock, D., Grossberg, S., and Guenther, F.H. (1992). A self-organizing neural network model for redundant sensory-motor control, motor equivalence, and tool use. In: *International Joint Conference on Neural Networks, Baltimore, MD, June 1992*, vol. IV, pp. 91-96. Piscataway, NJ: Institute of Electrical and Electronics Engineers.
- Bullock, D., Greve, D., Grossberg, S., and Guenther, F.H. (1993). A self-organizing neural network for learning a body-centered invariant representation of 3-D target position. In: Gielen, S., and Kappen, B. (eds.), *Proceedings of the International Conference on Artificial Neural Networks, Amsterdam, The Netherlands, 13-16 September 1993*, pp. 90-95. London: Springer-Verlag. Also in: *World Congress on Neural Networks*, vol. II, pp. 405-408. Hillsdale, NJ: Erlbaum.
- Guenther, F.H. (1993). A self-organizing neural model for motor equivalent phoneme production. In: *World Congress on Neural Networks*, vol. III, pp. 6-9. Hillsdale, NJ: Erlbaum. Also in: Gielen, S., and Kappen, B. (eds.), *Proceedings of the International Conference on Artificial Neural Networks, Amsterdam, The Netherlands, 13-16 September 1993*, pp. 71-74. London: Springer-Verlag.
- Guenther, F.H. (1993). Sensorimotor transformations in a neural model of motor equivalent speaking. *Society for Neuroscience Abstracts*, **19** Pt. 1, p. 553.
- Guenther, F.H. (1994). Skill acquisition, coarticulation, and rate effects in a neural network model of speech production. Program of the 127th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **95**(5) Pt. 2, p. 2924.
- Cameron, S., Grossberg, S., and Guenther, F.H. (1995). A self-organizing heading and depth detection network. *Proceedings of the World Congress on Neural Networks, Washington, D.C.*, vol. 1, pp. 3-7. Mahwah, NJ: Erlbaum.
- Guenther, F.H. (1995). A modeling framework for speech motor development and kinematic articulator control. In: Elenius, K., and Branderud, P. (eds.), *Proceedings of the XIIIth International Congress of Phonetic Sciences, Stockholm, Sweden, 13-19 August, 1995*, Vol. 2, pp. 92-99. Stockholm, Sweden: KTH and Stockholm University.

- Guenther, F.H., and Johnson, D. (1995). A computational model using formant space planning of articulator movements for vowel production. Program of the 129th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **97**(5) Pt. 2, p. 3402.
- Guenther, F.H., and Micci Barreca, D. (1995). Efficient curved reaches resulting from kinematic biases in the DIRECT model. *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, Vancouver, B.C., Canada.
- Johnson, D., and Guenther, F.H. (1995). Acoustic space movement planning in a neural model of motor equivalent vowel production. *Proceedings of the World Congress on Neural Networks, Washington, D.C.*, vol. 1, pp. 481-485. Mahwah, NJ: Erlbaum.
- Micci Barreca, D., and Guenther, F.H. (1995). Efficient trajectory formation using a learned approximate pseudoinverse in the DIRECT model of reaching. *Proceedings of the World Congress on Neural Networks, Washington, D.C.*, vol. 1, pp. 388-392. Mahwah, NJ: Erlbaum.
- Guenther, F.H., and Gjaja, M.N. (1996). The perceptual magnet effect as an emergent feature of neural map formation. Program of the 131st Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **99**(4) Pt. 2, p. 2590.
- Guenther, F.H., Hampson, M., and Micci Barreca, D. (1996). Approximate vocal tract shape invariance without vocal tract shape targets. Program of the Third Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, *Journal of the Acoustical Society of America*, **100**(4), Pt. 2, p. 2658.
- Gjaja, M.N., and Guenther, F.H. (1997). Experience-based auditory map formation and the perceptual magnet effect. In: J. Bower (ed.), *Proceedings of the 1996 Computational Neuroscience Meeting*. New York: Plenum.
- Guenther, F.H., Espy-Wilson, C.Y., Boyce, S.E., Matthies, M.L., Zandipour, M., and Perkell, J.S. (1997). Articulatory trade-offs reduce acoustic variability in American English /r/ productions. Program of the 134th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **102**(5) Pt. 2, p. 3094.
- Husain, F.T., and Guenther, F.H. (1998). Inducing a ``perceptual magnet''-like effect in a non-speech modality. Program of the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **103**(5) Pt. 2, p. 2982.
- Hampson, M., Guenther, F.H., and Cohen, M.A. (1998). Visual influences on the perception of alveolar/velar place discrimination. Program of the 136th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **104**(3) Pt. 2, p. 1854.
- Callan, D.E., Kent, R.D., Guenther, F.H., and Vorperian, H.K. (1998). An auditory feedback based model of speech production in the developing child. Program of the 136th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **104**(3) Pt. 2, p. 1854.
- Guenther, F.H. (1998). A theoretical framework for speech acquisition and production. *Proceedings of the Second International Conference on Cognitive and Neural Systems, Boston University, Boston, May 28-30, 1998*, p. 57. Boston: Boston University Center for Adaptive Systems.
- Husain, F.T. and Guenther, F.H. (1998). Experimental tests of the neural models of the perceptual magnet effect. *Proceedings of the Second International Conference on Cognitive and Neural Systems, Boston University, Boston, May 28-30, 1998*, p. 92. Boston: Boston University Center for Adaptive Systems.
- Husain, F.T. and Guenther, F.H. (1999). Psychophysical investigations of category and discrimination learning. Cognitive Neuroscience Society Annual Program 1999, *Journal of Cognitive Neuroscience Supplement*, p. 44.

