

Elizabeth S. Heller Murray, PhD, CCC-SLP

Department of Communication Sciences and Disorders
College of Public Health
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Research Employment:

Assistant Professor Temple University, Philadelphia, PA	8/2020
Postdoctoral Researcher Guenther Lab, Boston University, Boston, MA PI: Frank Guenther	6/2019 –7/2020
Doctoral Research Assistant Stapp Lab for Sensorimotor Rehabilitation Engineering, Boston University, Boston, MA PI: Cara Stepp	8/2013-5/2019
Research Assistant Massachusetts General Hospital Center for Laryngeal Surgery and Voice Rehabilitation, Boston, MA PI: James Heaton	2/2012-8/2013
Lab Manager Infant and Child Cognition Lab, Boston College, Boston, MA PI: Sara Cordes	8/2009-6/2011
Research Assistant Infant and Child Lab, Emory University, Atlanta, GA PI: Philippe Rochat	9/2007-8/2009

Education:

Boston University, Boston, MA Ph.D. in Speech, Language and Hearing Sciences <i>Dissertation Title:</i> Vocal motor control in school-age children with and without vocal fold nodules	2019
Massachusetts General Hospital Institute of Health Professions, Boston, MA M.S. in Speech-Language Pathology, Concentration in Voice Disorders <i>Thesis Title:</i> Naturalness of electrolarynx speech produced with electromyographic versus manual control	2013
Emory University, Atlanta, GA Bachelor of Arts in Psychology/ Linguistics Joint Major	2009

Awards, Honors, and Research Funding:

T32 Postdoctoral Researcher, NIDCD	6/2019-7/2020
F31 Ruth L. Kirschstein National Research Service Award (NRSA) <i>Vocal Motor Control in Children with Vocal Nodules (1F31DC016197)</i> \$39,536/year for up to three years of funding	7/2017-5/2019

Heller Murray: Updated 07/2020

Hariri Graduate Fellowship, Hariri Institute for Computing, Boston University \$10,000 awarded to students pursuing computational and data-driven research	2016
Council of Academic Programs in Communication Sciences (CAPCSD) PhD Scholarship \$20,000 scholarship to support pursuit of academic career	2016
Resident Student Editor, Journal of Voice	2014-2019
Boston University, Speech, Language, and Hearing Science Travel Award \$1200 for travel to the 2015 <i>American Speech and Hearing Association (ASHA) Convention</i>	2015
ASHFoundation New Century Scholars Doctoral Scholarship \$10,000 scholarship to support pursuit of teacher-investigator career in an academic environment	2015
Dudley Allen Sargent Research Fund \$4,400 to support proposal “effect of visual feedback on velopharyngeal port control”	2014
Boston University, Speech, Language, and Hearing Science Travel Award \$400 for travel to present at the 2014 <i>American Speech and Hearing Association (ASHA) Convention</i>	2014
Sargent College Doctoral Fellowship	2013
Kenneth N. Stevens Student Research Award	2013
Boston University, Speech, Language, and Hearing Science Travel Award \$200 for travel to present at the 2014 <i>Conference on Motor Speech</i>	2013
Christopher Norman Education Fund \$124 in support for Master’s Thesis at Massachusetts General Hospital Institute of Health Professions	2012

Journal Publications:

First Author:

Heller Murray, E.S., and Stepp, C.E., Relationships between vocal pitch perception and production: a developmental perspective. (2020). *Scientific Reports, a Nature Publishing Group*. 10(1), pp1-10.

Heller Murray, E.S., Segina, R.S., Harvey Woodnorth, G, Stepp, C.E., Relative Fundamental Frequency in Children with and without Vocal Fold Nodules. (*In Press*) *Journal of Speech, Language, and Hearing Research*.

Heller Murray, E.S., Hseu, A.F., Nuss, R.C., Harvey Woodnorth, G, Stepp, C.E. (2019). Vocal Pitch Discrimination in Children with and without Vocal Fold Nodules. *Applied Sciences*, 9(15), pp 3042.

Heller Murray, E.S., Lupiani, A.A., Segina, R.A., Kolin, K.L., Stepp, C.E. (2019). Pitch Shifting with the Commercially Available Eventide Eclipse: Intended and Unintended Changes to the Speech Signal. *Journal of Speech, Language, and Hearing Research*, 62(7), pp 270

Heller Murray, E.S., Lien, Y.A.S., Van Stan, J.H., Mehta, D.D., Hillman, R.E., Noordzij, J.P., Stepp, C.E. (2017). Relative Fundamental Frequency Distinguishes between Phonotraumatic and Non-Phonotraumatic Vocal Hyperfunction. *Journal of Speech, Language, and Hearing Research*, 60(6), pp1507-1515.

