

CURRICULUM VITAE

Emily Zimmerman, PhD, CCC-SLP

Assistant Professor

Dept Speech-Language Pathology and Audiology

I. Personal Information:

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Citizenship: United States

II. Educational History:

Institution	Major/Minor	Degree	Date
Brigham and Women's Hospital Harvard Medical School	Newborn Medicine	Postdoc	2013
University of Kansas	Developmental Speech Physiology Neuroscience	PhD	2011
University of Kansas	Speech Pathology	MA	2007
University of Kansas	Speech-Language-Hearing	BA	2005

III. Honors, Fellows and Awards:

Selected to attend ASHA's Pathways Program, funded by the NIDCD	2013
Student Research Travel Award (ASHA), \$400.00	2011
Margaret C. Byrne Saricks Graduate Research Award (KU)	2011
Passed Dissertation Oral Defense with Honors (KU)	2011
AMBUCS Scholarship, \$500.00	2010
Friends of the Life Span Institute Graduate Research Award (KU), \$1,500	2009
New Century Scholars Doctoral Scholarship (ASHF), \$10,000	2009
Passed Comprehensive Exams with Honors (KU)	2009
Awarded one of the Top 10 cited papers (2006-2008) published in the <i>Journal of Neonatal Nursing (JNN)</i>	2009
AMBUCS Scholarship, \$500.00	2009
Student Research Travel Award (ASHA), \$500.00	2008
AMBUCS Scholarship, \$500.00	2008
Santa Clara Valley Medical Center: VMC Foundation Honorarium, \$500.00	2008
Graduate Student Scholarship Award (KU), \$400.00	2007
Student Research Travel Award (ASHA), \$400.00	2007
Margaret C. Byrne Saricks Graduate Research Award, (KU)	2007
Stormont-Vail Regional Health Center Foundation, \$500.00	2006

IV. Research Experience:

The Neonatal Research Lab, Brigham and Women's Hospital, 2011-2013
Harvard Medical School

Postdoctoral Fellow for Dr. Amir Lahav

Consented parents and collected, organized, and analyzed data outcomes for premature infants enrolled in the Biological Maternal Sounds study. These outcomes include: respiratory, nutritional, parental stress, NICU noise levels, neonatal brain development, and auditory attention. Lead researcher on a project examining preterm infant attention prior to NICU discharge. Mentored undergraduate students and research assistants in the lab on research methods, data collection, and helped with manuscript preparation. Contributed to several lab manuscripts, see publication section.

Communication Neuroscience Laboratories, University of Kansas, 2005-2011
Research Assistant for Dr. Steven Barlow

Collected, organized, and analyzed data in sensorimotor systems physiology of suck and early feeding skills in premature infants with respiratory distress syndrome, intraventricular hemorrhage, hypoxic-ischemic events, and craniofacial anomalies. Learned new software tools and statistical methods to handle repeated measure design sets necessary for a new patterned orocutaneous intervention paradigm for preterm infant, known as the NTrainer. Provided training and assistance to the clinical trial sites as they started the NTrainer project in a variety of preterm infant populations (respiratory distress syndrome, chronic lung disease, small for gestational age, infants of diabetic mothers, Down syndrome, and abdominal wall defects). Helped in training, assisting, and setting up research projects with various undergraduate hourly students in the lab. Completed and published a master's thesis entitled *Pacifier Stiffness Alters the Dynamics of the Suck Central Pattern Generator* (Zimmerman et al., *J. Neonatal Nursing*, 2008). Completed and published a dissertation projection entitled *The Effects of Vestibular Stimulation Rate and Magnitude of Acceleration on Central Pattern Generation for Chest-Wall Kinematics in Preterm Infants* (Zimmerman & Barlow. *J. Perinatology*, 2011) and has co-authored several other journal articles from the lab, see publications.

Word and Sound Learning Laboratory, University of Kansas, Fall 2004
Undergrad Research for Dr. Holly Storkel

Attended weekly lab meetings. Formed a phonological probe for school-aged language studies.