- Guenther, F.H., and Husain, F.T. (1999). Psychophysical investigations of auditory space deformations resulting from category and discrimination learning. *Proceedings of the XIVth International Congress of Phonetic Sciences*, pp. 2061-2064. Berkeley: Regents of the University of California.
- Nieto-Castanon, A., and Guenther, F.H. (1999). Constructing speaker-specific articulatory vocal tract models for testing speech motor control hypotheses. *Proceedings of the XIVth International Congress of Phonetic Sciences*, pp. 2271-2274. Berkeley: Regents of the University of California.
- Perkell, J.S., Zandipour, M., Vick, J., Matthies, M., Lane, H., Guenther, F., and Gould, J. (2000). Rapid changes in speech production parameters in response to a change in hearing. *Proceedings of the 5th Seminar on Speech Production & CREST Workshop on Models of Speech Production, Kloster Seeon, Bavaria, Germany*, pp. 245-248.
- Perrier, P., Perkell, J., Payan, Y., Zandipour, M., Guenther, F., and Khalighi, A. (2000). Degrees of freedom of tongue movements in speech may be constrained by biomechanics. *Proceedings of the 6th International Conference on Spoken Language Processing, Beijing, China*, vol. II, pp. 162-165.
- Guenther, F.H., Nieto-Castanon, A., Tourville, J.A., and Ghosh, S.S. (2000). The representation of prototypical and non-prototypical vowels in peri-sylvian cortical areas. *Society for Neuroscience Abstracts*, vol. 26, part 2, p. 1971.
- Perkell, J.S., and Guenther, F.H. (2000). A model of speech motor control and supporting data: Influences of quantal effects. Program of the 140th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **108**(5) Pt. 2, p. 2626.
- Ghosh, S., Nieto-Castanon, A., Tourville, J., and Guenther, F. (2001). ROI-based analysis of fMRI data incorporating individual differences in brain anatomy. *Proceedings of the 7th Annual Meeting of the Organization of Human Brain Mapping, Brighton, UK*.
- Guenther, F.H. (2001). Neural modeling of speech production. *Proceedings of the 4th International Nijmegen Speech Motor Conference*, Nijmegen, The Netherlands, June 13-16, 2001.
- Guenther, F.H. (2001). A neural model of cortical and cerebellar interactions in speech. *Society for Neuroscience Abstracts.*
- Perkell, J., Guenther, F., Lane, H., Matthies, Vick, J., and Zandipour, M. (2001). Planning and auditory feedback in speech production. *Proceedings of the 4th International Nijmegen Speech Motor Conference*, Nijmegen, The Netherlands, June 13-16, 2001.
- Guenther, F.H., Nieto-Castanon, A., Tourville, J.A., and Ghosh, S.S. (2001). The effects of categorization training on auditory perception and cortical representations. *Proceedings of the Speech Recognition as Pattern Classification (SPRAAC) Workshop*, Nijmegen, The Netherlands, July 11-13, 2001.
- Perkell, J., Guenther, F., Lane, H., Matthies, M., Payan, Y., Perrier, P., Vick, J., Wilhelms-Tricarico, R., and Zandipour, M. (2001). The sensorimotor control of speech production. *Proceedings of The First International Symposium on Measurement, Analysis and Modeling of Human Functions*, *Sapporo, Japan*.
- Guenther, F.H. (2002). Effects of category learning on auditory perception and cortical maps. Program of the 143rd Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **111**(5) Pt. 2, p. 2383.
- Marrone, N., Stockmann, E., Guenther, F.H., Vick, J., Perkell, J.S., and Lane, H. (2002). Audio-visual integration in listeners with normal hearing and hearing aid users. Program of the 144th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **112**(5) Pt. 2, p. 2251.
- Vick, J.C., Perkell, J.S., Lane, H., Matthies, M., Zandipour, M., Stockmann, E., Guenther, F., and Tiede, M. (2002). Effects of hearing status and perturbation with a bite block on vowel production. Program of

the 144th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **112**(5) Pt. 2, p. 2358.

- Guenther, F.H. (2003). Introductory remarks on neural modeling in speech perception research. Program of the 145th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **113**(4) Pt. 2, p. 2209.
- Guenther, F.H., Tourville, J.A., and Bohland, J. (2003). Modeling the representation of speech sounds in auditory cortical areas. Program of the 145th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **113**(4) Pt. 2, p. 2210.
- Ghosh, S., Bohland, J., and Guenther, F. (2003). Comparisons of brain regions involved in overt production of elementary phonetic units. *Proceedings of the 9th Annual Meeting of the Organization forHuman Brain Mapping, New York*.
- Guenther, F.H. and Ghosh, S.S. (2003). A model of cortical and cerebellar function in speech. In M.J. Sole, D. Recasens & J. Romero (eds.), *Proceedings of the XVth International Congress of Phonetic Sciences* (pp. 169-173). Barcelona: Universitat Autonoma de Barcelona.
- Perkell, J.S., Guenther, F.H., Lane, H., Matthies, M.L., Stockmann, E., Tiede, M., and Zandipour, M. (2003). Cross-subject relations between measures of vowel production and perception. *Proceedings of the XVth International Congress of Phonetic Sciences*. Barcelona: 15th ICPhS Organizing Committee.
- Max, L., Gracco, V.L., Guenther, F.H., Ghosh, S., and Wallace, M. (2003). A sensorimotor model of stuttering: Insights from the neuroscience of motor control. In A. Packman, A. Meltzer, & H.F.M. Peters al. (Eds.), *Proceedings of the 4th World Congress on Fluency Disorders*. Nijmegen, The Netherlands: University of Nijmegen Press.
- Vick, J.C., Perkell, J.S., Hanson, H., Lane, H., Matthies, M., Marrone, N., and Guenther, F. (2003). Changes in the categorical perception of speech sounds following experience with a cochlear implant. *Proceedings of the 2003 Conference on Implantable Auditory Prostheses, Pacific Grove, California*.
- Nieto-Castanon, A., and Guenther, F.H. (2003). A model of auditory cortical representations underlying speech perception and production. *Society for Neuroscience Abstracts.*
- Guenther, F.H., Ghosh, S.S., and Nieto-Castanon, A. (2003). A neural model of speech production. *Proceedings of the 6th International Seminar on Speech Production, Sydney, Australia* (pp. 85-90).
- Bohland, J.W. and Guenther, F.H. (2004). An fMRI investigation of the neural bases of sequential organization for speech production. *Proceedings of the 10th Annual Meeting of the Organization for Human Brain Mapping, Budapest, Hungary*.
- Zandipour, M., Guenther, F., Perkell, J., Perrier, P., Payan, Y., and Badin, P. (2004). Vowel-vowel sequence planning in acoustic and muscle space. Proceedings of *From Sound to Sense: Fifty+ Years of Discoveries in Speech Communication, Cambridge, MA.*
- Guenther, F.H., and Perkell, J.S (2004). A neural model of speech production and supporting experiments. Proceedings of *From Sound to Sense: Fifty+ Years of Discoveries in Speech Communication, Cambridge, MA.*
- Villacorta, V., Perkell, J., and Guenther, F. (2004). Sensorimotor adaptation to acoustic perturbations in vowel formants. Program of the 147th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **115**, p. 2430.
- Tiede, M.K., Guenther, F.H., Perkell, J.S., Ostry, D.J., Zandipour, M., and Houle, G. (2004). Perturbation and compensation in speech acoustics using a jaw-coupled robot. Program of the 148th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America*, **116**, p. 2631.

