**Ian B. Mertes**

1. **Personal History and Professional Experience**

A. Educational Background

Northern Illinois University, B.A., Psychology, 2004

University of Iowa, M.A., Speech Pathology and Audiology, 2011

University of Iowa, dual Ph.D./Au.D., Speech and Hearing Science/Audiology, 2014

B. List of Academic Positions since Final Degree

2014-2016, Postdoctoral Research Associate, VA Loma Linda Healthcare System

2015-2016, Assistant Research Professor, Department of Otolaryngology and

Head/Neck Surgery, Loma Linda University Health

2016-present, Assistant Professor, Department of Speech and Hearing Science,

University of Illinois at Urbana-Champaign

C. Other Professional Employment

2013, Audiologist, University of Iowa Hospitals and Clinics

D. Honors, Recognitions, and Outstanding Achievements

2012, William F. Austin Scholarship, Starkey Hearing Technologies

2012-present, Licensure in audiology, State of Iowa

2015-present, Certificate of Clinical Competence in Audiology (CCC-A), American

Speech-Language-Hearing Association

2015, Selected attendee, Pathways, American Speech-Language-Hearing Association

2016, Selected attendee, Lessons for Success, American Speech-Language-Hearing

Association

2016-2018, 2020-2022, Loan Repayment Award, National Institute on Deafness and

Other Communication Disorders

2017, Selected attendee, ACES Research Academy, University of Illinois at Urbana-

Champaign

2021, Scholars Travel Fund, UIUC Office of the Vice Chancellor for Research &

Innovation

2021, Professional Poster Award, AAA (American Academy of Audiology) 2021

Virtual conference

E. Invited Lectures and Invited Conference Presentations since Last Promotion

None

F. Offices Held in Professional Societies

None

G. Editorships of Journals or Other Learned Publications

2022, Guest editor for 1 article, *Ear and Hearing*

H. Grants Received since Last Promotion at UIUC

1. **Mertes, I. B.** (PI), *Clinical utility of early and late TEOAE components*, Student Research Grant in Audiology, American Speech-Language-Hearing Foundation, 2010-2011, $2,000.
2. **Mertes, I. B.** (PI), *Repeatability of medial olivocochlear efferent effects in humans*, ECGPS Research Grant, University of Iowa Executive Council of Graduate and Professional Students, 2013-2014, $750.
3. **Mertes, I. B.** (PI), *Role of the auditory efferent system in auditory perceptual learning*, F32 DC015149, National Institute on Deafness and Other Communication Disorders, 2015-2016, $55,106.
4. **Mertes, I. B.** (PI), *Auditory efferent effects and speech perception in noise*, Career Development Award-1, U.S. Department of Veterans Affairs Office of Rehabilitation R&D Service, 2016-2018, $214,908 (awarded but declined due to accepting tenure-track position at UIUC).
5. **Mertes, I. B.** (PI), *Effect of static versus dynamic noises on auditory efferent activity and speech perception in noise*, Arnold O. Beckman Award, UIUC Campus Research Board, 2017-2019, $20,723.
6. **Mertes, I. B.** (PI), *Role of olivocochlear efferents for listening in dynamic noise*, 2017 New Investigators Research Grant, American Speech-Language-Hearing Foundation, 2017-2019, $10,000.
7. **Mertes, I. B.** (PI), *Auditory reflexes in listeners with normal hearing and with hearing loss*, UIUC Campus Research Board, 2021-2022, $29,338.

I. Review Panels

None

1. **Publications and Creative Works**

# Denotes any publication derived from the candidate’s thesis.

\* Denotes publication that has undergone stringent editorial review by peers.

+ Denotes publication that was invited and carries special prestige and recognition.

^ Denotes student co-author(s).

A. Doctoral thesis title

Repeatability of medial olivocochlear efferent effects on transient-evoked otoacoustic emissions in normal hearing adults

B. Books Authored or Co-Authored (in print or accepted)

None

C. Books Edited or Co-Edited (in print or accepted)

None

D. Chapters in Books (in print or accepted)

None

E. Monographs (in print or accepted)

None

F. Articles in Journals (in print or accepted)

1. \*Goodman, S. S., Bentler, R. A., Dittberner, A., & **Mertes, I. B.** (2013). The effect of low-level laser therapy on hearing. *ISRN Otolaryngology*, *2013*, 916370. doi: 10.1155/2013/916370

2. \*Goodman S. S., **Mertes, I. B.**, Lewis, J. D., & Weissbeck, D. K. (2013). Medial olivocochlear-induced transient-evoked otoacoustic emission amplitude shifts in individual subjects. *Journal of the Association for Research in Otolaryngology*, *14*(6), 829–842. doi: 10.1007/s10162-013-0409-9

3. \***Mertes, I. B.**, & Goodman, S. S. (2013). Short-latency transient-evoked otoacoustic emissions as predictors of hearing status and thresholds. *The Journal of the Acoustical Society of America*, *134*(3), 2127–2135. doi: 10.1121/1.4817831

4. \*#**Mertes, I. B.**, & Goodman, S. S. (2016). Within- and across-subject variability of repeated measurements of medial olivocochlear-induced changes in transient-evoked otoacoustic emissions. *Ear and Hearing*, *37*(2), e72–e84. doi: 10.1097/AUD.0000000000000244