V. Membership in Professional Organizations:

Association for Woman in Science, <i>Student Member</i>	2008-present
American Speech and Hearing Association, <i>Certified member</i>	2008-present
Golden Key International Honor Society, <i>Student Member</i>	2008-present
Kansas Speech and Hearing Association, <i>Student Member</i>	2007-present
The Society for Neuroscience, <i>Student Member</i>	2007-present

VI. Professional and Discipline Related Services:

ORC: Research Advisory Committee (BWH), Postdoc Rep 2012-2013
Attended the quarterly meetings and provided the research advisory committee with insights from the postdoctoral community.

Postdoc Leadership Council at Brigham and Women's Hospital, Member, 2012-2013
Member of the postdoctoral leadership council (PLC). Attended PLC meetings where we planned future postdoctoral events/speakers and postdoctoral orientations.

Research Mentor, Partners in Behavioral Milestones, Spring 2009
Mentored several speech therapists, occupational therapists, and behavioral therapists interested in studying the effects of multi-disciplinary intervention on speech, language, motor, and behavioral outcomes. Assisted in the research design set-up and methodologies that can be used to reach their goal and provided them with feedback regarding their research paradigms.

Kansas Neonate Oromotor Feed Symposium 2009, University of Kansas, Spring 2009
Conference Co-organizer
Created symposium itinerary and guest list for the two day conference. Planned catering and scheduled events for the invited speakers.

Student Research Travel Award Shadow Mentor, Christy Ludlow, PhD 2008
Attended and discussed several of the research-based symposiums and round-tables at the ASHA conference with my shadow mentor, Christy Ludlow. Completed a research and professional development meeting with Dr. Ludlow discussing career goals, dissertation, grants, tenure, etc.

KU Learning Commons Focus Group, University of Kansas, 2008
Graduate Student Representative
Provided insight on behalf of graduate students regarding the environment, programs, and services needed at the center of campus (Anschutz library) to enhancing daily learning at KU.

Scientific and Technical Consultant. KCBiomedix, Inc. Lenexa, Kansas, 2007-2008
Assisted in setting up three clinical FDA sites for KCBiomedix. Trained multi-disciplinary staff to utilize the NTrainer technology system and answered their questions. Provided in-services to the developmental team consisting of nurses, doctors, feeding specialists at Wake Medical Center, Raleigh Durham, NC, Overland Park Regional Medical Center, Overland Park, KS and Santa Clara Valley Regional Medical Center, Santa Clara, CA. Participated in weekly meetings to consult and aid in problem-solving, research-related issues and questions. Completed data analysis on suck dynamics (non-nutritive suck spatiotemporal index analysis) for each clinical trial site.

KU Campus-Fee Committee, University of Kansas, Fall 2007
Graduate Student Representative
Discussed and analyzed the decision to increase or decrease student fees. Represented the graduate school and ensured that the student fees committee considered this population in the decision making process.

KU Speech-Language-Hearing and Child Language Graduate Student Organization,
University of Kansas, 2006-2009
Member 2006, Treasurer 2007, Vice President 2008, 2009
Collected and maintained funding for the graduate organization. Attended monthly meetings with the graduate school and discussed financial planning for the organization. Prepared and

organized graduate student organization gatherings. Planned and prepared various social events and the schedule for an invited speaker to speak at our spring research symposium.

KU Student Speech-Language-Hearing Association, *University of Kansas*, 2002-2005
Member 2002-2005, Active Alternate 2005

Aided in organization tasks and participated in fundraising activities to raise money for the KU Shiefelbusch Speech and Hearing Clinic.

VII. Presentations (total # 21):

INVITED (5):

Zimmerman, E. (2011). The Effects of Physiologically-Based Vestibular and Auditory Stimulation on Respiratory, Feeding, and Growth Outcomes in Premature Infants. Department of Continuing Education at Harvard Medical School: #635, RSS Newborn Medicine Grand Rounds. Nov.