- Yoo, J.J., Guenther, F.H., and Perkell, J.S. (2004). Cortical networks underlying audio-visual speech perception in normally hearing and hearing impaired individuals. Program of the 148th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **116**, p. 2524.
- Tourville, J.A., Guenther, F.H., Ghosh, S.S., and Bohland, J.W. (2004). Effects of jaw perturbation on cortical activity during speech production. Program of the 148th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **116**, p. 2631.
- Guenther, F.H. (2004). A neural network model of cortical and cerebellar involvement in speech motor control. *Proceedings of the Conference on Motor Speech, Albuquerque, New Mexico*.
- Perkell, J., Matthies, M., Guenther, F., Lane, H., Stockmann, E., Tiede, M., and Zandipour, M. (2004). Relationship between perceptual ability and the effects of perturbations on produced vowel contrasts. *Proceedings of the Conference on Motor Speech, Albuquerque, New Mexico*.
- Civier, O. and Guenther, F.H. (2005). Simulations of feedback and feedforward control in stuttering. *Proceedings of the Oxford Dysfluency Conference, St. Catherine's College, Oxford, 29th June to 2nd July, 2005*.
- Matthies, M.L., Guenther, F.G., Denny, M., Perkell, J.S., Burton, E., Vick, J., Tiede, M., and Lane, H. (2005). Perception and production of /r/ allophones improve with hearing from a cochlear implant. Program of the 150th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **118**, p. 1964.
- Tourville, J.A., Guenther, F.H., Ghosh, S.S., Reilly, K.J., Bohland, J.W., and Nieto-Castanon, A. (2005). Effects of acoustic and articulatory perturbation on cortical activity during speech production. *NeuroImage (Proceedings of the 11th Annual Meeting of the Organization for Human Brain Mapping, Toronto),* **26**(S1), p. S49.
- Villacorta, V., Perkell, J.S., and Guenther, F.H. (2005). Relations between speech sensorimotor adaptation and perceptual acuity. Program of the 149th Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **117**, pp. 2618-2619.
- Yoo, J.J., Guenther, F.H., and Perkell, J.S. (2005). Cortical networks underlying audio-visual speech perception in normally hearing and hearing impaired individuals, *Proceedings of the Workshop on Plasticity in Speech Perception June 15-17, 2005*. London: UCL Centre for Human Communication.
- Bohland, J., Guenther, F., and Bullock, D. (2006). Modeling and imaging of sequencing in speech production. *Proceedings of the Tenth International Conference on Cognitive and Neural Systems, Boston, MA.*
- Reilly, K.J., Guenther, F.H., and Tourville, J.A. (2006). Learning of a novel sensorimotor mapping involving the speech articulators. *Proceedings of the Conference on Motor Speech, Austin, Texas*.
- Zandipour, M., Perkell, J., Guenther, F., Tiede, M., Honda, K., and Murano, E. (2006). Speaking with a bite block: Data and modeling. *Proceedings of the 7th International Seminar on Speech Production*.
- Perkell, J., Zandipour, M., Ghosh, S., Ménard, L., Lane, H., Tiede, M. and Guenther, F. (2007). Variation in vowel production. Program of the 152nd Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **120**, p. 505.
- Zandipour M., Perkell J., Guenther, F., Tiede, M., Honda, K., and Murano, E. (2007). Different motor strategies for increasing speaking rate Data and modeling. Program of the 152nd Meeting of the Acoustical Society of America, *Journal of the Acoustical Society of America,* **120**, p. 3293.
- Peeva, M.G., Guenther, F., Anton, J.L., Nazarian, B, and Alario, F.X. (2007). Investigating the neural bases of syllable construction and execution. *Society for Neuroscience Abstracts.*

- Siebert, S., Andreasen, D.S., Bartels, J., Brumberg, J., Guenther, F., Kennedy, P.R., and Wright, E.J. (2007). Human speech cortex long-term recordings [1]: Spike sorting and noise reduction. *Society for Neuroscience Abstracts.*
- Wright, E.J., Andreasen, D.S., Bartels, J., Brumberg, J., Guenther, F., Kennedy, P.R., Miller, L., Rebesco, J., Schwartz, A.B., Siebert, S., and Velliste, M. (2007). Human speech cortex long-term recordings [3]: Neural net analyses. *Society for Neuroscience Abstracts.*
- Miller, L., Andreasen, D.S., Bartels, J., Brumberg, J., Guenther, F., Kennedy, P.R., Rebesco, J., Siebert, S., and Wright, E.J. (2007). Human speech cortex long-term recordings [4]: Bayesian analyses. *Society for Neuroscience Abstracts.*
- Brumberg, J., Andreasen, D.S., Bartels, J., Guenther, F., Kennedy, P.R., Schwartz, A.B., Siebert, S., Velliste, M., and Wright, E.J. (2007). Human speech cortex long-term recordings [5]: Formant frequency analyses. *Society for Neuroscience Abstracts.*
- Peeva, M.G., Guenther, F., Anton, J.-L., Nazarian, B., and Alario, F.-X. (2007). Syllable sequence production: An fMRI repetition priming study. *Proceedings of the XVth Meeting of the European Society for Cognitive Psychology, Marseilles, France*.
- Reilly, K.J., Guenther, F.H., Tourville, J.A., and Bohland, J.W. (2007). A neuroimaging investigation of auditory-motor learning. *Proceedings of the 154th Meeting of the Acoustical Society of America. New Orleans, LA.*
- Tourville, J.A. and Guenther, F.H. (2007). Neural mechanisms underlying sensory feedback control of speech. *Proceedings of the 154th Meeting of the Acoustical Society of America. New Orleans, LA.*
- Patel, R. Campellone, P., Reilly, K.J., Niziolek, C., and Guenther, F.H. (2008). Prosodic compensations to pitch perturbation during running speech. *Proceedings of the Conference on Motor Speech, Monterey, California*.
- Perkell, J.S., Ghosh, S., Guenther, F.H., Lane, H., Matthies, M.L., Ménard, L., and Tiede, M. (2008). Mechanisms of vowel production: Auditory goals and speaker acuity. *Proceedings of the Conference on Motor Speech, Monterey, California*.
- Robin, D.A., Guenther, F.H., Narayana, S., Jacks, A., Tourville, J.A., Ramage, A.E., Lancaster, J.L., Franklin, C., Ghosh, S., and Fox, P.T. (2008). A transcranial magnetic stimulation virtual lesion study of speech. *Proceedings of the Conference on Motor Speech, Monterey, California*.
- Terband, H., Maassen, B., Brumberg, J., and Guenther, F.H. (2008). Increased levels of neural noise as the core deficit in childhood apraxia of speech (CAS). *Proceedings of the Conference on Motor Speech, Monterey, California*.
- Brumberg, J.S., Nieto-Castanon, A. Guenther, F.H., Bartels, J.L., Wright, E.J., Siebert, S.A. Andreasen, D.S., and Kennedy, P.R. (2008). Methods for development of a long-term human brain machine interface with the Neurotrophic Electrode. *Society for Neuroscience Abstracts*.
- Guenther, F.H., Brumberg, J.S., Nieto-Castanon, A., Bartels, J.L., Siebert, S.A., Wright, E.J., Tourville, J.A., Andreasen, D.S., and Kennedy, P.R. (2008). A brain-computer interface for real-time speech synthesis by a locked-in individual implanted with a Neurotrophic Electrode. *Society for Neuroscience Abstracts*.
- Guenther, F.H. (2008). Involvement of auditory cortex in speech production. *Acoustics '08 Paris, France*.
- Guenther, F.H. (2008). How oscillatory is speech production? Abstract, *Workshop on Brain Rhythms in Speech Perception and Production*, Cambridge, MA.