5. \***Mertes, I. B.**, & Leek, M. R. (2016). Concurrent measures of contralateral suppression of transient-evoked otoacoustic emissions and of auditory steady state responses. *The Journal of the Acoustical Society of America*, *140*(3), 2027–2038. doi: 10.1121/1.4962666

6. \***Mertes, I. B.**, Wilbanks, E. C., & Leek, M. R. (2018). Olivocochlear efferent activity is associated with the slope of the psychometric function of speech recognition in noise. *Ear and Hearing*, *39*(3), 583–593. doi: 10.1097/AUD.0000000000000514

7. \***Mertes, I. B.** (2018). Human medial efferent activity elicited by dynamic versus static contralateral noises. *Hearing Research*, *365*, 100–109. doi: 10.1016/j.heares.2018.05.007

8. \*^**Mertes, I. B.**, Johnson, K. M., & Dinger, Z. A. (2019). Olivocochlear efferent contributions to speech-in-noise recognition across signal-to-noise ratios. *The Journal of the Acoustical Society of America*, *145*(3), 1529–1540. doi: 10.1121/1.5094766

9. \***Mertes, I. B.** (2020). Establishing critical differences in ear-canal stimulus amplitude for detecting middle ear muscle reflex activation during olivocochlear efferent measurements. *International Journal of Audiology*, *59*(2), 140–147. doi: 10.1080/14992027.2019.1673491

10. \***Mertes, I. B.** (2020). Medial olivocochlear reflex effects on synchronized spontaneous otoacoustic emissions. *The Journal of the Acoustical Society of America*, *147*(3), EL235–EL240. doi: 10.1121/10.0000886

11. \*^**Mertes, I. B.**, & Johnson, K. M. (2020). Lack of association between contralateral inhibition of otoacoustic emissions and vowel formant discrimination in noise. *Hearing, Balance and Communication*, *18*(4), 250–255. doi: 10.1080/21695717.2020.1807257

12. \***Mertes, I. B.** (2021). Reliability and critical differences for an implementation of the coordinate response measure in speech-shaped noise. *JASA Express Letters*, *1*(1), 015202. doi: 10.1121/10.0003050

13. \*^**Mertes, I. B.,** & Potocki, M. E. (2022). Contralateral noise effects on otoacoustic emissions and electrophysiologic responses in normal-hearing adults. *The Journal of the Acoustical Society of America*, *151*(3), 2255–2267. doi: 10.1121/10.0009910

14. **\*^Mertes, I. B.**, & Stutz, A. L. (in press). Lack of correlation between medial olivocochlear reflex strength and sentence recognition in noise. *International Journal of Audiology*. doi: 10.1080/14992027.2022.2033857

15. \*^Tai, Y., **Mertes, I. B.**, Chappell, J., Jeon, C. B., & Husain, F. T. (in press). Comparison of otoacoustic emissions in tinnitus and hyperacusis in adults with normal hearing sensitivity. *International Journal of Audiology*. doi: 10.1080/14992027.2022.2052980

G. Creative Works (Exhibitions, Commissions, Competitions, Performances, Designs,

Art or Architecture Executed)

None

H. Patents

None

I. Bulletins, Reports, or Conference Proceedings (in print or accepted)

1. \*Goodman, S. S., **Mertes, I. B.**, & Scheperle, R. S. (2011). Delays and growth rates of multiple TEOAE components. *AIP Conference Proceedings*, *1403*, 279–285. doi: 10.1063/1.3658098

J. Abstracts (in print or accepted)

None

K. Book Reviews (in print or accepted)

None

L. Refereed Conference Papers and Presentations

1. **Mertes, I. B.**, & Goodman, S. S. (2009, March). *Delays and growth rates of early and late click-evoked otoacoustic emission components.* Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

2. Goodman, S. S., **Mertes, I. B.**, Sheffield, S. W., Scheperle, R. A., & Koehlinger, K. M. (2010, March). *MOC suppression of extended high-frequency TEOAEs*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

3. **Mertes, I. B.**, & Goodman, S. S. (2011, March). *Influence of multiple TEOAE components on measurement of growth and delay*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ*.*

4. **Mertes, I. B.**, & Goodman, S. S. (2012, March). *Behavior of multiple TEOAE components in normal-hearing and hearing-impaired ears*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ*.*

5. Weissbeck, D. K., **Mertes, I. B.**, Lewis, J. D., Goodman, S. S., & Marler, J. (2012, March). *A bootstrapping approach to detect TEOAE suppression in individual subjects*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ*.*

6. #**Mertes, I. B.**, & Goodman, S. S. (2014, February). *Repeatability and stability of medial olivocochlear reflex effects on short- and long-latency transient-evoked otoacoustic emissions*. Poster presented at the Association for Research in Otolaryngology MidWinter Meeting, San Diego, CA.