Barlow, SM., **Zimmerman, E.** (2008). Translational Neuroscience: Patterns for the Premature Brain Learning to Feed. DEMO 08 Conference, Palm Springs, California.

Zimmerman, E. (2008). NTrainer Device Demo In-Service. Overland Park Regional Medical Center, Kansas.

Zimmerman, E. (2008). NTrainer Device Demo In-Service. Santa Clara Valley Medical Center, California. April.

Zimmerman, E. (2007). Orocutaneous Patterns for the Premature Brain: A New Approach Towards Developing Oromotor Feeding Skills In-Service. Wake Medical Center. Raleigh, North Carolina. October.

ORAL PRESENTATIONS (6):

Lahav, A., Norton, M., **Zimmerman, E.** (2012, April). Mono Twins are Better in Stereo: Effects of Biological Maternal Sounds on Cardiorespiratory and Growth Outcomes in Extremely Premature Infants. *14th International Congress on Twin Studies and the 2nd World Congress on Twin Pregnancy*, Florence, Italy.

Zimmerman, E., Norton, M., Lahav, A., Doheny, L., McMahon, E., Arnold, B., Levine, P. (2012, Jan). *The Effects of Maternal Voice and Biological Sounds on Respiratory and Nutritional Outcomes in Preterm Infants*. Platform presentation at the Graven's Conference, Clearwater Beach, FL. (F: Care Issues).

Zimmerman, E., Barlow, S.M., Kieweg, D., Lee, J. (2011, November). *The Effects of Vestibular Stimulation Rate and Magnitude of Acceleration on Central Pattern Generation for Chest Wall Kinematics in Preterm Infants*. Platform presentation at the American Speech-Language-Hearing Association national convention, San Diego, CA. (#1394).

Zimmerman E, Barlow, SM, Kieweg D, Wang, J. (2011, May). *Vestibular Stimulation Alters Sensorimotor Integration of the Respiratory and Orofacial Central Pattern Generators in Preterm Infants*. Platform presentation at the Society for Pediatric Research, 3123.8.

Zimmerman, E., Barlow, S.M., Lee, J. (2007, November). *Pacifier Stiffness Alters the Infants Suck Central Pattern Generator Dynamics*. Platform presentation at the American Speech-Language-Hearing Association national convention, Boston, MA. (#1994).

Barlow, S.M., Finan, D.S., Vantipalli, R., Seibel, L., Chu, S., Poore, M., Urish, M., **Zimmerman, E.**, & Estep, M. (2006, May). *Patterned oromechanosensory inputs are effective in developing the non-nutritive suck in premature infants*. Platform presentation at the Society for Pediatric Research, 3153.

POSTER CONTRIBUTIONS (10):