Heller Murray, E.S., Michener, C., Enflo, L., Cler, G.J., Stepp, C.E. (2017). Impact of Glottal Configuration on Speech Breathing. *Journal of Voice*, 32(4), pp 420-427.

Heller Murray, E.S., Girouard, K.L., Cler, M.J., Stepp, C.E. (2016). Development of an Electronic Documentation System for Voice Therapy: A New Teaching and Clinical Research Tool. *Perspectives of the ASHA Special Interest Groups*, 1(3), pp63-73..

Heller Murray, E.S., Mendoza, J.O., Gill, S.V., Perkell, J.S., Stepp, C.E. (2016). Effects of Biofeedback on Control and Generalization of Nasalization in Typical Speakers. *Journal of Speech, Language, and Hearing Research*, 59(5), pp1025-1034.

Heller Murray, E.S., Hands, G.L., Calabrese, C., Stepp, C.E. (2016). Effects of Adventitious Acute Vocal Trauma: Relative Fundamental Frequency and Listener Perception. *Journal of Voice*, 30(2), pp177-185.

Middle Author:

Daliri, A., **Heller Murray, E. S.**, Blood, A. J., Burns, J., Noordzij, J. P., Nieto-Castanon, A., Tourville, J.A., & Guenther, F. H. (2020). Auditory Feedback Control Mechanisms Do Not Contribute to Cortical Hyperactivity Within the Voice Production Network in Adductor Spasmodic Dysphonia. *Journal of Speech, Language, and Hearing Research*, 63(2), pp421-432.

Kearney, E., Nieto-Castañón, A., Weerathunge, H.R., Falsini, R., Daliri, A., Abur, D., Ballard, K.J., Chang, S.E., Chao, S.C., **Heller Murray, E.S.** and Scott, T.L., 2020. A Simple 3-Parameter Model for Examining Adaptation in Speech and Voice Production. *Frontiers in Psychology*, 10, pp2995.

Lien, Y.A.S., Calabrese, C., Michener, C.M., **Heller Murray, E.S.**, Van Stan, J.H., Mehta, D.D., Hillman, R.E., Noordzij, J.P., Stepp, C.E. (2017). Validation of an Algorithm for Automated Estimation of Relative Fundamental Frequency. *Annals of Otology, Rhinology, and Laryngology*, 126(10), pp712-716.

McKenna V.S., **Heller Murray E.S.**, Lien Y.A.S., Stepp C.E. (2016). The Relationship Between Relative Fundamental Frequency and a Kinematic Estimate of Laryngeal Stiffness in Healthy Adults. *Journal of Speech, Language, and Hearing Research*, 59(6), pp1283-1294.

McKenna, V.S., **Heller Murray, E.S.**, Lien, Y.A.S., & Stepp, C.E. (2016). Acoustic and Kinematic Estimates of Laryngeal Stiffness. *The Journal of the Acoustical Society of America*, 139(4), pp2193-2193.

Lien, Y.A.S., Calabrese, C.R., Carolyn, C.M., **Heller Murray, E.S.**, Van Stan, J.H., Mehta, D.D., Hillman, R.E., Noordzij, J.P., Stepp C.E. (2015). Voice Relative Fundamental Frequency via Neck-Skin Acceleration In Individuals With Voice Disorders. *Journal of Speech, Language, and Hearing*, 58(8), pp1482-1487.

Hurst, M., Monahan, K., **Heller, E.S.**, and Cordes, S. (2014). 123s & ABCs: Developmental Shifts in Logarithmic to Linear Responding Reflect Fluency with Sequence Values. *Developmental Science*, 17(6), pp892-904.

Cordes, S., Goldstein, A., **Heller, E.S.** (2014). Sets Within Sets: The Influence of Set Membership on Numerical Estimates. *Journal of Experimental Psychology: Human Perception and Performance*, 40(1), pp94-105

Frigerio, A., Hadlock, T., **Heller, E.S.**, Heaton, J. (2014). "Infrared-Based Blink Detecting Glasses For Facial Pacing: Towards A Bionic Blink." *JAMA Facial Plastic Surgery*, 16(3), pp211-218.