7. Stanziola, R. W., **Mertes, I. B.**, Goodman, S. S., & Lewis, J. D. (2014, March). *Relationship between the medial olivocochlear reflex, attention, and hearing in noise*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

8. #**Mertes, I. B.** (2014, September). *Repeatability of medial olivocochlear efferent effects on transient-evoked otoacoustic emissions in normal-hearing adults*. Podium presentation at SoCal Hearing Conference, University of California San Diego, La Jolla, CA*.*

9. **Mertes, I. B.** (2015, August). *Assessing olivocochlear efferent effects using auditory steady-state responses*. Podium presentation at SoCal Hearing Conference, University of California Irvine, Irvine, CA.

10. **Mertes, I. B.**, Wilbanks, E. C., & Leek, M. R. (2015, February). *Pitch dominance within harmonic complexes in hearing-impaired listeners*. Poster presented at the Association for Research in Otolaryngology MidWinter Meeting, Baltimore, MD.

11. **Mertes, I. B.**, & Leek, M. R. (2016, February). *Comparison of ASSRs and TEOAEs for measuring MOC function in humans*. Poster presented at the Association for Research in Otolaryngology MidWinter Meeting, San Diego, CA.

12. **Mertes, I.**, Stagner, B., Wilbanks, E., & Leek, M. (2016, March). *Contralateral suppression of TEOAEs and ASSRs measured concurrently*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

13. **Mertes, I.**, Wilbanks, E., & Leek, M. (2017, March). *Are auditory training outcomes related to olivocochlear efferent function?* Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

14. ^**Mertes, I. B.**, Johnson, K. M., & Dinger, Z. A. (2018, February). *Human olivocochlear efferent activity elicited by dynamic versus static noise*. Poster presented at the Association for Research in Otolaryngology MidWinter Meeting, San Diego, CA.

15. ^Johnson, K., Dinger, Z., & **Mertes, I.** (2018, March). *Assessing olivocochlear efferent contributions to speech understanding in noise*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

16. ^Dinger, Z., & **Mertes, I.** (2019, March). *Wideband tympanometry: Contralateral acoustic reflexes and normative data*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

17. ^Johnson, K., & **Mertes, I.** (2019, March). *Examining involvement of olivocochlear efferents for frequency discrimination*. Poster presented at the American Auditory Society Scientific and Technology Meeting, Scottsdale, AZ.

18. ^Potocki, M. E., & **Mertes, I. B.** (2021, April). *Olivocochlear effects on otoacoustic emissions versus auditory steady-state responses*.Poster presented at AAA (American Academy of Audiology) 2021 Virtual, online conference.

M. Other

1. **Mertes, I. B.** (2017, April). *Assessing olivocochlear efferent activity using cochlear, neural, and perceptual measures*. Invited speaker at Seminars in Hearing Research at Purdue, Department of Speech, Language, & Hearing Sciences, Purdue University, West Lafayette, IN.
2. **Resident Instruction**

A. Summary of Instruction

1. Descriptive Data

Table

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2. Supervision of Graduate Student Research

*Ph.D. Students: Committee Member*

1. Tai, Yihsin, 2019-2020, “Investigating the relationship between cognitive control and speech-in-noise recognition in tinnitus from perceptual, neuroanatomical, and electrophysiological aspects,” current status: Assistant Professor of Audiology, Department of Speech Pathology and Audiology, Ball State University, Muncie, IN.
2. Shende, Shraddha, 2021-present, “Cognitive control in age-related hearing loss,” current status: doctoral candidate.

*Doctor of Audiology Students: Committee Chair*

1. Dinger, Zoë, 2017-2020, “Measurement of the acoustic reflex using wideband tympanometry,” current status: audiologist.
2. Johnson, Kristin, 2017-2020, “Examining involvement of olivocochlear efferents for frequency discrimination,” current status: audiologist.
3. Marquess, Ali, 2018-present, “Use of otoacoustic emissions by U.S. audiologists: A survey study.”
4. Potocki, Morgan, 2018-2021, “Effects of contralateral noise on transient-evoked otoacoustic emissions and auditory steady-state responses,” current status: audiology extern.
5. Stutz, Abigail, 2018-2021, “The associations of the medial olivocochlear reflex with realistic speech-in-noise performance,” current status: audiology extern.
6. Auriemma, Celine, 2020-present, “Effect of time-windowing on transient-evoked otoacoustic emission amplitude,” current status: passed preliminary examination.
7. Haynes, Carly, 2020-present, “Early detection of ototoxicity in pediatric oncology patients: DPOAEs vs. pure tone audiometry,” current status: passed preliminary examination.
8. Crawford, Thomas, 2021-present, “Auditory reflexes in listeners with normal hearing,” current status: project development.