- Zimmerman, E.**, Ringer, S., Norton, M., McMahon, E., Arnold, B., Insoft, R. Lahav, A. (2012, April). Audio Technology for Delivering Maternal Voice and Biological Sounds to Very Low Birthweight Infants while in the Incubator: Effects of Respiratory and Growth Outcomes. *Pediatric Academic Society*, #1536.668, Boston, MA.
- Barlow, SM., **Zimmerman, E.**, Jagatheesen, P., Govindaswami, B., Weiss, S., Sakumura, A., Song, D. (2011, May). aEEG Correlates of Patterned Orosensory Stimulation in Preterm Infants. *Pediatric Academic Society*, #1419.202, Denver, CO.
- Barlow SM, Urish MM, **Zimmerman E**, Poore M, Venkatesan L. (2010, May). Frequency modulation of the sCPG in preterm infants with RDS. *Pediatric Academic Society*, #753086, Vancouver, BC.
- Poore, M., **Zimmerman, E.**, Barlow, S.M., Wang, J., Gu, F. (2008, October). *NTrainer Treatment Reduces Suck Spatiotemporal Variability in Preterm Infants*. Poster presented at the Kansas Speech and Hearing Association, Overland Park, KS.
- Poore, M., **Zimmerman, E.**, Barlow, S.M., Wang, J., Gu, F. (2008, March). *NTrainer Treatment Reduces Suck Spatiotemporal Variability in Preterm Infants*. Poster presented at the 14th Biennial Conference on Motor Speech, Monterey, California.
- Zimmerman, E.**, Barlow, S.M, Chu, S., Fei, G. (2008, November). *Orocutaneous Therapy Promotes Faster Oral Feed Transitions in Preterm Infants*. Poster presented at the American Speech and Hearing Association, Chicago, IL (2443; 290).
- Zimmerman, E.**, Barlow, S.M., Seibel, L., Poore, M., Stumm, S., Estep, M., Chu, S., Fees, M., Urish, M., Gagnon, K., Cannon, S., Carlson, J. (2008, October). *Pacifier stiffness alters the dynamics of the suck central pattern generator*. Poster presented at the Kansas Speech and Hearing Association, Overland Park, KS (PS22).
- Barlow, S.M., Poore, M., **Zimmerman, E.**, Wang, J., Gu, F. (2008, May). *NTrainer patterned orocutaneous therapy accelerates suck pattern stability and oral feeding in preterm infants*. Poster presented at the Pediatric Academic Society, Hawaii (#754296, 5840.25)
- Barlow, S.M., Finan, D.S., Seibel, L., Chu, S., Poore, M., **Zimmerman, E.**, Urish, M., Estep, M. (2006, June). *Translational neuroscience: using patterned somatosensory stimulation to entrain oromotor activity in premature infants*. Poster presented at the 5th International Conference on Speech Motor Control, Nijmegen, The Netherlands.
- Zimmerman, E.**, Barlow, S.M., Seibel, L., Poore, M., Stumm, S., Estep, M., Chu, S., Fees, M., Urish, M., Gagnon, K., Cannon, S., Carlson, J. (2006, May). *Pacifier stiffness alters the dynamics of the suck central pattern generator*. Poster presented at the Society for Pediatric Research, San Francisco (5571:393).

VIII. Publications (total # 12):

PEER REVIEWED ARTICLES (7)

Zimmerman, E., Keunen, K., Norton, M., Lahav, A. (2013). Weight Gain Velocity in Very Low-Birth-Weight Infants: Effects of Exposure to Biological Maternal Sounds. *American J. Perinatology*, [Epub ahead of print].

- Zimmerman E**, McMahon E, Doheny L, Levine P, Lahav A. (2013). Transmission of biological maternal sounds does not interfere with routine NICU care: assessment of dose variability in very low birth weight infants. *J Pediatr Neonat Individual Med.* 1(1), 73-80.
- Zimmerman, E.**, & Lahav, A. (2013). Ototoxicity in preterm infants: effects of genetics, aminoglycosides, and loud environmental noise. *J Perinatol.* 33(1):3-8
- Barlow, S.M., Urish, M., Venkatesan, L., Harold, M., **Zimmerman, E.** (2012). Frequency Modulation (FM) and Spatiotemporal Stability of the sCPG in Preterm Infants with RDS. *International J Pediatrics*, [Epub ahead of print].
- Zimmerman, E.**, Barlow, S.M. (2011). The Effects of Vestibular Stimulation Rate and Magnitude of Acceleration on Central Pattern Generation for Chest Wall Kinematics in Preterm Infants. *J Perinatology*, 32(8):614-20.
- Poore, M., **Zimmerman, E.**, Barlow, S.M., Wang, J., Gu, F. (2008). NTrainer therapy increases suck spatiotemporal stability in preterm infants. *Acta Paediatrica*, 97(7), 920-927.
- Zimmerman, E.**, Barlow, S.M. (2008). Pacifier stiffness alters the dynamics of the suck central pattern generator. *J Neonatal Nursing*, 14(3):79-86. * [Editor's Choice Award](#)

INVITED (3)

- Zimmerman, E.**, Lahav, A. (2011). The Multisensory Brain and its Ability to Learn Music. *Ann N Y Acad Sci.* 1252, 179-84.
- Zimmerman, E.**, Barlow, S. (2009). The Complexity of Transitioning to Oral Feeds in Preterm Infants. *ASHA SID 5 Perspectives Newsletter*, 19 (1), 52-57.
- Barlow, S.M., Poore, M., **Zimmerman, E.**, Finan, D.S. (2008). Synthetic orocutaneous stimulation entrains suck in preterm infants with feeding difficulties. *Neonatology Today*, 3(4), (ISSN: print 1932-7129; online 1932-7137).