Hohman, M., Kim, S., **Heller, E.S.**, Frigerio, A., Heaton, J., Hadlock, T. (2013). Determining the Threshold for Asymmetry Detection in Facial Expression. *The Laryngoscope*, 124(4), pp860-865.

Kim, S., **Heller, E.S.**, Hohman, M., Hadlock, T., Heaton, J. (2013). Detection and Perceptual Impact of Side-To-Side Facial Movement Asymmetry. *JAMA Facial Plastic Surgery*, 15(6), pp411-416.

Kim, S.W., **Heller, E.S.**, Hohman, M.H., Hadlock, T.A., & Heaton, J.T. (2013). The Effect of Side-to-Side Movement Timing Asymmetry on the Perception of Dynamic Facial Movement Naturalness. *JAMA facial plastic surgery*, 15(6), 411.

Book Chapters:

Heller Murray, E.S., Harvey Woodnorth, G. 2019. *Clinical Approach to Acoustic Assessment*. In McMurray, J.S., Hoffman, M.R., Braden, M.N. (Eds.) *Multidisciplinary Management of Pediatric Voice and Swallowing Disorders*, Springer International Publishing

Heller Murray, E.S., Harvey Woodnorth, G. 2019. *Clinical Approach to Aerodynamic Assessment*. In McMurray, J.S., Hoffman, M.R., Braden, M.N. (Eds.) *Multidisciplinary Management of Pediatric Voice and Swallowing Disorders*, Springer International Publishing

Conference Presentations (*EHM presenting author):

***Heller Murray, E.S.** & Stepp, C.E. “Vocal Pitch Perception and Production in Children and Adults,” *Conference on Motor Speech*. Santa Barbara, CA, February 2020.

***Heller Murray, E.S.**, Hseu, A.F., Nuss, R.C., Harvey Woodnorth, G, Stepp, C.E., “Vocal Pitch Discrimination in Children with and without Vocal Fold Nodules,” *The 13th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research*, June 2 –4, 2019, Montreal Quebec, Canada, [podium presentation].

***Heller Murray, E.S.**, Kolin, K.R., Harvey Woodnorth, G., Stepp, C.E. “Relative Fundamental Frequency Differences between Children with and without Vocal Fold Nodules,” *American Speech and Hearing Association (ASHA) Convention*, November 15 – 17, 2018, Boston, Massachusetts, [podium presentation].

***Heller Murray, E.S.**, Lupiani, A.A., Kolin, K.R., Stepp, C.E. “Accuracy of the Commercially Available Eventide Eclipse to Perturb Auditory Feedback of Fundamental Frequency,” *11th International Conference on Voice Physiology and Biomechanics*, August 1-3, 2018, East Lansing, Michigan, [poster presentation].

Stepp C.E., ***Heller Murray E.S.**, Abur D., Lester-Smith R.A., Daliri A., Noordzij J.P., Lupiani A.A. “Auditory-motor impairment as an underlying basis of hyperfunctional voice disorders,” *7th International Conference on Speech Motor Control*, July 5 – 8, 2017, Groningen, the Netherlands, [poster presentation].

***Heller Murray, E.S.**, Girouard, K.L., Cler, M.J., Stepp, C.E. “Development of an electronic documentation system for voice therapy: A new teaching and clinical research tool,” *American Speech and Hearing Association (ASHA) Convention*, November 17-19, 2016, Philadelphia, PA, [oral presentation].

***Heller Murray, E.S.**, Michener, C.M., Enflo, L., Cler, M.J., Stepp, C.E. “The impact of glottal closure on speech breathing,” *10th International Conference on Voice Physiology and Biomechanics*, March 14-17, 2016, Vina del Mar, Chile, [oral presentation].

Heller Murray, E.S., Lien, Y-A. S., Van Stan, J. H., Mehta, D. D., Hillman, R. E., Noordzij, J.P., Stepp, C.E. “Relative fundamental frequency distinguishes between phonotraumatic and non-phonotraumatic vocal hyperfunction,” *10th International Conference on Voice Physiology and Biomechanics*, March 14-17, 2016, Vina del Mar, Chile, [oral presentation].

Lien Y.S., Calabrese C., Michener C.M., **Heller Murray E.S.**, Van Stan J., Mehta D.D., Hillman R.E., Noordzij J.P., Stepp C.E. “Automated algorithms for voice relative fundamental frequency: Validation and applications in assessing voice disorders,” *American Speech and Hearing Association (ASHA) Convention*, November 12-14, 2015, Denver, CO, [oral presentation].