- Cai, S., Boucek, M., Ghosh, S.S., Guenther, F.H., and Perkell, J.S. (2008). A system for online dynamic perturbation of formant trajectories and results from perturbations of the Mandarin triphthong /iau/. *Proceedings of the 8th International Seminar on Speech Production*.
- Perkell, J.S., Lane, H., Ghosh, S., Matthies, M.L., Tiede, M., Guenther, F., and Ménard, L. (2008). Mechanisms of vowel production: Auditory goals and speaker acuity. *Proceedings of the 8th International Seminar on Speech Production*.
- Brumberg, J.S., Kennedy, P.R., and Guenther, F.H. (2009). Artificial speech synthesizer control by brain-computer interface. *Proceedings of Interspeech 2009*.
- Overduin, S.A. and Guenther, F.H. (2009). Brain structures differentially responsible for controlling overt and covert speech. *Society for Neuroscience Abstracts.*
- Golfinopoulos, E. and Guenther, F.H. (2009). An fMRI investigation of the neural bases of suprasegmental timing in speech production. *Society for Neuroscience Abstracts.*
- Velliste, M., Brumberg, J.S., Perel, S., Fraser, G.W., Spalding, M.C., Whitford, A.S., McMorland, A.J.C., Wright, E.J., Guenther, F.H., Kennedy, P.R., and Schwartz, A.B. (2009). Modular software architecture for neural prosthetic control. *Society for Neuroscience Abstracts.*
- Kennedy, P., Andreasen, D., Brumberg, J., Clements, M., Guenther, F., Kim, J., Matthews, B., Ramos, C., Velliste, M., and Wright, E.J. (2009). Human speech cortex [2]: Tuning of single units during listening and imagined singing of tones and musical notes using feedback. *Society for Neuroscience Abstracts.*
- Panko, M., Brumberg, J.S., Nieto-Castanon, A.Wright, E.J., Law, R., Kennedy, P.R., and Guenther, F.H. (2009). Decoding intended speech with a brain-machine interface utilizing a Neurotrophic Electrode. *Proceedings of the Berlin Brain-Computer Interface Workshop: Advances in Neurotechnology*.
- Cai, S., Ghosh, S.S., Guenther, F.H., and Perkell, J.S. (2010). Coordination of the first and second formants of the Mandarin triphthong /iau/ revealed by adaptation to auditory perturbations. *Proceedings of the 159th Meeting of the Acoustical Society of America. Baltimore, MD.*
- Brunner, J., Hoole, P., Guenther, F.H., and Perkell, J.S. (2010). Dependency of compensatory strategies on the shape of the vocal tract during speech perturbed with an artificial palate. *Proceedings of the 159th Meeting of the Acoustical Society of America. Baltimore, MD*. Full paper in *Proceedings of Meetings on Acoustics*, vol. 9.
- Hiroya, S. and Guenther, F.H. (2010). Effects of speech sound naturalness on the neural basis of formant frequency discrimination. *Society for Neuroscience Abstracts.*
- Niziolek, C. and Guenther, F.H. (2010). Phonetic categories influence auditory feedback control of speech. *Society for Neuroscience Abstracts.*
- Brumberg, J.S., Kim, J., Matthews, B., Wright, E.J., Guenther, F.H., Clements, M., and Kennnedy, P.R. (2010) Evaluation of supervised classification techniques for direct phoneme prediction by a brain-computer interface. *Society for Neuroscience Abstracts.*
- Golfinopoulos, E. and Guenther, F. H. (2011). Prominence in English spoken utterances: fMRI evidence for left hemisphere cortical recruitment. *The 17th Annual Meeting of the Organization for Human Brain Mapping (Human Brain Mapping 2011), Quebec City, Canada*.
- Guenther, F.H. (2011). Development of a brain-machine interface for speech restoration. *6th International Conference on Speech Motor Control, Groningen, The Netherlands.*
- Niziolek, C., Houde, J.F., and Guenther, F.H. (2011). Feedback alterations across vowel category space. *6th International Conference on Speech Motor Control, Groningen, The Netherlands*.