*Doctor of Audiology Students: Committee Member*

1. Prachar, Nora, 2016-2017, “Current tinnitus counseling practices among audiologists in the United States: A survey study for audiologists,” current status: audiologist.
2. Lee, Daniel, 2016-2017, “The effects of a broadly shaped contralateral masker in bilateral cochlear implant users,” current status: graduate student in dentistry.
3. Coobs, Katherine, 2018, “Comparison of treatment methodology for idiopathic sudden sensorineural hearing loss,” current status: audiologist.
4. Arns, Andrea, 2018-2019, “The relationship between peripheral hearing loss and cognitive decline: A literature review,” current status: audiologist.
5. Brownlee, Ariel, 2018-2019, “Current internet resources used for self-education and self-management by adults with tinnitus in the United States: A survey study,” current status: audiologist.
6. Kadakia, Kruti, 2018-2019, “Use of high frequency audiometry for young-adults” current status: audiologist.
7. Jeon, Carolyn, 2018-2019, “The effect of tinnitus and hyperacusis on distortion product otoacoustic emissions in individuals with normal hearing,” current status: audiologist.
8. Buenting, Emily, 2019, “Level specific chirp effect on the auditory brainstem response,” current status: audiologist.
9. Eschmann, Victoria, 2020, “Electrode array and stimulus effect on the auditory brainstem response,” current status: audiologist.
10. Wagman, Malorie, 2020, “Effect of electrode montage on the binaural interaction component (BIC) elicited by level specific (LS) chirps,” current status: audiologist.
11. Dang, Monique, 2021, “Investigation of tinnitus self-reported questionnaires: associations, sub-scales, and clinical utility from a large-scale research database,” current status: audiology extern.
12. Legare, Carolyn, 2021, “Evaluation of the Lombard effect on disturbance and vocal effort using A-weighted (dBA) and unweighted (dB) noise levels,” current status: audiologist.
13. Arenz, Taylor, 2021-present, “Auditory brainstem response result analysis in 3-month-old infants: Lateral asymmetry in tone burst responses,” current status: passed preliminary examination.
14. Brennan, Caroline, 2021-present, “Misophonia prevalence and co-morbidities in a collegiate population,” current status: passed preliminary examination.
15. Shireman, Peter, 2022-present, “Hearing aids and dementia prevention: The audiologist’s role,” current status: passed preliminary examination.
16. Lindberg, Ragnar, 2022-present, “Effects of electrode montage on the LS-chirp 40’s auditory brainstem response,” current status: passed preliminary examination.

3. Supervision of Undergraduate Students

*Research Supervisor*

1. Kogan, Sandra, data collection for speech-in-noise study, Fall 2019.
2. Musur, Elizabeth, data collection for speech-in-noise study, Fall 2019-Spring 2020.
3. Van Zant, Gabrielle, data collection for speech-in-noise study, Fall 2019.
4. Bastys, Ariana, data collection for speech-in-noise study, Spring 2020-Fall 2020.
5. Lanier, Margo, data collection for speech-in-noise study, Spring 2020-Fall 2020.
6. Raden, Natalie, data collection for speech-in-noise study, Spring 2020-Fall 2020.
7. Griffith, Lydia, data collection for speech-in-noise study, Spring 2020-Fall 2020.
8. Osborn, Kirsten, guided readings and data collection for auditory physiology study, Spring 2022-present.

4. Other Contributions to Instructional Programs

*Course and Curriculum Development*

1. Developed and taught seminar SHS 588 Advanced Seminar in Neural Bases of Communication Disorders (Peripheral Auditory Assessment), Spring 2017.
2. Developed and taught seminar SHS 593 Special Problems (Otoacoustic Emissions), Fall 2017.
3. Contributed to revision of Doctor of Audiology (Au.D.) course sequence, Spring 2017.
4. Led breakout session on small class teaching, SHS Faculty Retreat, Spring 2021.

*Presentations and Guest Lectures*

1. Presenter, *Contralateral suppression of cochlear and neural responses in humans,* SHS 592 Proseminar in Speech and Hearing Science, Fall 2016.
2. Presenter, *Auditory efferent contributions to speech recognition in noise,* SHS 592 Proseminar in Speech and Hearing Science, Spring 2019.
3. Panel member, SHS 191X Freshman Seminar, Spring 2019, Spring 2022.
4. Guest lecturer, *Hearing science,* SHS 170 Introduction to Human Communication Systems and Disorders, Spring 2019, Fall 2019.
5. Guest lecturer, *The efferent system*, SHS 541 Clinical Auditory Anatomy and Physiology,Fa 19-21.

*Independent Study*

1. Tai, Yihsin, Ph.D. student, SHS 557 Advanced Clinical Practicum in Audiological Assessment and (Re)Habilitation, Spring 2017.
2. Lanier, Margo, Undergraduate student, SHS 390 Individual Study, Fall 2020.
3. Raden, Natalie, Undergraduate student, SHS 390 Individual Study, Fall 2020.
4. Kim, Gibbeum, Ph.D. student, SHS 593 Special Problems, Spring 2021.

*James Scholar Projects*

1. SHS 450 Intro Audiol & Hear Disorders, 3 contracts, Fall 2018.
2. SHS 450 Intro Audiol & Hear Disorders, 5 contracts, Fall 2019.
3. SHS 450 Intro Audiol & Hear Disorders, 2 contracts, Fall 2020.
4. SHS 450 Intro Audiol & Hear Disorders, 6 contracts, Fall 2021.

*Other*

1. Invited participant, Illinois Online Teaching Academy, Summer 2020.
2. Invited participant, Illinois Summer Teaching Institute, Summer 2021.

B. Evaluation of Instruction

1. Student ICES Course Evaluation Results

Table

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\* No ICES evaluations available for SHS 551 Spring 2019 and SHS 554 Spring 2020 due to fewer than 5 students enrolled.