BOOK CHAPTERS (2)

- Lahav, A. & **Zimmerman, E.** (2012). Pharmacotoxic Effects of Aminoglycosides and Loud Environmental Noise: An Overlooked Risk for Hearing Loss in Preterm Infants. In JV Aranda, V Fanos, J van der Anker (Eds), Perinatal Pharmacology. Hygeia Press Di Corridor Marinella. 105-113.
- Barlow, S.M., Poore, M., **Zimmerman, E.** (2008). Oromotor Entrainment Therapy to Develop Feeding Skills in the Preterm Infant. In S. Chabon & E. Cohn (Eds), Communication Disorders: A Case-Based Approach: Stories from the Front Line. Allyn & Bacon. 1-37, In press.

IX. Teaching Experiences:

Guest Lecturer for Infant Development, *University of Kansas*, Spring 2009, 2010, 2011
Presented a 3 hour lecture on respiratory entrainment and multi-modal sensory stimulation to young neonates. Created class aims and led a class discussion on the presented topic.

Teacher's Assistant for Speech Science, *University of Kansas*, Fall 2009
Prepared course syllabus, created and presented 21 lectures on the nasopharynx, velopharynx, oropharynx, pharynx, and swallowing systems. Created and graded three online quizzes, the midterm, and the final exam. Held weekly office hours to provide addition help to students.

Teacher's Assistant for Aerodynamics of Speech, University of Kansas, Summer 2009
Taught 5 three hour class periods. Prepared all power points slides, course related handouts, quizzes, and the final exam. Prepared, graded, and administered the class final. Maintained aerodynamics lab equipment.

Directed Teaching for Speech Science, University of Kansas, Fall 2008
Prepared and taught 14 lectures focusing on the oropharyngeal system and speech aerodynamics. Prepared, administered, and graded the final exam.

Teacher's Assistant for Aerodynamics of Speech, University of Kansas, Summer 2008
Taught two 3-hour class periods for the class. Prepared all course related handouts. Prepared, graded, and administered the class final. Maintained aerodynamics lab equipment.

Teacher's Assistant for Aerodynamics of Speech, University of Kansas, Summer 2007
Aided the primary teacher with reading materials and resources necessary for the class. Maintained aerodynamics lab equipment.

Guest Lecturer for Intro to Communication Disorders, University of Kansas, Spring 2006
Taught introductory information to beginning speech pathology and audiology students on the basics of the speech system.

X. Clinical Experiences:

Lawrence Therapy Services, Lawrence, Kansas 2010-2011
Speech Pathologist
Provide speech-language assessment and therapy to young children ranging from five to eleven years of age with a variety of therapeutic goals.

Premier Therapy Services, Kansas City, Kansas 2007-2011
Speech Pathologist
Provided speech therapy intervention through Missouri's First Steps Early Intervention program and Lakemary Early Intervention Services in Paola, KS. Worked as a contracted speech therapist at Pioneer Ridge Middle School in Gardner, KS for an academic year in the sixth grade. Worked with a variety of clients with strong behavioral needs at Partner's in Behavioral Milestones in Kansas City, MO. Lead individual home-health therapy to school-aged individuals with developmental delays.

Topeka Ear, Nose, and Throat Clinic, Topeka, Kansas, 2007
Student Speech-Language Clinician
Performed videolaryngostroboscopy daily. Completed assessment and intervention for various voice disorders.