- Guenther, F.H. and Brumberg, J.S. (2011). Brain-machine interfaces for real-time speech synthesis. *33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Boston, MA.*
- Guenther, F.H. (2011). The neural mechanisms of speech: From computational modeling to neural prosthesis. *International Seminar on Speech Production 2011, Montreal, Canada*.
- Civier, O., Bullock, D., Max, L., and Guenther, F. H. (2011). Simulations of stuttering and induced fluency by drugs that partially block dopamine action. *Proceedings of the 9th Congress for People Who Stutter. Buenos Aires, Argentina, 18 to 21 May, 2011*.
- Civier, O., Bullock, D., Max, L., and Guenther, F. H. (2011). Dopamine excess may delay selection of syllabic motor programs: A modeling study of stuttering. *Proceedings of the 17th International Congress of Phonetic Sciences. Hong Kong, China, 17 to 21 Aug., 2011*.
- Segawa, J.A., Tourville, J.A., Guenther, F.H. (2011). Neuroimaging evidence for changes in phonological and structural frame representations in subsyllabic speech motor sequence learning. *International Seminar on Speech Production 2011, Montreal, Canada*.
- Segawa, J.A., Tourville, J.A., Guenther, F.H. (2011). Neural correlates of subsyllabic speech motor sequence learning. *17th Annual Meeting of the Organization for Human Brain Mapping, Québec City, Canada*.
- Maas, E., Mailend, M.-L., Story, B.H., and Guenther, F.H. (2011). The role of auditory feedback in apraxia of speech: Effects of feedback masking on vowel contrast. *6th International Conference on Speech Motor Control, Groningen, The Netherlands*.
- Brumberg, J.S., Salazar-Gomez, A. and Guenther, F.H. (2011). A non-invasive brain-computer interface for control of a speech synthesizer. *Society for Neuroscience Abstracts*.
- Stephen, E.P., Brumberg, J.S., and Guenther, F.H. (2011). Distinguishing imagined movement from rest using electroencephalography. *Society for Neuroscience Abstracts*.
- Panko, M., Brincat, S., Brumberg, J., Salazar-Gomez, A., Roy, J., Overduin, S., Kennedy, P., Miller, E., and Guenther, F. (2011). Signal stability in chronic invasive brain-machine interfaces. *Society for Neuroscience Abstracts*.
- Cai, S., Beal, D., Tiede, M., Perkell, J., Guenther, F., and Ghosh, S.S. (2011). Relating the kinematic variability of speech to MRI-based structural integrity of brain white matter in people who stutter and people with fluent speech. *Society for Neuroscience Abstracts*.
- Cai, S., Beale, D., Ghosh, S.S., Tiede, M., Guenther, F.H., and Perkell, J.S. (2011). Comparing auditory-motor interaction in static and time-varying articulation between stutterers and normal speakers. *Neurobiology of Language Conference*.
- Maas, E., Mailend, M.-L., and Guenther, F.H. (2011). The role of auditory feedback during speech production in apraxia of speech. *Proceedings of the Conference on Motor Speech, Santa Rosa, CA.*
- Lorenz, S., Brumberg, J., Galbraith, B., and Guenther, F. (2012). Adaptive real-world brain-computer communication interfacing with EEG. *Proceedings of the International Conference on Cognitive and Neural Systems, Boston, MA.*
- Brumberg, J.S., Salazar-Gomez, A. and Guenther, F.H. (2012). Controlling a formant synthesizer using a noninvasive brain-machine interface. *Motor Speech Conference, Santa Rosa, CA.*
- Brumberg, J.S., Lorenz, S.D., Galbraith, B.V., and Guenther, F.H. (2012). The Unlock Project: A Python-based framework for practical brain-computer interface communication "app" development. *34th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, San Diego, CA.* PMCID: PMC3637898

- Stephen, E.P., Kramer, M.A., Lepage, K.Q., Eden, U.T., Brunner, P., Guenther, F.H., Schalk, G., and Brumberg, J.S. (2012). Characterizing the dynamically evolving functional networks of speech. *42nd Annual Meeting for the Society for Neuroscience. New Orleans, LA.*
- Cai, S., Beal, D.S., Guenther, F.H., Perkell, J.S., Ghosh, S.S. (2012). fMRI resting state connectivity of the brain in stuttering. *42nd Annual Meeting for the Society for Neuroscience.* New Orleans, LA.
- Tourville, J.T. and Guenther, F.H. (2012). Automatic cortical labeling system for neuroimaging studies of normal and disordered speech. *42nd Annual Meeting for the Society for Neuroscience.* New Orleans, LA. *Progam No. 681.06.*
- Segawa, J.A. Tourville, J.A., Beal, D.S., and Guenther, F.H. (2012). Dissociated neural representations of phonological content and syllabic frame structure. *42nd Annual Meeting for the Society for Neuroscience.* New Orleans, LA.
- Galbraith, B.V., Brumberg, J.S., Lorenz, S.D. and Guenther, F.H. (2012). Unlock: A Python-based framework for rapid development of practical brain-computer interface applications. *Proceedings of the 11th Python in Science Conference, Austin, Texas.*
- Maas, E., Mailend, M.L. and Guenther, F.H. (2013). Feedback and feedforward control in speech production in apraxia of speech and aphasia. *Clinical Aphasiology Conference, Tucson, Arizona.*
- Tourville, J.A., Cai, S., Guenther, F.H. (2013). Exploring auditory-motor interactions in normal and disordered speech. *21st International Conference on Acoustics, Proceedings of Meeting on Acoustics, Montreal, Canada.*
- Brincat, S., Salazar-Gomez, A.F., Jia, N., Panko, M., Miller, E.K., and Guenther, F.H. (2013). Development of an intracortical eye movement-based brain-computer interface. *International BCI Meeting, Pacific Grove, CA.*
- Brincat, S., Jia, N., Salazar-Gomez, A.F., Panko, M., Miller, E.K., and Guenther, F.H., (2013). Which neural signals are optimal for brain-Computer interface control? *International BCI Meeting, Pacific Grove, CA.*
- Tourville, J.A., Neito-Castanon, A., and Guenther, F.H. (2013). Large N analyses of neuroimaging data on speech production. *19th Annual Meeting of the Organization for Human Brain Mapping, Seattle, WA.*
- Shankar, V., Sherbakov, L., Galbraith, B., Sohail, A., Livitz, G., Gorchetchnikov, A., Ames, H., Guenther, F., and Versace, M. (2013). Object selection and search via a brain machine interface in a co-robotic assistant. *Proceedings of the 2013 International Joint Conference on Neural Networks*.
- Shankar, V., Sherbakov, L., Galbraith, B., Sohail, A., Livitz, G., Gorchetchnikov, A., Ames, H., Guenther, F., and Versace, M. (2013). A co-robotic assistant capable of object selection and search via a brain machine interface. *Proceedings of the 6th International IEEE EMBS Conference on Neural Engineering.*
- Segawa, J.A., Tourville, J.A., Beal, D.S., and Guenther, F.H. (2014). Neural and behavioral correlates of speech motor sequence learning. *Program of the 21st Annual Meeting of the Cognitive Neuroscience Society. Boston MA.*
- Tourville, J.A., Nieto-Castanon, A., and Guenther, F.H. (2014). Functional parcellation of cortical regions that contribute to speech motor control. Program of the 21st Annual Meeting of the Cognitive Neuroscience Society. Boston MA. Supplement of the *Journal of Cognitive Neuroscience.* p. 219:F118.
- Varghese, L.A., Michalka, S.W., Yazdanbakhsh, A., Somers, D., Stepp, C.E., Guenther, F.H, and Shinn-Cunningham, B. (2014). Decoding the locus of attention to visual, auditory, and audiovisual stimuli from single-trial EEG data. *Proceedings of the 37th Annual MidWinter Meeting of the Association for Research in Otolaryngology*.