*List of Teachers Ranked as Excellent by Their Students*

SHS 450 Introduction to Audiology and Hearing Disorders, Fa118 – Fa21

SHS 551 Electrophysiological Indices of Audition, Sp18, Sp21

SHS 554 Advanced Audiological Assessment, Fa16, Sp16, Sp21

SHS 588 Advanced Seminar in Neural Bases of Communication (Peripheral

Auditory Assessment), Sp17

SHS 593 Special Problems (Otoacoustic Emissions), Fa17

C. Candidate’s Teaching Activities Report and Self-Review

*Teaching Philosophy*

My teaching focuses on both understanding underlying concepts and how to successfully apply those concepts to real-world situations. The students I teach in the Department of Speech and Hearing Science typically seek careers as clinicians and scientists. Students must be well-versed in fundamental concepts that will prepare them to adapt to an ever-changing professional and technological landscape. I strive for students to see that the field of communication sciences and disorders relies on an interrelationship between research and clinical practice. Finally, my teaching emphasizes the importance of understanding the “why” in addition to the “how” (e.g., why a procedure is performed, in addition to having the skills to successfully perform it). My ultimate goal is for my students to become independent, confident, and knowledgeable practitioners and scientists who improve human communication.

*Classroom Teaching*

I have contributed to three of the four programs in the Department of Speech and Hearing Science (undergraduate, Au.D., and Ph.D.). At the undergraduate level, I teach *SHS 450 Introduction to Audiology and Hearing Disorders*, a required course in the SHS major. This course examines clinical assessment and treatment of auditory disorders and includes a laboratory section. I have been on the List of Teachers Ranked as Excellent each semester I have taught this course. Additionally, several students have told me at the end of each semester that that they decided to pursue a career in audiology because of the course, which brings me great personal satisfaction.

My teaching also involves two courses in the Au.D. program. *SHS 551 Electrophysiological Indices of Audition* and *SHS 554 Advanced Audiological Assessment* focus on objective assessments of auditory function and are required for 2nd and 3rd year Au.D. students, respectively. Both courses involve lectures and laboratory components. I have been on the List of Teachers Ranked as Excellent for both courses. Alumni have also told me that the knowledge and skills they gained from my courses have been useful in their later clinical experiences. I had the opportunity to develop two seminar courses, *SHS 588 Advanced Seminar in Neural Bases of Communication Disorders (Peripheral Auditory Assessment)* in Spring 2017 and *SHS 593 Special Problems (Otoacoustic Emissions*) in Fall 2018. These seminars focused on my research expertise in inner ear assessments, and I was ranked as excellent for both.

Finally, I have taught Ph.D. students in *SHS 592 Proseminar in Speech and Hearing* in Spring 2018. The biweekly departmental seminar had a discussion section for Ph.D. students. I focused on preparing for careers in academia. Students found an academic job posting that was related to their interests, drafted the major components of an academic job application, and received feedback. Students found this to be a valuable experience, and one former student who obtained a tenure-track faculty position told me the assignment was very helpful for preparing for the application process.

*Teaching Methods*

I aspire to create an interactive classroom in all of my courses. Student participation is a key component. In addition to learning through lectures and reading, students learn by performing procedures and learn from each other. Participation requires communication, so I encourage this because students are training to be specialists in human communication and its disorders. In my Au.D. courses, students have at least one year of clinical experience by the time they take my courses. This allows me to engage in a dialogue with them about their clinical experiences and how they can relate it to the course topics. In *SHS 450 Introduction to Audiology and Hearing Disorders*, I give students opportunities to participate by presenting questions and allowing them to consult with their neighbors before answering via iClicker. When the course was transitioned to a remote format, I utilized a variety of question formats through Zoom polls and Google Forms.

Another critical component of my teaching is providing hands-on experience. For *SHS 450 Introduction to Audiology and Hearing Disorders*, I provide students with laboratory experiences that will be practically useful in their careers as speech-language pathologists and audiologists. Examples include taking a patient case history, conducting a hearing screening using an audiometer, and conducting a listening check of hearing aids to ensure proper function. When the course was moved to a remote format, I was able to adapt many of these experiences in ways that required creativity and problem solving. For example, students were no longer able to physically use audiometers to practice hearing screenings. To provide them with a virtual experience, I created a PowerPoint-based audiometer with functional buttons that allowed students to present sounds to their partner and practice screening hearing via Zoom breakout rooms.

For my Au.D. courses, students apply the fundamentals of auditory anatomy, physiology, and clinical decision making to performing procedures on each other as they would on a patient. This includes setting up the equipment, properly conducting the testing, analyzing the results, and reporting them as they would in a clinical report. These experiences are practically useful because as future audiologists, they will be required to properly conduct and interpret the assessments.

In the classroom, I use a number of methods to promote student engagement and accommodate different learning styles. I utilize slides with minimal text and large images. Lecturing is broken up using discussion, poll questions, and videos. I am also a proponent of providing students with a variety of perspectives. In addition to my own knowledge and professional opinions, students are exposed to the viewpoints of textbook authors, journal article authors, and webinar presenters. I also incorporate guest speakers, allowing students to learn from professionals who bring a wealth of clinical expertise. Examples include clinical audiologists in the community and a speech-language pathologist who works with children who are deaf and hard of hearing.