Stormont-Vail Regional Health Center, Topeka, Kansas, 2006
Student Speech-Language Clinician
Completed daily bedside swallow studies and modified barium swallow studies. Performed assessment and intervention for individuals post-stroke and traumatic brain injury. Assessment and intervention for suck and feeding skills in the NICU.

Schiefelbusch Speech-Language-Hearing Clinic, *University of Kansas,* 2006
Student Speech-Language Clinician

A member of the facilitation adult communication team which provided assessment and intervention for adults' post-stroke and traumatic brain injury. Participated in several group therapy support groups.

KUMED Speech and Hearing Clinic, *University of Kansas Medical Center,* 2005-2006
Student Speech-Language Clinician

Performed evaluation and intervention for individuals with autism, articulation delay, and apraxia. Served on a diagnostic cleft palate team through St. Luke's hospital and the University of Kansas Medical Center. Led a weekly Parkinson's Group, which was based off of LSVT. Counseled and educated individuals with ALS on communication strategies and techniques bi-monthly at ALS clinic.

XI. Current Research Interests:

Dr. Zimmerman directs the Speech & Neurodevelopment Lab (SNL). The main goal of the SNL is to create assessments and therapeutic interventions that enhance suck, swallow, respiration, and neurodevelopmental outcomes. Of particular interest are multisensory interventions that improve oral feeding in preterm infants.

Postdoctoral Training: Our lab works on developing ways to optimize brain development and short- and long-term outcomes of extremely premature infants in the neonatal intensive care unit (NICU). Throughout my postdoctoral training, I have been intimately involved in the day-to-day operations of the Biological Maternal Sounds project. In collaboration with Amir Lahav, I gained advanced training on hearing development, the importance of auditory stimulation on nutrition, growth, and respiratory outcomes as well as early infant attention in the NICU. In the Maternal Sounds project, extremely premature infants are randomized to either the control group or the Maternal Sounds group. Infants in the maternal sounds group receive their mother's voice and heartbeat sounds (4x/day) with a low-pass filter applied to mimic womb frequencies. These sounds are played via micro-speakers installed in the infant's incubator/crib. Thus far, we have shown that this project is feasible for the widely variable NICU environment and does not interfere with clinical care (Zimmerman et al., 2012). In addition, we have shown that infants who receive their mother's voice and heartbeat sounds gain more weight (g/kg/day) during the neonatal period compared to the control group (Zimmerman et al., In Revisions). I am also the lead researcher on a project assessing auditory attention and processing prior to NICU discharge. In this study, infants hear a variety of acoustic stimuli (mother's voice, female's voice, and NICU sounds) and eye tracking is utilized to examine auditory attention. We hope to follow these infants long-term and send questionnaires to the parents of infants enrolled at age 1 and 2 to assess how well these early behaviors correlate with the behavior/attention outcomes at these respective time points.

Doctoral Training: I started my doctoral training at the University of Kansas in spring 2007 studying developmental speech physiology and neuroscience. This educational background included clinical training in speech pathology, communication sciences and disorders, and neuroscience. While at KU, my research program focused on the neural mechanisms involved in orofacial systems (suck, swallow, speech). During my time in the Communication Neuroscience Laboratories, I was heavily involved with the NTrainer technology systems invented by Dr.

Steven Barlow. These devices make it possible to quantitatively examine the integrity of suck patterns in the NICU. Another aspect to this technology is an orocutaneous stimulation paradigm that essentially teaches preterm infants how to suck in an organized pattern through a motorized pacifier. In addition to working on the NTrainer system, I completed a master's thesis entitled *Pacifier Stiffness Alters the Infant's Suck Central Pattern Generator Dynamics*.

My dissertation examined the effects of providing vestibular stimulation to preterm infants in an effort to alleviate their vestibular deprivation and increase neural connectivity during a critical period of brain development. Vestibular stimulation was attained by using a position-servo glider rocking chair, see article Zimmerman & Barlow (2011). The outcomes from my dissertation were very promising and will hopefully result in further studies using vestibular stimulation to improve patient outcomes. Currently, the VestibuGlide chair is patented (#022913) at the University of Kansas.