- Golfinopoulos, E., Cai, S, Blood, A., Burns, J, Noordzij, J. P., and Guenther, F. H. (2015). Resting and task-based functional neuroimaging of adductor spasmodic dysphonia. *Proceedings of the 2015 Human Brain Mapping Meeting, Honolulu, Hawaii.*
- Golfinopoulos, E., Bullock, D., and Guenther, F. H. (2015). Neurocomputational modeling of impaired sensory feedback control in spasmodic dysphonia. *Proceedings of the 2015 Human Brain Mapping Meeting, Honolulu, Hawaii.*
- Torene, S., Ritt, J.T., and Guenther, F.H. (2015). Brain machine interface control through neurofeedback guided by beta rhythm modulation. *45th Annual Meeting for the Society for Neuroscience. Chicago, IL.*
- Cler M.J., Nieto-Castanon A., Guenther F.H., and Stepp C.E. (2015). Speech synthesis via surface electromyographic control: Training effects. *Proceedings of the 2015 Summer School on Neurorehabilitation, Valencia, Spain.*
- Cler M.J., Nieto-Castanon A., Guenther F.H., and Stepp C.E. (2015). Speech synthesis via surface electromyographic control: Training effects. *Proceedings of the Neural Processing in Humans, Animals, and Machines Conference, Boston University*.
- Daliri, A., Golfinopoulos, E., Tourville, J.A., Guenther, F.H. (2015). Neuroanatomical differences between adults who stutter and adults who do not stutter. *45th Annual Meeting for the Society for Neuroscience, Chicago, IL*. Program No. 753.25.
- Turkes, E., Golfinopoulos, E, Guenther, F.H., Tourville, J.A. (2015). Investigating intrinsic functional connectivity within the speech production network. *NeuroHAM Conference, Boston, MA.*
- Daliri, A., Wieland, E. A., Cai, S., Guenther, F. H., & Chang, S. (2016). Auditory-Motor Adaptation Is Reduced in Adults Who Stutter but not in Children Who Stutter. *2016 ASHA Convention, Philadelphia, PA.*
- Daliri, A., Tourville, J. A., Nieto-Castanon, A., & Guenther. F. H. (2016). A general framework for quantitatively assessing neurocomputational models with functional neuroimaging data. *46th Annual Meeting for the Society for Neuroscience, San Diego, CA.*
- Frankford, S., Nieto-Castañón, A., Guenther, F.H. (2016), Reliability of fMRI data during speech production tasks across scanning sessions. *11th Annual Eleanor M. Saffran Conference, Philadelphia, PA.*
- Segawa, J.A., Tourville, J.A., Nguyen, Q.T.H., Karahanoglu, F.I., Wighton, P.I., van der Kouwe, A. Tisdall, M.D., Fowler, R.A., Small, J., Manoach, D.S. & Guenther, F.H. (2016). Neural bases of language phenotypes in Autism Spectrum Disorder. *42nd Annual Meeting for the Society for Neuroscience, San Diego, CA.*
- Guenther, F.H. (2017). Neuroimaging of the speech network. *Proceedings of Acoustics '17, Boston, MA.*
- Salazar-Gomez, A.F., DelPreto, J., Gil, S., Guenther, F.H., and Rus, D. (2017). Correcting robot mistakes in real time using EEG signals. *Proceedings of the 2017 IEEE International Conference on Robotics and Automation, Singapore*.

OTHER PUBLICATIONS

- Guenther, F.H. (1992). *Neural Models of Adaptive Sensory-motor Control for Flexible Reaching and Speaking*. Boston University Ph.D. Dissertation.
- Guenther, F.H., and Bullock, D. (1992). Book Review: *Neural Networks for Control*, Miller, W.T. III, Sutton, R.S., and Werbos, P.J. (eds.) *Neural Networks*, **5**, pp. 531-535.
- Fiala, J., and Guenther, F.H. (1994). Book Review: *Handbook of Intelligent Control: Neural, Fuzzy, and Adaptive Approaches*, White, D.A., and Sofge, D.A. (eds.) *Neural Networks*, **7**, pp. 851-852.

- Guenther, F.H., and Meyers, C. (1995). Book Review: *An Introduction to the Modeling of Neural Networks*, Peretto, P. *Neural Networks*, **8**, pp. 1487-1489. Also appeared in *SIAM Review*, **37**(4).
- Guenther, F.H., Espy-Wilson, C.Y., Boyce, S.E., Matthies, M.L., Zandipour, M., and Perkell, J.S. (1997). Intraspeaker comparisons of acoustic and articulatory variability in American English /r/ productions. Technical Report CAS/CNS-97-010. Boston: Boston University.
- Hampson, M., Guenther, F.H., Cohen, M. (1999). Changes in the McGurk effect across phonetic contexts. I. Fusions. Technical Report CAS/CNS-TR-99-031. Boston: Boston University.
- Callan, D.E., Honda, K., Masaki, S., Kent, R.D., Guenther, F.H., and Vorperian, H.K. (2001). Robustness of an auditory-to-articulatory mapping for vowel production by the DIVA model to subsequent developmental changes in vocal tract dimensions. ATR Technical Report TR-H-309. Kyoto, Japan: Advanced Telecommunications Research Institute.
- Hampson, M. Guenther, F.H., Cohen, M.A., and Nieto-Castanon, A. (2003). Changes in the McGurk Effect across phonetic contexts. Technical Report CAS/CNS-TR-03-006. Boston: Boston University.
- Tourville, J.A. and Guenther, F.H. (2003). A cortical and cerebellar parcellation system for speech studies. Technical Report CAS/CNS-03-022. Boston, MA: Boston University.