I assess students in multiple ways to ensure that they are given a fair chance at demonstrating their mastery of the course content. Quizzes and written assignments are used as low-stakes evaluations. I also inform them that the assignments allow them to regularly gauge their understanding of the course material. Laboratory assignments involve analyzing and interpreting the results and also allow students to apply their knowledge (e.g., if given a certain result, determine the likely diagnoses). Most of my courses include several exams. Review sessions provide students with sample questions to reduce test anxiety. My assessments also serve as teaching tools. In my graduate seminars, students select a journal article related to the course topic, write a critical summary, and present their article to the class. These activities allow students to teach and learn from each other, while also giving them valuable experience reading scientific literature critically.

*Mentorship*

I have also contributed to the Department of Speech and Hearing Science through mentorship and advising. I have served as a member on Ph.D. dissertation committees as well as a chair and member of Au.D. capstone committees. I have led independent studies for Ph.D. and undergraduate students. Finally, I have been the faculty mentor for James Scholar projects each semester I have taught *SHS 450 Introduction to Audiology and Hearing Disorders*.

I have also provided mentorship in my laboratory since beginning my position. I am eager to provide students with a research experience that is mutually beneficial. I have trained multiple Au.D. and undergraduate students in the responsible conduct of research, informed consent, data collection protocols, and data analysis. Two of my former Au.D. students completed capstone projects in my laboratory. They were awarded prestigious mentored travel awards from the National Institutes of Health to present their preliminary results at the *Meeting of the American Auditory Society*. One student recently published her capstone project as a co-author in a peer-reviewed journal (Mertes & Johnson, 2020). Additionally, both students were co-authors on an article for another lab project (Mertes et al., 2019).

My undergraduate students performed data collection that resulted in another recent publication (Mertes, 2021). Another recent mentorship success was an Au.D. student who was selected for a T35 Summer Research Traineeship at Vanderbilt University sponsored by the National Institutes of Health, where she will pursue a mentored research project in the area of hearing aids. I am actively recruiting a Ph.D. student for Fall 2021, and I look forward to continuing to mentor undergraduate and graduate students.

*Self-Review*

I take great pride in being recognized for my teaching excellence. As a clinician, I feel that I connect well with students because I can incorporate my clinical experiences and anecdotes into my teaching. I use ICES feedback and departmental peer evaluations to improve my teaching each semester. For example, after my first semester teaching *SHS 450 Introduction to Audiology and Hearing Disorders*, a number of students expressed dissatisfaction with the laboratory section due to limited hands-on experience. The following year, I significantly revised the laboratories to include more activities and the subsequent ICES feedback was very positive. I have also taken advantage of campus resources to improve my teaching, including workshops and consults with the Center for Innovation in Teaching and Learning and participating in the Illinois Online Teaching Academy in Summer 2020. An area of improvement is to better incorporate research activities into my undergraduate course *SHS 450*. Audiology assessment and intervention is rooted in research, but I will strive to better demonstrate how research informs clinical practice and vice versa. Additionally, in all my courses I will strive to include more authentic assessments that will be practically useful in students’ careers. An example is to have graduate students incorporate the procedures they learn in my class into a full hearing evaluation they perform on a partner so they can see how the specific procedures they are learning about fit into the larger picture of hearing assessment. Such activities will provide students opportunities to explore, practice, and learn from mistakes over the course of the semester.

3. Departmental Evaluation of Teaching and Course Documentation *Please provide the name of the person(s) who developed the evaluation.*

(Author of evaluation: )

1. **Service (Public, Professional/Disciplinary, and University)**

A. Summary of Service

1. Public Engagement

2008-2013 Volunteer, Special Olympics Healthy Hearing

2018 Presenter, *A brief introduction to audiology*, Illini Summer Academy

2. Service to Disciplinary and Professional Societies or Associations

a. Review Editor

2017- *Frontiers in Auditory Cognitive Neuroscience*

b. Ad-hoc Journal Reviewer

*Journal of the Association for Research in Otolaryngology*

*Ear and Hearing*

*The Journal of the Acoustical Society of America*

*Journal of Speech, Language, and Hearing Research*

*Journal of the American Academy of Audiology*

*Journal of Hearing Science*

*International Journal of Audiology*

c. Other Service to the Field

2017 Reviewer, Graduate Student Scholarships, American Speech-Language-Hearing Foundation

2018 Program committee member, Scientific and Technology Conference of the American Auditory Society

d. Professional Society Memberships

2009- American Auditory Society

2015- American Speech-Language-Hearing Association

2015-2019 Association for Research in Otolaryngology

2020- Acoustical Society of America

3. University/Campus Service

a. Campus

2017 Ad hoc reviewer, Research Support Award, Campus Research Board

2017 Invited participant, The Next 150 campus strategic planning meeting

b. College of Applied Health Sciences

2020-2021 Member, Elections and Credentials Committee

2021-2022 Chair, Elections and Credentials Committee

c. Department of Speech and Hearing Science

2016- Faculty mentor for undergraduate students

2016-2017, Member, Awards Committee

2018-2021

2016-2017 Member, Search Committee for Open-Rank Faculty Positions in Speech Science and in Hearing Science

2017-2018 Member, Search Committee for Clinical Assistant Professor of Audiology and of Speech-Language Pathology