***Heller Murray E.S.**, Hands G.L., Calabrese C.R., Stepp C.E. “Effects of adventitious vocal trauma: Relative fundamental frequency and listener perception,” *44th Annual Symposium: Care of the Professional Voice, Voice Foundation*, May 26-31, 2015, Philadelphia, PA, [oral presentation].

Heaton, J.T., **Heller Murray, E.** “Preliminary testing of a wireless electromyographically controlled electrolarynx voice prosthesis,” *Combined Otolaryngology Spring Meetings (COSM)*, April 22-26, 2015, Boston, MA.

***Heller Murray, E.S.**, Mendoza, J., Stepp C.E. “Effects of normalized nasal acceleration feedback on control and generalization of nasalance,” *American Speech and Hearing Association (ASHA) Convention*, November 20-22, 2014, Orlando, FL, [oral presentation].

Anand, S., **Heller Murray, E.S.**, Stepp C.E. “Vocal loudness discrimination deficits in individuals with Parkinson’s disease,” *American Speech and Hearing Association (ASHA) Convention*, November 20-22, 2014, Orlando, FL, [oral presentation].

Nagle, K., **Heller Murray, E.S.**, Heaton, J.T. “Association between acoustic and perceptual measures of question intonation for EMG-activated electrolaryngeal speech,” *American Speech and Hearing Association (ASHA) Convention*, November 20-22, 2014, Orlando, FL, [poster presentation].

***Heller Murray, E.S.**, Stepp, C.E. “The role of feedback on discrimination of vocal sound pressure levels,” *Conference on Motor Speech*, February 27-March 2, 2014, Sarasota, FL, [poster presentation].

Kim, S.W., **Heller, E.S.**, Hohman, M.H., Hadlock, T.A., and Heaton, J.T. “Detection and Perceptual Impact of Side-to-Side Facial Movement Asymmetry,” *Combined Otolaryngology Spring Meeting*, Orlando, FL, [poster presentation].

Hohman, M.H., Kim, S.W., **Heller, E.S.**, Heaton, J.T., and Hadlock, T.A. “Determining the threshold for detection of asymmetry in facial movements,” *Combined Otolaryngology Spring Meeting*, Orlando, FL, [poster presentation].

Recent Teaching Experience:

Structural resonance disorders and Assessment of voice disorders. 2018, Guest lecture, Master’s level class “Advanced Speech Science,” Boston University Sargent College, Boston, MA.

Pediatric Voice. 2017 & 2018, Guest lecture, Master’s level class “Advanced Voice Disorders,” MGH Institute of Health Professions, Boston, MA.

Functional Speech Anatomy. 2016 & 2017, Guest lecture, Doctoral level class “Anatomy of Speech and Hearing,” Speech and Hearing Bioscience and Technology, Harvard University, Boston, MA.

Research in Speech-Language Pathology. 2014 & 2015, Guest lecture, Undergraduate level class “Introduction to speech, language and hearing science,” Boston University Sargent College, Boston, MA.

Caring for Your Professional Voice: Vocal Health and Vocal Hygiene. 2015, Guest lecture, Master’s level class, “Vocal Pedagogy,” Boston University College of Fine Art, Boston, MA.

Professional Memberships:

ASHA, SIG 19, Speech Science	2015-present
ASHA, SIG 03, Voice and Voice Disorders	2014-present
ASHA, SIG 03, Voice and Voice Disorders Professional Development Committee	1/2016-12/2019
ASHA, SIG 05, Craniofacial and Velopharyngeal Disorders	2015-2016

ASHA, SIG 13, Swallowing and Swallowing Disorders, Dysphagia 2014-2016

National Student Speech Language Hearing Association 2014-2016

Certification and Professional Development Courses:

Certification of Clinical Competence, Speech-Language Pathology 2016
Boston Children's Hospital

Certificate of Completion 2014
Langmore Advanced FEES course

Competency for Independent Performance of Endoscopy 2014
Competency determined by Dr. Susan Langmore

Selected Clinical Experience:

Boston Children's Hospital, Outpatient Voice and Cleft, Boston, MA 10/2015-05/2019
Speech-Language Pathologist

Massachusetts General Hospital Center for Laryngeal Surgery and Voice Rehabilitation: 11/2011-8/2013
MGH Voice Center, Outpatient Voice Clinic, Boston MA
Voice Evaluation Administrator, Analyst, and Student Clinician