INVITED LECTURES

- "Skill acquisition, coarticulation, and rate effects in a neural model of speech production." Boston University Center for Adaptive Systems Colloquium Series, April 12, 1994.
- "Acquisition, coarticulation, and rate effects in a neural model of speech production." Haskins Laboratories, New Haven, Connecticut, June 23, 1994.
- "Neural models of sensory-motor interactions for flexible movement control." Cognition, Brain, and Neural Nets Workshop on Brain and Space, Ruhr-Universitat, Bochum, Germany, July 21-22, 1994.
- "Skill acquisition, coarticulation, and rate effects in a neural model of speech production." Massachusetts Institute of Technology RLE Speech Group Seminar Series, October 7, 1994.
- "A modeling framework for speech motor development and kinematic articulator control." 1/3 plenary lecture at the XIIIth International Congress on Phonetic Sciences, Stockholm, Sweden, August 15, 1995.
- "Motor control issues in speech production." Brandeis University Department of Psychology Colloquium Series, November 9, 1995.
- "Neural network modeling of speech production." Boston University College of Engineering Speech Processing Seminar Series, March 26, 1996.
- "The perceptual magnet effect as an emergent property of neural map formation." Boston University Biomedical Engineering Department Hearing Research Center Seminar Series, May 31, 1996.
- "A computational view of infant babbling." Marsh Chapel 'Food for Thought' lecture series, Boston University, November 26, 1996.
- "A neural modeling view of speech development in infants." Massachusetts General Hospital Center for Morphometric Analysis, April 8, 1997.
- "The perceptual magnet effect as a consequence of auditory map formation." Eaton Peabody Laboratory Seminar Series, April 18, 1997.
- "The perceptual magnet effect as an emergent property of auditory map formation." Massachusetts Institute of Technology RLE Speech Group Seminar Series, May 7, 1997.
- "Articulatory tradeoffs reduce acoustic variability during /r/ production." Massachusetts Institute of Technology RLE Speech Group Seminar Series, Oct. 1, 1997.

- "A neural network model of speech production." Invited 90-minute talk with ensuing panel discussion, 1997 Annual Convention of the American Speech-Language-Hearing Association, Boston, MA, November 20, 1997.
- "A theoretical framework for speech acquisition and production." Boston University Psychology Department's Brain, Behavior, and Cognition Seminar Series, March 20, 1998.
- "A theoretical framework for speech acquisition and production." Second International Conference on Cognitive and Neural Systems, Boston University, Boston, MA, May 29, 1998.
- "Using computational models to investigate speech perception and production." UCLA Department of Linguistics, Los Angeles, CA, June 11, 1999.
- "Effects of categorization and discrimination training on auditory perceptual space." Massachusetts Institute of Technology RLE Speech Group Seminar Series, October 27, 1999.
- "Neural network models of speech perception and production." Invited 80-minute lecture with commentary, International Institute for Advanced Studies Neuroscience of Language Workshop, Kyoto, Japan, November 20, 1999.
- "Neural models of speech perception and production." Laboratoire Parole et Langage, Universite de Provence, Aix-en-Provence, France, May 19, 2000.
- "Neural modeling of speech production." Institut de la Communication Parlee, Institut National Polytechnique de Grenoble, Grenoble, France, May 24, 2000.
- "A model of speech motor control and supporting data: Influences of quantal effects." Special session on Kenneth Stevens' contributions to speech research, 140th Meeting of the Acoustical Society of America, Newport Beach, CA, December 7, 2000.
- "Neural modeling of speech perception and production." School of Communication Sciences and Disorders, McGill University, March 19, 2001.
- "Neural modeling of speech production and perception." Department of Neurology, Yale University School of Medicine, March 29, 2001.
- "A model of cortical and cerebellar interactions in speech." Massachusetts Institute of Technology RLE Speech Group Seminar Series, May 16, 2001.
- "Neural modeling of speech production." Keynote Lecture, 4th International Nijmegen Speech Motor Conference, Nijmegen, The Netherlands, June 13, 2001.
- "The effects of categorization training on auditory perception and cortical representations." Speech Recognition as Adaptive Pattern Classification Workshop, Nijmegen, The Netherlands, July 11, 2001.
- "A model of the neural bases of speech motor control." Massachusetts Eye and Ear Infirmary/Harvard Medical School, Boston, Massachusetts, January 15, 2002.
- "A model of the neural bases of speech motor control." Sixth International Conference on Cognitive and Neural Systems, Boston, Massachusetts, May 29, 2002.
- "Effects of category learning on auditory perception and cortical maps." 143rd Meeting of the Acoustical Society of America, Pittsburgh, Pennsylvania, June 4, 2002.
- "A model of the neural bases of speech production." NTT Basic Research Laboratories, Atsugi, Japan, October 15, 2002.
- "Effects of category learning on auditory perception and cortical maps." ATR International, Kyoto, Japan, October 17, 2002.
- "A model of the neural bases of speech production." ATR International, Kyoto, Japan, October 18, 2002.