2017-2018, Member, Program Policy Committee

2020-2021

2017-2018, Member, Faculty Advisory Committee

2021-

2018 Ad hoc member, Graduate Admissions Committee

2018 Panel member, National Student Speech-Language-Hearing Association graduate school information night

2018-2020 Member, Education Policy Committee

2018-2020 Chapter adviser, National Student Speech-Language-Hearing Association

2021-2022 Member, Search Committee for Specialized Faculty of Audiology and Clinical Assistant Professor in Audiology

B. Evaluation of Service *Please provide the name of the person(s) who developed the evaluation.*

(Author of evaluation: )

1. Public Engagement

2. Service to Disciplinary and Professional Societies or Associations

3. University/Campus Service

1. **Research**

A. Candidate’s Statement of Research Goals and Accomplishments

*Overview of Research Program*

The World Health Organization estimates that 466 million individuals worldwide have hearing loss, and this number is expected to nearly double by the year 2050. The most common report of individuals with hearing loss is difficulty hearing others in the presence of background noise. Untreated hearing loss is associated with depression, social isolation, decreased workplace productivity, and possibly dementia. Treatments such as hearing aids provide, at most, only moderate satisfaction with listening in noise. Additionally, standard diagnostic procedures in the audiology clinic primarily focus on hearing ability in quiet environments. Therefore, timely diagnosis and effective treatment of hearing-in-noise difficulties are crucial public health goals.

The **long-term objectives** of my research program are to understand the anatomic and physiologic underpinnings of hearing in noise abilities and to develop clinically-relevant assessments to characterize difficulties in these abilities. My current work focuses on how the brain controls the inner ear (**auditory efferent system**) and how this top-down control contributes to hearing in background noise. Sound reaching the ear travels from the inner ear up to the brain, resulting in the perception of sound. At the same time, when sounds of interest are degraded by background noise, the normally-functioning auditory system allows the brain to modify input from the inner ear to fine-tune the sound of interest reaching the brain, functioning as a noise reduction system. The **theoretical framework** underlying my research is that the auditory efferent system contributes to successful hearing in background noise and that difficulties hearing in background noise can be explained in part by dysfunction of this system. This framework is based on decades of physiologic studies in animals demonstrating that auditory efferent activation enhances encoding of sounds in the presence of background noise. An additional aim of my research is to optimize non-invasive measurements of the auditory efferent system in humans to develop clinically-feasible assessment tools.

*Research Progress: Insights into Normal Functioning of the Auditory Efferent System*

Since starting at UIUC, my work has focused on young adults with no hearing issues to better understand the normally-functioning auditory efferent system. I utilize non-invasive physiologic measurements of how the brain controls inner ear function and I correlate these measurements with perceptual assessments of how individuals understand speech in background noise. This approach combines my clinical and research training as a doctoral student with my postdoctoral research training in ways that are distinct from my mentors.

My first study at UIUC investigated how the auditory efferent system reacts to noises that resemble multiple people talking simultaneously, which is a common noise source in daily life. Results demonstrated that the auditory efferent system is activated by this noise and the effects are robust. This suggests that the noise created by multiple people talking in the background will cause the auditory efferent system to fine-tune the response to other sounds of interest which may be beneficial when listening in background noise. This work was funded by grants from the American Speech-Language-Hearing Foundation and the Campus Research Board. I presented preliminary results at the *MidWinter Meeting of the Association for Research in Otolaryngology*. I then published the results in the journal *Hearing Research* (Mertes, 2018).

My next study examined the association between physiologic measures of the auditory efferent system with perception of speech presented in a range of background noise levels. My postdoctoral work (Mertes et al., 2018) suggested that this relationship is complex and may not be apparent when presenting speech in the presence of only one noise intensity. I expanded upon this postdoctoral work to include a wider range of noise intensities. Results revealed that performance could be predicted by the amount of auditory efferent activity, but only when the change in performance across intensity levels was characterized. These results may explain the discrepant findings of previous work which only investigated performance at a single background noise intensity. Furthermore, the results support the hypothesis that hearing in background noise is driven in part by the auditory efferent system. This work was supported by grants from the American Speech-Language-Hearing Foundation and the Campus Research Board. Two of my Au.D. students were involved in this project. One student presented the results at the *Meeting of the American Auditory Society* in 2019 and received a mentored travel award from the National Institutes of Health. These students also served as co-authors on the manuscript that was published in *The Journal of the Acoustical Society of America* (Mertes et al., 2019).

The results of this work raised questions regarding the specific components of the speech signal that are made more understandable when the auditory efferent system is activated. The acoustics of speech are complex and involve changes in frequencies and intensities over time. Motivated by animal work showing an involvement of the auditory efferent system in perception of vowels, I led a study that examined the relationship between auditory efferent activity and vowel perception in young adult listeners. This study served as the basis of an Au.D. student’s capstone project. This student again presented at the *Meeting of the American Auditory Society* and received a second mentored travel award from the National Institutes of Health. The work was recently published in *Hearing, Balance and Communication* (Mertes & Johnson, 2020). Future work will examine associations between auditory efferent activity and other components of the speech signal (e.g., changes in intensity over time) to better understand the specific functional benefits that the auditory efferent system confers.

*Research Progress: Methodologic Improvements to Auditory Efferent System Assessments*

The function of the auditory efferent system can be investigated non-invasively through responses called **otoacoustic emissions**, which are low-intensity sounds created by the inner ear that can be measured with a sensitive microphone placed in the ear. The presence of otoacoustic emissions indicates a functioning inner ear. The effects of the auditory system can be ascertained by stimulating it with noise and observing the change in the intensity of otoacoustic emissions, where larger changes indicate stronger auditory efferent function. One confound to this measurement paradigm is that the noise can also activate a reflex that contracts a middle ear muscle that also results in a change in otoacoustic emission intensity. If this middle ear reflex is activated, it becomes difficult to determine the extent to which the auditory efferent system contributed to the measurement. I have described statistical methods for detecting when this middle ear reflex is activated during the measurement, which is important for proper interpretation of the results and can be used to select stimulus parameters that do not invoke the middle ear reflex. The work was funded by the Campus Research Board and was recently published in *International Journal of Audiology* (Mertes, 2020a).

The changes in otoacoustic emissions intensity due to the auditory efferent system can vary in magnitude across individuals. Small changes can be difficult to detect and may limit the clinical utility of such measurements. Recently, I reported that the magnitude of the effect is significantly larger for otoacoustic emissions that persist later in time relative to those that occur earlier in time. Importantly, these later-occurring components are excluded from standard measurements of otoacoustic emissions. The results suggest that inclusion of these later components may improve the sensitivity of measurements of the auditory efferent system, which bodes well for clinical feasibility. This research was supported by the Campus Research Board at UIUC and was published in *The Journal of the Acoustical Society of America – Express Letters* (Mertes, 2020b).

Most recently, I have established the test-retest reliability of a common speech-in-noise task used in a number of studies, including my own work on the auditory efferent system. For this study, my undergraduate lab members collected repeated-measures data in young adults with normal hearing. Contrary to expectation, the results demonstrated only moderate test-retest reliability for this task. This suggests that only large changes in performance can be considered true changes (e.g., due to activation of the auditory efferent system). This work was published in *JASA Express Letters* (Mertes, 2021). The results will guide my future work when selecting perception tasks that are sensitive to changes in performance due to auditory efferent activity.

*Ongoing Work and Future Directions*

Over the course of the next three years, I will continue progress on my long-term objectives of characterizing mechanisms of hearing in noise and developing clinical assessments for hearing in noise. In January 2021, I received a second Campus Research Board grant to examine the contributions of auditory efferent activity and middle ear reflex activity to hearing in noise. This work will build upon my recent publications (e.g., Mertes et al., 2019; Mertes, 2020a, 2020b, Mertes, 2021). The middle ear reflex will be measured using distinct methodology. I will investigate how the two systems work in tandem to contribute to perception of sounds in background noise.

This grant also has an aim to assess auditory efferent function in adults with slight and mild hearing loss, which will require an exploration of measurement parameters to detect small changes in otoacoustic emission intensity in this population. This aim represents a further step toward moving my work in a clinically-oriented direction. To recruit participants with hearing loss, I will establish connections with the Department of Speech and Hearing Science’s Audiology Clinic as well as local otolaryngology departments.

Ongoing work also utilizes electrophysiologic methods to assess the auditory efferent system. These methods allow for examining the effect of auditory efferent activity further up the auditory pathway compared to otoacoustic emissions. This research expands upon my postdoctoral work (Mertes & Leek, 2016), with the goal of more fully characterizing the effects of auditory efferent function on the auditory system. Preliminary results will be presented at the American Academy of Audiology 2021 meeting. This project will also produce pilot data for a grant application (Early Career Research R21) to be submitted to the National Institute on Deafness and Other Communication Disorders in June 2021 to support my research for three years. I will also pursue foundation funding for this work. The proposed research will assess auditory efferent activity at multiple levels of the auditory system and investigate the relationship between this activity and performance on hearing perception tasks. Within these studies, methodologic parameters will also be investigated to optimize the measurements to detect and characterize auditory efferent activity. Over the course of my career, I aspire to improve the accuracy and timeliness of the diagnosis of hearing loss and further our understanding of the mechanisms of hearing, with the ultimate goal of improving the quality of life for the millions of individuals with hearing loss.

B. Departmental Evaluation of Research Accomplishments *(with emphasis on one or two publications or creative works)* *Please provide the name of the person(s) who developed the evaluation.*

(Author of evaluation: )

C. Departmental Evaluation of Future Potential *Please provide the name of the person(s) who developed the evaluation.*

(Author of evaluation: )

1. **External Evaluations**

***NOTE: Please start this section on a new page.***

A. Sample Letter(s) to External Evaluators *Include a copy of the letter (or letters, if different versions) used to solicit the outside evaluations.*

B. Qualifications of the External Evaluators *Include a listing of the names, addresses, and affiliations of all scholars or professional specialists outside the University of Illinois from whom you have solicited letters of evaluation.*

1. External Letters
2. **Special Comments by the Executive Officer**

***NOTE: Please start this section on a new page.***

Executive Officer Name (please type):

1. **Special Comments by the Dean** *(Only when needed)*

***NOTE: Please start this section on a new page.***

Dean Name (please type):