- "Elucidating the neural bases of speech." Boston University Linguistics Association, Boston, Massachusetts, April 24, 2003.
- "Introductory remarks on neural modeling in speech perception research." 145th Meeting of the Acoustical Society of America, Nashville, Tennessee, April 29, 2003.
- "Using a neural model to investigate the learning of speech motor skills." Conference on Ontogeny and Phylogeny of Syllable Organization, Barcelona, Spain, August 3, 2003.
- "A model of cortical and cerebellar function in speech." XVth International Congress of Phonetic Sciences, Barcelona, Spain, August 7, 2003.
- "A neural model of speech production." Keynote lecture, 6th International Seminar on Speech Production, Sydney, Australia, December 8, 2003.
- "A neural model of speech production and supporting data." National Institutes of Health, Bethesda, Maryland, June 1, 2004.
- "A neural model of speech production and supporting data." University of Maryland Dental School, Baltimore, Maryland, June 2, 2004.
- "A neural model of speech production and supporting experiments." Plenary lecture, From Sound to Sense: Fifty+ Years of Discoveries is Speech Communication, Cambridge, Massachusetts, June 12, 2004.
- "Auditory, somatosensory, and motor interactions in speech production." Distinguished Lecture in Speech and Hearing Bioscience and Technology, Harvard-MIT Division of Health Sciences and Technology, Cambridge, Massachusetts, December 9, 2004.
- "Auditory, somatosensory, and motor interactions in speech production." CELEST Science of Learning Seminar, Boston University, Boston, Massachusetts, December 10, 2004.
- "Cortical interactions underlying the production of speech sounds." American Speech and Hearing Association (ASHA) Research Institute, San Diego, California, November 18, 2005.
- "Using modeling and neuroimaging to investigate normal and disordered speech." 2005 American Speech and Hearing Association (ASHA) Convention, San Diego, California, November 19, 2005.
- "Auditory, somatosensory, and motor interactions in speech production." M.D. Steer Distinguished Lecture, Department of Speech, Language, and Hearing Sciences, Purdue University, February 23, 2006.
- "Auditory, somatosensory, and motor interactions in speech production." Department of Cognitive and Linguistic Sciences, Brown University, March 13, 2006.
- "Auditory, somatosensory, and motor interactions in speech acquisition and production." Symposium on Efference Copy, Auditory Feedback, and Speech Production, University of California at San Francisco, April 7, 2006.
- "Neural modeling and imaging of the cortical interactions underlying speech." Experimental and Computational Cognitive Neuroscience: Towards a Synthesis, Satellite Symposium at the 2006 Annual Meeting of the Cognitive Neuroscience Society, San Francisco, California, April 8, 2006.
- "Auditory, somatosensory, and motor interactions in speech production." University of Texas Health Science Center, San Antonio, Texas, September 19, 2006.
- "Brain Mechanisms of Speech Perception and Production". From Synapse to Schoolroom: The Science of Learning, Satellite Symposium at the 2006 Annual Meeting of the Society for Neuroscience, Atlanta, Georgia, October 13, 2006.
- "Auditory, somatosensory, and motor interactions in speech production." Department of Linguistics, University of Maryland, December 8, 2006.

- "Auditory, somatosensory, and motor interactions in speech production." CONTACT International Workshop, Is a Neural Theory of Language Possible? Lecce, Italy, June 30, 2007.
- "The neural control of speech." Willard R. Zemlin Lecture in Speech Science, Annual Convention of the American Speech-Language-Hearing Association, November 16, 2007.
- "The neural control of speech." Department of Speech-Language Pathology, Northeastern University, December 14, 2007.
- "The neural control of speech." Max Planck Institute for Dynamics and Self-Organization, Goettingen, Germany, June 27, 2008.
- "Involvement of auditory cortex in speech production." Acoustics '08 Paris, France, July 3, 2008.
- "A neurocomputational model of speech production and its application to communication disorders and neural prosthesis." 5th International Workshop on Language Production, Annapolis, Maryland, July 30, 2008.
- "How oscillatory is speech production?" Workshop on Brain Rhythms in Speech Perception and Production, Cambridge, MA, November 9, 2008.
- "Investigating the neural bases of normal and disordered speech." Nancy Lurie Marks Family Foundation Boston Club, Wellesley, MA, November 14, 2008.
- "Investigating the neural bases of normal and disordered speech." Gabrieli Lab, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, Cambridge, MA, December 12, 2008.
- "Investigating the neural bases of normal and disordered speech." Center for Language and Speech Processing, The Johns Hopkins University, Baltimore, Maryland, April 7, 2009.
- "Development of a speech prosthesis in a locked-in individual." Plenary talk, American Society for Artificial Internal Organs, Dallas, Texas, May 28, 2009.
- "Neural mechanisms of speech." Keynote Speech, Foundation Ugo Bordoni Meets Frank Guenther, Rome, Italy, September 22, 2009.
- "The neural control of speech." Distinguished Lecture in Cognitive Science, Michigan State University, December 7, 2009.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, September 9, 2010.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Cushing Neurosurgical Society, Harvard Medical School, November 16, 2010.
- "Connecting theory to practice: Neural modeling of motor speech disorders." Annual Convention of the American Speech-Language-Hearing Association, November 19, 2010.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Communication Science and Disorders Speaker Series, Northwestern University, April 21, 2011.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Hearing Research Center Seminar Series, Boston University, April 29, 2011.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Integrated Program for Neuroscience Colloquium Series, Georgetown University, May 17, 2011.
- "The neural mechanisms of speech production: From computational modeling to neural prosthesis." Keynote Lecture, IEEE Workshop on Automatic Speech Recognition and Understanding," Waikoloa Village, Hawaii, December 15, 2011.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Tufts University, March 12, 2012.

- "Giving voice to a thought: New advances in augmentative communication." Boston University National Student Speech Language Hearing Association Fundraiser Meeting, March 29, 2012.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." University College London, July 6, 2012.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." University of Iowa Delta Center, December 7, 2012.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Northeastern University Action Club, March 22, 2013.
- "Brain-computer interfaces for locked-in syndrome." Coolidge Corner Theatre Science on Screen Series, Brookline, MA, April 22, 2013.
- "The neural substrates of speech motor learning." Progress in Motor Control IX, Montreal, Canada, July 15, 2013.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." 2014 Curt von Euler Honorary Lecture, Co-sponsored by the Stockholm University Department of Linguistics and Nobel Institute for Neurobiology at the Karolinska Institute, Stockholm, Sweden, January 8, 2014.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Keynote Lecture, Centre for Research on Brain, Language, and Music Scientific Day, Montreal, Canada, May 8, 2015.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Keynote Lecture, The Voice Foundation 44th Annual Symposium, Philadelphia, Pennsylvania, May 27, 2015.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Keynote Lecture, International Congress on Phonetic Sciences, Glasgow, Scotland, August 14, 2015.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." University of Buffalo Cognitive Science Colloquium Series, April 6, 2016.
- "The neural mechanisms of speech: From computational modeling to neural prosthesis." Temple University, Philadelphia, Pennsylvania, May 2, 2016.
- "Sensory feedback control in speech: Neural circuits and individual differences." 171st Meeting of the Acoustical Society of America, Salt Lake City, Utah, May 26, 2016.
- "Illuminating the neural bases of speech disorders through neurocomputational modeling." 2016 ASHA Convention, Philadelphia, Pennsylvania, November 18, 2016.
- "Neural damage and functional circuits." 2016 ASHA Convention, Philadelphia, Pennsylvania, November 18, 2016.